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R. A. F. N A R R A T I V E

THE WEST AFRICAN REINFORCEMENT ROUTE.

AIR HISTORICAL BRANCH (1)

AIR MINISTRY.

THE WEST AFRICAN REINFORCEMENT ROUTE

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CHRONOLOGY OF PRINCIPAL EVENTS

1940

10 June	Italy declared War
20 June	Air Ministry decided to inaugurate West African Reinforcement Route
4 July	Embarkation of R.A.F. Advanced Party
14 July	Arrival of R.A.F. Advanced Party at Takoradi
16 - 17 July	Survey of Reinforcement Route by the A.O.C. Sudan
23 July	Conference at Takoradi of O.C. and Officers of R.A.F. Advanced Party
21 August	Arrival of R.A.F. Main Party at Takoradi
25 August	Reinforcement Route Staging posts manned by R.A.F. Maintenance Parties
5 September	Arrival of first consignment of crated Aircraft (Hurricanes and Blenheims) at Takoradi
13 September	Test of First Erected Hurricane
17 September	Test of First Erected Blenheim
18 September	Despatch of first convoy of Erected Aircraft from Takoradi to the Middle East
25 October	Arrival of first Glen Martins and Fulmars at Takoradi
29 October	Arrival of Fleet Air Arm Officers and ratings (for ferrying Fulmars) at Takoradi
1 November	Arrival of "Topic Force" personnel (Free French) at Takoradi <u>en route</u> to Fort Lamy
27 November	Arrival of H.M.S. "Furious" at Takoradi
29 Nov. - 3 Dec.	Operation "Stripe".
2 December	Air Marshal Tedder (Deputy A.O.C.-in-C.) inspected Takoradi
12 December	Test of first erected Glen Martin
17 December	Arrival of first Mohawks at Takoradi
27 December	Crash during test of first erected Mohawk, and death of the O.i/c Flying, Takoradi

1941

8-11 January	Operation "Monsoon" (H.M.S. "Furious")
January	Formation of War Flight-Takoradi
8 February	Arrival of first aircraft from U.S.A. (100 Tomahawks and 20 Glen Martins) at Takoradi

21 February	Start of tropical trials of Tomahawks
6 March	Revised Station Routine at Takoradi consequent upon call for maximum output of aircraft
20--22 March	Operation "Pageant" (H.M.S. "Furious")
22 March	Group-Captain Lydford (D.D.O.2. Air Ministry) inspected Takoradi and inaugurated "Leapfrog" scheme for convoys
May	Cessation of aircraft <u>ex-</u> U.S.A. to Takoradi
June	Formation of G.R. & Anti-Raider and Defence Flights at Takoradi
June	Appointment of Air Reinforcement Controller, Middle East
July	Inauguration of Observer posts in the Gold Coast
20 July	Formation of R.A.F. Ferry Command
12 August	Agreements with Pan-American Airways and its sub- sidiary companies
23 September	Arrival of Personnel of R.A.F. West African Command at Freetown
September	Opening of R.A.F. Alternative Reinforcement Route
28 October	Arrival of American Stores and Personnel at Lagos
28-30 December	Operation "Cross"
<u>1942</u>	
3-8 January	Operation "Churn"
February	First Supply of Aircraft flown from U.S.A. to West Africa
May	Formation of No.216 (Ferry) Group
June	Record Erection and Despatch of Aircraft, Takoradi
September	Middle East Establishments Sub-Committee Visited Takoradi
October	Formation of No.298 Wing
October	Further Record Erection and Despatch of Aircraft, Takoradi
December	Re-formation of No.216 (Transport and Ferry) Group
December	Inauguration of South Atlantic Route
<u>1943</u>	
February	Formation of R.A.F. Transport Command
March	Closing of Fighter Defence Flight, Takoradi

April	Arrival of No.26 Squadron S.A.A.F. at Takoradi
June	Formation of No.114 Wing
July	Arrival of First Transit Aircraft from the U.S.
30 July	Erection of 5,000th Aircraft at Takoradi
October	Cessation of Erection of Aircraft at Takoradi

I. INTRODUCTION

It has been said by a recent writer that "success in air warfare depends upon the presence of efficient aircraft in sufficient numbers"¹ This is an axiom, and its implication of successful reinforcement became of vital importance to the Royal Air Force of the Middle East Command when Italy entered the Second World War in June 1940.

The Royal Air Force in the Middle East comprised the following areas within its command:-

A-C-M
Longmore's
Despatch
13 May '40
31 Dec. '40
(A.H.B.:II
J1/7/1)

Egypt, the Sudan, Palestine and Trans-Jordan, East Africa, Aden, British Somaliland, 'Iraq and adjacent territories, Cyprus, the Mediterranean Sea, the Red Sea and the Persian Gulf,

and, according to the instructions sent to the Air Officer Commanding-in-Chief, Air Chief Marshal Sir A.M. Longmore, there was "the possibility of air forces from the Middle East Command being employed in the execution of such other plans as might be approved by the Chiefs of Staff from time to time".

Until June 1940 reinforcing fighter and medium bomber aircraft for the Middle East could be flown from Great Britain via French North Africa and Malta, but Italy's participation in the War and the collapse of France precluded the further use of this route except for long-range bomber aircraft which could reach Malta without having to refuel en route in French North Africa.

The Italian Air Force operated in comparatively close proximity to its own country which was able to send reinforcing aircraft to the Middle East theatres of war from its Continental production

1. P. Guedalla "Middle East, 1940-42 - A Study in Air Power".

production bases, by flying them to Libya and thence to Eritrea and Abyssinia. On the other hand the Royal Air Force of the Middle East Command was based on Egypt -- a distance of some 2,000 miles from its lines of production in Great Britain.

A-C
Thorold's
Report on
R.A.F.
Station,
Takoradi
and the
W.A.A.R.
July '40
Sept. '41

When Italy entered the war two factors became

evident:-

- (1) That the wastage of aircraft in the Middle East would at once increase owing to operations against Italy on the Egyptian-Libyan frontier, and in East Africa, and
- (2) That the Mediterranean Supply line for reinforcement aircraft to the Middle East would be jeopardised.

It was therefore necessary to provide a Supply line which would be capable of supplying aircraft at a rate comparable to the accelerated wastage.

Ibid

There were three main alternative methods of supplying aircraft for the Middle East, namely:-

- (1) The shipping of crated aircraft round the Cape of Good Hope to a Red Sea port for assembly at a base in Egypt.
- (2) The delivery of aircraft by air over the Mediterranean via Gibraltar and Malta.
- (3) The shipping of crated aircraft by a combined sea and air route.

File D.
Ops.
(Overseas
Part I
(AHB.IIJ/
15/1)

A-C
Thorold's
Report on
R.A.F.
Station
Takoradi
and the
W.A.A.R.
July 40 -
Sept.41.

The first of these methods was considered to be wasteful in shipping and would have locked up a large quantity of first-line aircraft during the long voyage to Egypt. Moreover, this route was liable to attacks by enemy submarines in the Red Sea and by bombers based in Eritrea.

The second method was liable to interruption

1. This route was in fact still used on several occasions in spite of the foregoing dangers and disadvantages.

by the Italians (particularly from the Italian air bases in Sicily and Sardinia), and it would be open to increasing enemy resistance. The third method was a compromise of the other two: its employment would occupy less than a third of the shipping space required by the first method, and it would be far more secure than for reinforcing aircraft to fly to Egypt via the Mediterranean.

Suggested Routes

File D.Ops.
(Overseas)
Part I
(A.H.B.II
J/15/1)

With regard to the third method the combined routes likely to be available were as follows:-

(1) To Casablanca by sea, thence to Egypt via Algeria and Malta.

(2) To Casablanca by sea, thence across the Sahara to Kano (Nigeria) and on to Khartoum.

(3) To Takoradi (Gold Coast) or Lagos (Nigeria) by sea, thence to Khartoum via Kano.

(4) To the Congo by sea, thence across the Congo to Khartoum.

(5) To the Cape by sea, thence by the Empire Air Route to Khartoum.

Of these routes (1) and (2) were considered unsuitable

for development as Casablanca might not be a very

safe port, and moreover, it would be much more difficult

to arrange for fuel supplies along those routes. On

the other hand the air journey of route (3) was mostly

over British territory and it had been frequently used

in the past. The sea passage of route (4) was longer

than that of route (3) and the facilities of route (4)

appeared to be no better than those of route (3).

Both the sea passage and the air journey of route (5)

/were

(5) were considerably longer than those of route (3) necessitating a longer turn of shipping and greater risk of injury to aircraft on the air journey. In view of all these circumstances it was decided (on 20th June 1940) that route (3) was the most suitable especially as the air part of this route had been in frequent use for some years.

As early as 1925 the strategic and commercial possibilities of this West African Reinforcement Route (as it was now to be known officially) had been partially surveyed when Squadron-Leader (now Air Marshal Sir Arthur) Coningham, made a survey flight from the Nile to Kano in Northern Nigeria. This survey was extended in 1930 by the first flight across Africa from Egypt to Bathurst (Gambia) and back via Khartoum led by Squadron-Leader (now Air Commodore) Howard-Williams.

Report on Progress of Civil Aviation 1930 and W.A. Campbell's Report on A Visit to W. Africa June-Oct. 1930. (Air Ministry's Library).

Meanwhile in the previous year (1929) the late Air Commodore (then Flight Lieutenant) O.R. Gayford had visited Takoradi on the Gold Coast and had examined a site for a landing-ground. This site, together with a proposed seaplane base, was visited in 1930 by Mr. W.A. Campbell of the Air Ministry during a tour which he made of Nigeria, the Gold Coast, Sierra Leone, and Gambia to ascertain the air requirements of these Colonies, and a recommendation that the proposed site of the landing-ground at Takoradi should be adopted was included in his Report of his tour.

During the next few years further survey work was carried out on the West African route by civil

Reports on Progress of Civil Aviation 1935/1936.

pilots assisted by the Public Works Departments of the British Colonies concerned. In 1935 Imperial Airways made arrangements for an air service from Khartoum to /Nigeria

Nigeria and the Gold Coast, and in 1936 landing grounds were established at Accra and Takoradi and a weekly service was inaugurated from Kano to Khartoum connecting the latter place with the England-South Africa Service. This service was extended

Air Ministry
Khartoum-
W. Africa
Civil
Transport
Service -
Cmd.
Papers
5403/1937
and 5770/
1938.

to Kaduna, Minna and Lagos (Nigeria), and an agreement was made between the Air Ministry and the Company to carry passengers and mails between Khartoum and Lagos, the route to be Khartoum - El Obeid - El Fasher - Geneina (Sudan) - Abesker - Fort Lamy (French Equatorial Africa) - Oshogbo - Lagos (Nigeria) - Accra - Takoradi (Gold Coast). Meanwhile in October 1937 Elders Colonial Airways (an associated Company of Imperial Airways) began a twice-weekly service from Accra to Lagos which connected Lagos with the weekly Khartoum - Lagos service operated by Imperial Airways.

Selection of Base for Reinforcement Route.

Having decided (on 20 June 1940) to utilise route (3) as the Reinforcement Route¹ the Air Ministry next considered whether Takoradi or Lagos should be the base. From information supplied by Flight Lieutenant F.G. Bowling (of the Air Ministry's Directorate of Organisation), who had made a tour of the West African Coast from Lagos to Bathurst in December 1937 - January 1938, it was decided (on 22 June) that Takoradi was the most suitable place. In Flight Lieutenant

A.M.S. 5137,
Part I.

1. See page 4 supra.
2. Situated at Apapa, approx. 5 miles from Lagos.

Bowling's opinion the existing aerodrome at Takoradi was one of the best in West Africa. It had a better surface¹ than the Lagos aerodrome and it was equipped with a reasonably sized hangar measuring 100 feet by 75 feet, whereas the hangar at the Lagos aerodrome was considerably smaller. At Lagos the climate is extremely humid and if aircraft had to be parked in the open this would probably have had a detrimental effect. At Accra - which has a similar climate to Takoradi - Imperial Airways and other aviation Companies used to leave their aircraft in the open (before a hangar was built) as the question of wear and tear through climatic conditions did not arise. Again, the distance of the aerodrome from Takoradi township was about three miles, whereas the aerodrome at Lagos was approximately five miles distant from Lagos town.

A.C. Thorold's Report on R.A.F. Station, Takoradi and the W.A.R.R. July '40 - Sept. 41

Moreover, the harbour at Takoradi could accommodate ships of considerable tonnage, and the draft and wharfside facilities existed on a scale unusual amongst

West African ports. By 1940 the port of Takoradi had been operating for some ten years during which time it had dealt with the export of several thousands of tons of manganese ore and general cargoes. Furthermore, it was ascertained that accommodation was more easily obtainable at Takoradi than at Lagos.

-
1. Situated at Apapa, approx. 5 miles from Lagos.

II. INAUGURATION OF THE WEST AFRICAN REINFORCEMENT ROUTE

The Air Ministry's preliminary investigations having been completed the next step was to send an Advanced Party of the Royal Air Force to examine Takoradi and to report generally on the practicability of the West African Reinforcement scheme. Accordingly, on 23 June (1940) the Colonial Office (at the request of the Air Ministry) cabled the Governor of the Gold Coast advising him that an R.A.F. station would be opened at Takoradi and requesting him to arrange for temporary accommodation for 50 officers, 83 N.C.O's and 486 airmen.

A.M.S. 62474

Proposed Organisation

Ibid

In the meantime the Air Ministry had drawn up a memorandum which outlined the proposed organisation as follows:-

Approximate number of aircraft per month required by the Middle East:-

Fighters	45
Medium Bombers	45
Single-engine Army Co-operation aircraft	20
Bomber transport	5 (these might be flown to Egypt direct)
Training and Communication aircraft	12

Establishment. The eventual Establishment of the R.A.F. Station at Takoradi was to consist of:-

An Aircraft Assembly Unit
A Communication Unit
A Port Detachment, and
A small Supply Depot.

Staging Posts. The staging posts on the route from Takoradi to Khartoum were to be as follows:-

Takoradi	-	Lagos
Lagos	-	Kano
Kano	-	Maiduguri
Maiduguri	-	Geneina
Geneina	-	El Fasher
El Fasher	-	Khartoum

Between Maiduguri and Geneina the route crossed French Equatorial Africa, in which territory landings were to be prohibited.

Defence of Takoradi and the Reinforcement Route

File D.Ops
(Overseas)
Part I
(AHB.IIJ/
15/1)

On 28 June, (1940) a conference of Army and Royal Air Force officers was held at the War Office. At this conference the question of the defence of Takoradi was discussed: the Chairman (Lieut. Colonel Gale) considered that owing to the recent events in France and the consequent uncertainty as to the future of the French Colonies, there was a definite possibility of Takoradi needing defence against air attack. In view of this it was recommended that four heavy and four light anti-aircraft guns would probably be required from the Army, assuming that the Royal Air Force provided its own Lewis guns.

A.M.
S.62474

On 11 July the Air Ministry requested the Army Council to confirm that they would provide for the necessary ground defences at Takoradi, Lagos, Kano and Maiduguri, with special reference to the latter place owing to its proximity to French Equatorial Africa. The War Office replied (on 26 July) that they could provide ground protection for these places; that they were investigating the question of anti-aircraft guns for Takoradi but that no anti-aircraft guns were available for the (West African) staging-posts. They also stated that General Headquarters, Middle East, was considering measures for the protection of Gencina and the other landing-grounds in the Sudan.

A.M.
S.5137
Part I

Meanwhile on 24 June a signal had been sent to the A.O.C.-in-C., Middle East, informing him of the proposed Reinforcement Route. In his reply (of 25 June) the A.O.C.-in-C. requested information as to the types of aircraft intended to be sent so that arrangements could be made for petrol stocks along the route which was a matter of "extreme difficulty owing to lack of communications and weather".

It was anticipated that the main types of aircraft to be shipped to Takoradi would be Blenheim IV's, Hurricanes and Lysanders, and in addition to these, ferry pilot aircraft - probably Bombays - would also be sent. With regard to the

/fuel

Ibid

fuel for aircraft, it was suggested that the Air Ministry should be responsible for fuelling arrangements from Takoradi to Maiduguri and that Middle East Command should be responsible for the remainder of the route from Geneina to Egypt. For this purpose it was suggested (from calculations made as to the consumption of the different types of aircraft to be flown over the route) that 575 tons of petrol and a proportionate supply of oil should be laid down at Lagos and that Middle East Command should hold 426 tons of petrol, these supplies to be allocated to Takoradi and the Staging-posts as the Officer in charge of the line of communication should direct.¹ In the meantime a suggestion had been made that Fort Lamy (near Lake Chad) might be used as a Staging-post between Kano and Geneina instead of Maiduguri -- if permission could be obtained from the French authorities --- and if this were done the fuelling supply of Fort Lamy was to be the responsibility of the Air Ministry.

R.A.F. Advanced Party, Takoradi

At the end of June the constitution of the R.A.F. Advanced Party for Takoradi was completed as follows:-

Officer Commanding	Group-Captain H.K. Thorold, D.S.C., D.F.C., A.F.C.,
Officer i/c Flying	Sqn/Ldr. A.W. Sweeney.
Technical Officer	Sqn/Ldr. W.F. Beckwith
Equipment Officer	Sqn/Ldr. F.G. Lee
Signals Officer	A/Sqn/Ldr. J. Sheppard Smith
Embarkation Officer	A/Sqn/Ldr. W. E. Hole.
Administrative Officer	A/Sqn/Ldr. C.A.A. Hiatt
Senior Medical Officer	F/Lt. F.H. King.
Commissariat Officer	F/Lt. W.H. Crowe.

and 15 other ranks.

The party embarked on board the S.S. "Durban Castle" on 4 July and arrived at Takoradi on 14 July. During the voyage the Commanding Officer explained in detail the proposals of the Air Ministry with regard to the Reinforcement Route, and the Officers / were.

1. The petrol was supplied by the Shell Company of West Africa.
2. Except as stated in the margin the authorities for the narrative are A.C. Thorold's "Report on R.A.F. Station, Takoradi and the W.A.R.R., July '40 - Sept. '41", and R.A.F. Station, Takoradi, Forms 540, 541 and Appendices, Entries of 23 July '40 et seq.

were instructed to make an appreciation based on the scheme as to the action to be taken by their particular departments on arriving at Takoradi. There after a conference was held at which it was decided that an examination as to all facilities available at Takoradi was to be made on arrival.

The Officers were accommodated temporarily at the Chamber of Mines Hostel and the other ranks in the Government Technical School which had been allotted by the Governor of the Gold Coast to the R.A.F. for the duration of the war.

Takoradi Township and Aerodrome.

The township of Takoradi is centred on the harbour to which a terminal extension of the Gold Coast railways had been made. Until 1929 Takoradi was a small outlying "suburb" of the town of Sekondi¹ which was itself a minor "surf-boat harbour", the main coastal traffic of the colony being at Accra, although here again there was no harbour and off-loading from ships had to be done in surf-boats. In 1929 a large harbour was built at Takoradi which was chiefly designed to deal with cocoa and manganese exports, and the construction of the harbour led to a considerable migration of Europeans from Sekondi to Takoradi with the result that accommodation and other facilities were modern and relatively spacious.

The existing aerodrome at Takoradi had been constructed by consolidating a considerable area of swamp. It was built in the form of three runways, the longest of which was 1,100 yards and facing the prevailing wind. The surface of the runway was tar-sprayed, but it was found later that this was insufficient to stand up to heavy rains which broke through the consolidated layer over the swamp. In addition to the single hangar there was a small office block which had been recently erected for the use of the British Overseas Airways Corporation.²

/ During

1. The European population of Sekondi was only approx: 150.
2. The B.O.A.C. had absorbed Imperial Airways.

During the first week after the Advanced Party's arrival the officers were engaged in examining the practicability of the scheme as regards the port, aerodrome, and accommodation at Takoradi and the landing-grounds and ferry route, and in making their several surveys and preparing a preliminary organisation for the reception of the main party of personnel which was expected to arrive at a later date. On 17 July Air Commodore L.H. Slatter, of the R.A.F. Middle East Headquarters Staff, arrived by B.O.A.C. aircraft after flying over the aircraft reinforcing route from Khartoum. During his stay at Takoradi he reported on the flying conditions and landing-grounds at the Staging-posts, and in consultation with Group-Captain Thorold, he drew up a provisional organisation for the maintenance of the Staging-posts and decided upon the number of personnel to be sent to these places.¹ It was also decided that the Air Ministry schedule of Staging-posts² should be adhered to with the addition of a small refuelling post at El Obeid (Sudan) for use in emergency.

Activities of the R.A.F. Advanced Party - Takoradi

On 22 July Group-Captain Thorold held a conference at which his officers submitted their reports on their respective investigations and made their recommendations as to the period required before the main Royal Air Force party could be received and the work of aircraft erection started. As a result of this conference a signal was sent to the Air Ministry confirming that:-

- (a) the scheme was possible;
- (b) the main party of personnel could be received forthwith;
- (c) aircraft erection could be begun as soon as certain essential equipment was supplied.

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1. This provisional establishment is given in Appendix "A".
 2. See page 7. supra.

On the following day (23 July) Group-Captain Thorold flew to Accra on a visit to the Governor of the Gold Coast and discussed matters of general administration as affecting the R.A.F. Station at Takoradi. He also visited Lagos and conferred with the Governor of Nigeria, and returned to Takoradi on 25 July.

As a result of Group-Captain Thorold's visit to Accra the R.A.F. departmental officers visited those Departments of the Gold Coast Civil Service which were in a position to assist the Royal Air Force, and detailed arrangements were made for their co-operation. These arrangements included:-

- (a) close co-operation between the Post and Telegraphs Department and the R.A.F. Signals Section;
- (b) the assistance of the staff of the Gold Coast Railways¹ and the use by the R.A.F. of the Railways' equipment and engineering workshops.
- (c) the assistance of the Public Works Department in constructional work required by the R.A.F.: this work was to be given immediate priority.

Preliminary Organisation Takoradi

In accordance with the Establishment detailed by the Air Ministry¹ a preliminary organisation for Takoradi was now formed comprising:-

- (a) A Station Headquarters (including Signals, Equipment and Accountant Sections)
- (b) Three independent Units, namely:-
 - (i) A Port Detachment (under the Senior Embarkation Officer)
 - (ii) An Aircraft Assembly Unit (under the Chief Technical Officer)
 - (iii) A Communication Unit (consisting of a Servicing

/ Section

1. See page 7 supra

Section and a Despatch Flight, under the
Officer i/c Flying)

(c) A small Supplies Depot.

The commanders of these Units were directly responsible to the Officer Commanding the Station.

Planning and Construction of R.A.F. Station, Takoradi.

As soon as the requirements of the various departments were ascertained a lay-out of the Station and detailed plans for the construction of hangars, workshops, storehouses, offices and other buildings were prepared by the R.A.F. Chief Technical Officer. Information had already been received from the Air Ministry that two Bellman hangars were being despatched to Takoradi, and -- as will be seen in the site plan¹ -- these and other aerodrome buildings were to be erected adjoining the existing hangar owing to the limited area of suitable building-ground available and also to ensure the maximum output with the small supply of equipment which seemed likely to be available. For this reason the question of security by the dispersal of the aerodrome buildings had to give place to administrative and organisation requirements.

The plans having been passed by the Commanding Officer, were sent to the Public Works Department with a request that the construction of the buildings might be put in hand forthwith. The original site plan was subsequently modified in some respects; the new plan (drawn by the Public Works Department on 8 August) is shown in Appendix "C".

Organisation of Aircraft Flow.

A skeleton organisation was formed for the reception, erection and despatch of aircraft, and, as already stated,² the executive side of the Station was divided into three Sections,

¹ The original site plan is given in Appendix "B".

² On page 12 supra.

a Port Detachment, an Aircraft Assembly Unit, and a Despatch Flight. The details of the work of these Units was as follows:-

Port Detachment. It was decided that reinforcing aircraft should be off-loaded in the harbour by the Port Detachment and then taken to the aerodrome by mechanical transport. The possibility of laying a railway track from the harbour to the aerodrome was considered but in view of the time factor, the expense, and the lack of flexibility of such a system this was not proceeded with. Arrangements were made, however, to reinforce the road surface by tar spraying so as to stand up to the frequent heavy loads which would pass over it.

Aircraft Assembly Unit. This Unit was organised as a series of Flights for the erection of the different types of aircraft shipped to Takoradi; there was also a separate air testing organisation in this Section for testing and adjusting aircraft after assembly in the hangars.

As the arrival and capacity of cranes from Great Britain appeared to be problematical a steel gantry, trollies, and heavy jacks were constructed for the handling of crated aircraft at the aerodrome.

Despatch Flight. It was considered that the most satisfactory organisation for this Section was a modified form of a Ferry Pilots' Pool (under the direct control of the Officer i/c Flying) for piloting the aircraft to the Middle East Headquarters. This Flight would also include maintenance personnel for the servicing of aircraft.

Reinforcement Route.

On 30 July the Officer i/c Flying (A/Sqdn. Ldr. Sweeney) left by a B.O.A.C. chartered aircraft to make a second survey¹ of the Reinforcement Route. He was accompanied by the Chief Signals Officer (Sqdn/Ldr. Sheppard Smith) who wished to make a preliminary

1. A preliminary survey had already been made by Air-Comdre. Slatter (see page 11 supra).

preliminary Signals survey. On their return (on 11 August) Group-Captain Thorold called a conference at which the results of their surveys were discussed, and in co-operation with the Chief Technical Officer (Sqdn/Ldr. Beckwith) the organisation of the Staging-posts for the Route was consolidated.

Description of Staging-Posts

The landing-grounds at the Staging-posts had been used as a Civil air route since 1936, and a chain of landing-grounds existed from Takoradi to Khartoum. In general, these landing-grounds had been designed for aircraft of the 15,000 lbs. "all-up weight" class. They possessed short run take-off and landing runs, and consequently the runways were rarely more than 1,200 yards long while some were only 900 yards. The lay-out of the runways had been constructed to a standard plan, with one main runway orientated to the prevailing wind and usually two shorter runways in the direction of the ordinary secondary winds. The landing-grounds on the Coast had been made on swampy ground with a consolidated surface (as at Takoradi), while in Nigeria the sites had been selected at slight plateaus for purposes of drainage: in French Equatorial Africa and the Sudan the landing-grounds had been, perforce, constructed in desert sand.

The climate at the various Staging-posts differed from the humid tropical heat of West Africa with its seasons of tornadoes and sudden squalls to the desert heat (and cold) of the Sudan with its dust storms and Harmattan winds.¹

Description of Route.

The first stage of the Reinforcement Route consisted of a 378 miles flight from Takoradi to Lagos (Nigeria), the route following the coast line of the Gold Coast Colony and French Dahomey. If necessary a halt could be made at Accra
/(situated

1. The Harmattan blows from December to May: it is a hot wind which raises sand-storms and dust resulting in very poor visibility.

(situated 117 miles east of Takoradi). The second stage was from Lagos to Kano (Nigeria), a distance of 525 miles in a north-easterly direction over forest land. The third stage consisted of two sections, Kano to Maiduguri (Nigeria), a distance of 325 miles, and Maiduguri to Gencina (Sudan) -- 689 miles.

At Maiduguri a halt was made for re-fuelling. The greater part of the third stage was over the Chad Province of French Equatorial Africa where, until the Free French Government took over the Administration, landings were prohibited.

The country varied between partially cultivated scrub and sandy wastes interspersed with marshes. The fourth stage was from Gencina to Khartoum, a distance of 754 miles, with a re-fuelling stop at El Fasher (Sudan) situated 194 miles from Gencina. On the El Fasher-Khartoum section the route passed over El Obeid which could be used as an emergency landing-ground. The country on this fourth stage was mostly desert but of a more barren type than the previous stage and the climatic conditions were of the typical sand-storm nature of the Sudan.¹

By a subsequent amendment to the schedule the Route was extended from Khartoum to the Royal Air Force depot at Abu Sueir² in two stages of 520 and 506 miles via Wadi Halfa where a re-fuelling post was established. To ensure the safety of the aircraft the course of the Nile was followed over this section of the Route.

Communication Along the Reinforcement Route.

Pending the establishment of R.A.F. Wireless communication along the Reinforcement Route it was decided to employ the existing Civil system, and such R.A.F. Wireless personnel and equipment as were available with the Advanced party were used to strengthen the weaker points in the Civil

1. Fuller details of the topographical and climatic conditions of the Route are given in Appendix "G", and a map of the Route is also appended.

2. Situated approx, 60 miles east of Cairo.

system. The Air Ministry had already provided for the early despatch to Takoradi of Transmitters for inter-command communication, and preparations for the installation of this apparatus were put in hand simultaneously with the arrangements with the Civil authorities for the handling of R.A.F. signals traffic along the Route.

Takoradi Station.

(a) Supplies.

Soon after the arrival of the Advanced party the Air Ministry was informed by signal of the immediate requirements in equipment which would be needed for the initial operation of Takoradi Station. In the meantime the Senior Equipment Officer had examined the extent to which local resources could be utilised. It was ascertained that most of the furniture required for the R.A.F. Offices and barracks could be made locally by the Public Works and Prisons Departments who were then given the necessary specifications for the work. The sources of local food supplies were also examined: it was found that fruit was plentiful but as the supply of green vegetables was limited it was decided to start an R.A.F. vegetable plantation.

(b) Accommodation.

It was decided to build an Officers' Mess to accommodate 70 Officers (the number expected at Takoradi when the main party arrived), and the Public Works Department drafted a plan for an Officers' Camp, and began the erection of the Mess. (It was subsequently found necessary to take over the Chamber of Mines Hostel as an additional Officers' Mess on the increase of the number of officers over the original establishment).

The Government Technical School (which had been made over to the R.A.F. for the other ranks) could accommodate 400 men, and as the first draft of the main party was to consist of 350, the immediate needs for accommodation were met. As, however, the establishment of the other ranks personnel had been fixed at 525¹ (which might be increased later on) additional accommodation would be required, and the Public Works Department was therefore asked to draft plans for additional buildings to the Government Technical School.

(c) Medical.

As Takoradi is situated in a swamp area, which is the breeding ground of malaria-carrying mosquitoes, the prevalence of malaria was high and preventive measures and treatment had to be organised. Yellow Fever and Sleeping-sickness are also indigenous to the Coast: before leaving Great Britain all personnel were inoculated against Yellow Fever, but although Takoradi is situated in a Tsetse-fly belt, the prevalence of Sleeping-Sickness in the neighbourhood was small.

On 8 August the R.A.F. Senior Medical and Senior Equipment Officers attended a conference at Accra with the Gold Coast Deputy Director of Medical Services, and it was subsequently arranged with the District Medical Officer of Health that all R.A.F. sick cases should be taken to the European Hospital. But as the hospital might become overcrowded as a result of subsequent R.A.F. expansion at Takoradi, the Air Ministry was asked to sanction the construction of an R.A.F. hospital to accommodate 60 patients.

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¹ The interim Establishments is given in Appendix "D".

In co-operation with the District Medical Officer of Health measures were taken to ensure that all drains and other breeding places should be cleaned out regularly so as to destroy mosquito larvae. Arrangements were also made for anti-malaria measures to be taken with all R.A.F. personnel flying over the Reinforcement Route.

Arrival of First Main Party, R.A.F.

The first main party of the R.A.F. personnel consisting of 28 officers and 329 other ranks arrived at Takoradi from the United Kingdom in H.M.T. "Aska" on 21 August, (1940). Their disembarkation was, however, delayed for three days as their beds, which had been despatched in another vessel, had not arrived. The construction of improvised beds made of timber and wire netting was at once put in hand, and on 24 August the party was disembarked and was housed at the Government Technical School.

Meanwhile (on 21 August) a signal had been sent to the Air Ministry that the erection of aircraft could be begun but that the information had been received that the first consignment was not expected to arrive until 5 September. (The aircraft in question were to be six Blenheims IV's and six Hurricanes with long-range tanks).

File D.Ops.
Overseas.
(A.H.B.II.
J15/1).

On 26 August maintenance parties were sent from Takoradi to the staging posts of the Reinforcement Route as follows:-

- 1 Officer and 16 other ranks to Lagos.
- 1 Officer and 19 other ranks to Kano.
- 1 Officer and 8 other ranks to Geneina.
- 7 other ranks to Maiduguri.
- 3 other ranks to El Fasher.
- 3 other ranks to El Obeid.

Signal X55839
of 21.8.40.
Air HQ ME.
to Air Min.
A.M.S. 62177

In the meantime the A.O.C.-in-C., Middle East, had decided to place the Takoradi station under the command of the newly formed No.203 Group, Khartoum, (Air Commodore Slatter), with effect from 26 August. This arrangement was modified subsequently, the A.O.C., No.203 Group being made operationally / responsible.

A.M.
CS.9703

responsible for the Reinforcement Route from Geneina to Wadi Halfa and the O.C., Takoradi being responsible for Takoradi Station and the first (West African) part of the Route. With the subsequent extension of the Route to Abu Sueir¹. No.202 Group (Heliopolis) became operationally responsible for the Egyptian section of the Route.

Ferry Organisation.

The ferrying organisation was established under the Despatch Flight of the Communication Unit. From the inception of Takoradi Station it was decided to form a Ferry Pilots' Pool of which the personnel would be responsible for the ferrying of aircraft over the Reinforcing Route. This could best be accomplished by pilots who knew the difficulties of the route over which they had to fly. It was therefore decided that as a matter of policy the ferry pilots should be based at Takoradi and should be flown back from Egypt by B.O.A.C. Chartered aircraft after the delivery of each flight.²

The original members of the Ferry Pilots' Pool arrived with the first R.A.F. main party on 21 August, and consisted of 12 Officers and 13 Sergeant Pilots from No.4 Ferry Pool, Kenble.

To ensure the safe ferrying of aircraft it was arranged that skilled navigators of the B.O.A.C. should be loaned as leaders for the first few convoys until the nucleus of the R.A.F. pilots were considered to have sufficient knowledge of the route. Each aircraft was to be tested in the Test Flight and was then to be transferred to the Despatch Flight and allotted to one of the pilots who was to be required to make a further test flight of at least one hour's duration before

/ proceeding

¹. See page 16 supra.

². The B.O.A.C. aircraft continued to operate along the Route and were dealt with as a Civil organisation: their administrative headquarters were at Lagos and they were represented at Cairo. By the Summer of 1941 the R.A.F. was using 75% of the seating capacity of the B.O.A.C. aircraft (for the return of pilots), but it exercised no operational control of their movement. (File CS.9703).

proceeding on convoy. This further test flight ensured that the aircraft was capable of making the flight over the route and also enabled the pilot to prove his ability to convoy the aircraft.

In order to overcome difficulties in navigation and as an aid to locating forced-landed aircraft without delay, it was considered essential to form single-engined aircraft convoys led by a Blenheim aircraft carrying a full crew. The normal convoys, therefore, comprised one Blenheim and six Hurricanes. (This arrangement would be varied on occasion according to the output of aircraft erected).

/III INITIAL

1. The first part of the report is a general introduction to the subject of the study.

2. The second part of the report is a detailed description of the methods used in the study.

3. The third part of the report is a presentation of the results of the study.

4. The fourth part of the report is a discussion of the results and their implications.

5. The fifth part of the report is a conclusion and a list of references.

6. The sixth part of the report is a list of appendices.

7. The seventh part of the report is a list of figures and tables.

8. The eighth part of the report is a list of footnotes.

9. The ninth part of the report is a list of abbreviations.

10. The tenth part of the report is a list of symbols.

11. The eleventh part of the report is a list of equations.

12. The twelfth part of the report is a list of diagrams.

13. The thirteenth part of the report is a list of photographs.

14. The fourteenth part of the report is a list of maps.

15. The fifteenth part of the report is a list of other materials.

16. The sixteenth part of the report is a list of other references.

17. The seventeenth part of the report is a list of other symbols.

18. The eighteenth part of the report is a list of other equations.

III. INITIAL CONVOY OPERATIONS

On 5 September (1940) the first consignment of aircraft (six crated Blenheim IV's and six crated Hurricanes) together with additional tools, equipment, general stores and some M.T. vehicles arrived at Takoradi in the S.S. "Berreby", and the same day three of the Blenheims were off-loaded and taken to the aerodrome. On the following day (6 September) H.M.S. Aircraft Carrier "Argus" arrived at Takoradi with thirty Hurricanes which were complete with undercarriages, engines and propellers installed, but with their main planes and long range tanks removed. These Hurricanes were off-loaded into lighters¹ whence they were taken to the lower wharf of the harbour, and handled with the 5 ton cranes. The Hurricanes were then towed to the aerodrome by a Commer trailer, the tail wheels of the aircraft having been first removed, and the tail strut attached to the trailer's prime mover.

It was decided to deal first with the "Argus" Hurricanes before starting work on the crated Hurricanes from the S.S. "Berreby", and by the evening of 6 September six of the "Argus" Hurricanes were on the aerodrome tarmac ready for the attachment of their main planes and long-range tanks.

The total number of aircraft which had arrived (viz. six Blenheims and thirty-six Hurricanes) indicated that the first six convoys would comprise one Blenheim and six Hurricanes, and erecting parties of the Aircraft Assembly Unit were therefore organised on this basis. It was hoped that the first convoy would be despatched by the middle of September but the erection of the aircraft was delayed owing to the difficulty of locating certain essential equipment which had arrived in the S.S. "Berreby"² and which could not be supplied locally.

/The

1. i.e. one aircraft per lighter.

2. Such items as split pins could not be located, and the locking of the main plane root attachment bolts on the first three Hurricanes was done with the aid of a packet of split pins which the R.A.F. Chief Technical Officer found in a refuse dump in the harbour. This was, fortunately, augmented by a further supply obtained from a local motor garage.

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The first Hurricane was completed by the afternoon of 13 September and it was then flown in a successful test flight by the Officer i/c Flying. Four days later (17 September) the first Blenheim was completed and made a satisfactory test flight. The length of time taken in assembling these two aircraft was in no way an indication of the time which would normally be taken, for the reason that a greater part of the time was employed in contriving methods to overcome difficulties arising from lack of adequate equipment, tools and the supply of A.G.S.¹ items. Meanwhile, on 7 September, the S.S. "Mary Kingsley" had arrived at Takoradi with further stores and equipment.

The First Convoy.

On 18 September part of the main runway of the aerodrome subsided while a Hurricane was taxiing over it. The runway was immediately repaired, and on the following day (19 September) one Blenheim and six Hurricanes were ready to make the first delivery flight, and it was arranged that this convoy should leave Takoradi next day under the leadership of Flight Lieutenant Blackwood, with First Officer Rendell of the B.O.A.C. as Navigator. Owing to adverse weather conditions the scheduled start at 06.30 hours was postponed, and the schedule for the flight was therefore amended, the first day to be only as far as Lagos, and the second day Lagos to Kano (instead of Takoradi - Kano on the first day with a refuelling halt at Lagos).

At 09.00 hours the pilots had been "briefed" as to the route etc. and the engines started, but while taxiing off the Blenheim became bogged at the side of the runway where an additional strip of tarmac had just been laid down. The Blenheim received no damage and having been inspected and passed as serviceable the flight took off at 11.00 hours and arrived at Lagos at 13.25 hours. The departure was watched by H.E. the Governor of the Gold Coast, who sent the following signal to the Secretary of State for the Colonies:-

/ "I

1. i.e. Aircraft General Service.

"I saw the first flight consisting of one Blenheim and six Hurricanes start from Takoradi this morning for Egypt. Only two months¹ have been taken to start this vital service which, taking the local problems and difficulties into consideration, is a remarkable achievement and reflects very highly on the administrative capabilities of Group Captain Thorold, his officers and men".

During the progress of the first flight information was received from R.A.F. Headquarters, Middle East, that despatch flights were to proceed from Khartoum to Abu Sueir (Cairo) and that the aircraft were to be delivered to No.102 Maintenance Unit at that place.

On 25 September the second convoy comprising one Blenheim (flow by Pilot Officer Bowring, with First Officer Rose of the B.O.A.C. as Navigator), and six Hurricanes left Takoradi. The first convoy arrived at Abu Sueir on 27 September (with one Hurricane left behind at Geneina as it had become unserviceable), and the second convoy arrived on 30 September: two of the Hurricanes of the second convoy had become unserviceable and had had to be left en route, and one had crashed at Lagos while landing.

As a result of these two ferry flights the following general observations were recorded:-

- (a) Runways. The runways at all Staging-posts from Lagos to El Obeid (inclusive) were good for present requirements, but in most cases failure of aircraft to keep strictly to the runways whilst taking off or landing would result in damage owing to obstructions or rough ground.
- (b) Signals. The Signal organisation between Staging-posts was found, on the whole, to be unsatisfactory, the main difficulty being that several of the landing grounds possessed different cyphers, and in some cases there was confusion as a result of faulty transmission or reception by operators.

/(c)

1. As already stated, the R.A.F. Advanced Party arrived on 14 July, and a signal was sent to the Air Ministry on 22 July (after preliminary investigations) that the scheme was feasible.

- (c) Refuelling. This was generally satisfactory, but at Geneina, El Fasher and El Obeid there was no 100 Octane fuel available, and it was only procurable at Khartoum with difficulty¹.
- (d) Maintenance Inspections and Repairs. These were sometimes handicapped owing to shortage of the appropriate tools and spares, and there was no proper equipment for picketing down aircraft at all landing-grounds.
- (e) Accommodation and Catering. This was generally adequate, but sleeping accommodation was not available at some emergency stopping places.
- (f) Formation Flying. It was found to be essential that all aircraft should keep in their correct relative positions to enable the formation leader to keep a constant watch on each one. It was therefore decided that the aircraft should fly in a broad "V" formation, each one being "stepped up" away from the leader which thus made it clearly visible against the sky.

It was considered very inadvisable for the captain of the leader (Blenheim) aircraft, pending further experience, to undertake the flight without a B.O.A.C. Navigator.

On 29 September the third convoy (of one Blenheim and five Hurricanes) left Takoradi. It was joined at Lagos and at Maiduguri respectively by the two Hurricanes of the second convoy which had become unserviceable. Considerable trouble was experienced during this flight including the loss of one of the Hurricanes which collided with another,² and out of eight aircraft only the Blenheim and four Hurricanes³ reached Abu Sueir (on 5 /October).

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1. This shortage of 100 Octane fuel was no doubt due to lack of distribution facilities in the Middle East Command which was responsible for the refuelling of the Staging-posts in the Sudan (i.e. eastwards from Geneina). In this connection see the A.O.C. in C's signal to the Air Ministry, para.3, page 8, supra.
 2. It appeared that a side or bottom panel had dropped off the aircraft which may have either affected its keel surface or may have struck the tail unit, causing the aircraft to swing sideways and collide. The pilot baled out and was unhurt; the other aircraft received superficial damage and landed safely.
 3. There were in all seven Hurricanes, viz: the original five plus the two which joined the convoy en route.

October). The Radio Telephony communication during the flight was quite ineffective and the Wireless Telegraphy communication was unsatisfactory.

As a result of this convoy several improvements were suggested for the landing-grounds at the Staging-posts, including:-

- (a) The provision of chocks or sandbags at El Fasher so that aircraft could be run up for the checking of their engines. (This was particularly necessary at this landing-ground before taking off on the 560 mile journey to Khartoum).
- (b) The clear marking of unserviceable parts of runways. (This had not been done at El Fasher where a Hurricane sank in loose sand on the runway thereby causing delay to other aircraft which were waiting to land).
- (c) Charging facilities for batteries.

In addition to Blenheim and Hurricane aircraft the Air Ministry arranged to ship some Glen Martins to Takoradi and also some Fulmar aircraft for the Fleet Air Arm at Alexandria. The first six Glen Martins arrived on 25 October in the S.S. "Mary Slessor", accompanied by a representative of Messrs. Pratt and Whitney¹ to advise on their erection. On the same day two Fulmar aircraft arrived in the S.S. "Sangara", and on 29 October five Naval Officers and three ratings disembarked from the S.S. "Swedru" on attachment from the Fleet Air Arm for ferrying duties with the Fulmars. They were followed by more Fulmars, and on 7 November five Fulmars left Takoradi for Aboukir piloted by Fleet Air Arm personnel with a B.O.A.C. pilot as navigator.

Enlargement of Ferry Pilots' Pool

It was soon found that the number of pilots of the Ferry Pilots' Pool would be insufficient as the programme of despatch flights increased, and in October (1940) the Air Ministry decided to employ personnel of the Polish Air Force as Ferry pilots. These Polish airmen were specially selected

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Part I

1. This firm manufactured the Glen Martin engines.

and possessed an average experience of 2,500 flying hours.

They were formed into a unit within the Takoradi establishment and were placed under the control of the Officer Commanding Takoradi Station. The first draft of these Polish pilots, comprising 12 Officers and 10 other ranks, arrived on 21 November in the S.S. "Ormonde" which also brought a draft of 285 R.A.F. other ranks for Takoradi.

"Topic Force", Fort Lamy

Meanwhile the British Government had agreed to assist the Free French in reinforcing their Air Force at Fort Lamy with eight Blenheim IV's, some M.T. vehicles, and an R.A.F. detachment of 2 Officers and 32 other ranks. It was arranged that the Blenheims should be sent to Takoradi and assembled and flown from thence by Free French pilots from a detachment of 20 Free French Officers and 75 other ranks who were to go to Fort Lamy. The R.A.F. detachment was solely for the maintenance of the aircraft: it was to receive its operational orders from the Free French commander but was not to be under him for discipline. Takoradi was to be the parent station for the detachment. The whole force (English and Free French) was known as "Topic Force". It was decided that the Blenheims were to fly to Maiduguri where the force would be concentrated temporarily, as owing to the rains having broken, the road from Maiduguri to Fort Lamy would be impassable for some weeks.¹

On 1 November 11 Free French Officers and 13 other ranks of "Topic Force" arrived at Takoradi by sea and on 2 and 13 November the R.A.F. detachment arrived at Lagos. The eight Blenheim aircraft for "Topic Force" arrived at Takoradi in due course and were flown by the Free French pilots to Maiduguri in two convoys on 10 and 12 December.

Increase in Output and of Establishment at Takoradi

In the meantime the Air Ministry had decided that the output of aircraft sent to Takoradi should be 120 to 150 per month,

1. The main party, M.T. and stores etc. were to disembark at Lagos and proceed to Maiduguri by rail and road.

per month, comprising

24 Hurricanes
48 Blenheims
40 Mohawks
20 Glen Martins
15 various types.

and on 21 November the O.C. Takoradi received information that the revised personnel Establishment for the station (excluding the Polish pilots) would be:-

	64 Officers
	837 N.C.O's and airmen
	185 Civilians
Total:	<u>1,086</u> ¹

Operation "Stripe"

Meanwhile, on 9 November the Air Ministry signalled the O.C. Takoradi that No.73 Squadron, R.A.F., was being sent to reinforce the Middle East, that its aircraft (34 long-range Hurricanes) would arrive at Takoradi in H.M.S. Aircraft-Carrier "Furious", and that pilots of the Squadron would accompany the aircraft and fly them off the "Furious" to Takoradi and thence to Abu Sueir.

H.M.S. "Furious" arrived at Takoradi on 27 November and by the same evening 15 of the Hurricanes (and 3 Fulmars for the Fleet Air Arm) had been flown off the "Furious" and had landed at Takoradi. Meanwhile 6 Skuas had landed to carry out anti-submarine patrols while the "Furious" lay off Takoradi. By 29 November all the Hurricanes had landed at Takoradi except one which crashed into the sea while taking off from the "Furious". This aircraft was a total loss, but the pilot was saved.

Owing to the limited space available on board the "Furious" and the difficult conditions under which the aircraft were there assembled, nearly every aircraft had to be classed as "unserviceable" on landing at Takoradi. Accordingly a 30-hour inspection was made on each aircraft

/which

1. A schedule of this revised Establishment is given in Appendix "E".

which necessarily delayed the despatch of the convoys to the Middle East by one day.

On 29 November and on the next four days the "Stripe" aircraft took off for the Middle East in convoys of six Hurricanes and one Blenheim (the last convoy being three Hurricanes and one Blenheim), followed on 5 December by a convoy of four Fulmars piloted by Officers of the Fleet Air Arm. By 8 December, 27 of the "Stripe" Hurricanes (with 6 Blenheim leaders) had reached Heliopolis: 5 of the Hurricanes had forced-landed south of Geneina¹ of which one crashed (the pilot being killed), two were intact and one was repairable. The arrival of the Hurricanes evoked congratulatory signals to the O.C., Takoradi, from the Chief of the Air Staff and the A.O.C.-in-C., Middle East.

Meanwhile, on 2 December Air Marshal A.W. Tedder, had arrived at Takoradi on his way to Air Headquarters, Middle East, to take up the appointment of Deputy A.O.C.-in-C. He made a detailed inspection of the Station, and in a letter of 19 December to the Chief of the Air Staff stated:-

"..... I went round Takoradi pretty thoroughly including the arrangements at the port and I must say I was very impressed by what Thorold and his people have done. The whole show is a first class piece of improvisation, from the devices for off-loading the extremely awkward Blenheim cases to the excellent accommodation fixed up for the troops. The whole atmosphere struck me as being excellent and they were all clearly imbued with the aim of passing everything up the line as quickly as possible. They have, of course, had many handicaps to overcome, particularly shortages of tools, A.G.S. parts etc. This has been fully reported and action is being taken....."

File
D.Ops.
Overseas,
Part I.
A.H.B.II.
J15/1)

/This

1. This was apparently due to Wireless failure.

Ibid.

This letter was received a few days before the Prime Minister sent a Minute to the Chief of the Air Staff suggesting that in view of a number of aircraft stated to be at Takoradi awaiting despatch to Middle East, Group Captain Thorold should be called upon to submit a special report.¹ In his reply the Chief of the Air Staff assured the Prime Minister that the O.C. Takoradi, was doing everything in his power to hasten the despatch of aircraft and stated that he had received "a most favourable report" on Takoradi from Air Marshal Tedder.

On 12 December the first Glen Martin aircraft to be erected at Takoradi made a successful test flight after some initial take-off trouble necessitating firm control by both rudder and throttle. On 17 December the first four Mohawk aircraft were landed at Takoradi. While the first of these aircraft was being tested after erection (on 27 December) it crashed into the sea and the Chief Flying Officer (Wing Commander A.W. Sweeney), who was acting as its pilot, was killed.

Organisation of Technical Section, Takoradi.

As the erection and despatch of aircraft increased the provisional organisation of the Aircraft Assembly Unit was remodelled and (early in January 1941) a Technical Section was formed. This Section was put under the command of the Senior Technical Officer who was made responsible for the erection, maintenance, and repairs of aircraft, the Mechanical Transport Repair Section, the technical supervision of and orders to the Staging-posts, advice to the Commanding Officer on technical questions, and the general supervision of all technical matters.

The Technical Section included the Aircraft Assembly Unit which was sub-divided into:- / (a)

1. There were then at Takoradi 44 aircraft, of which 25 were in course of erection and 19 waiting to be erected. The C.A.S. did not consider this "an alarming concentration".
Ibid.

- (a) a Base Erecting Section (Comprising single and twin-engine units)
- (b) a test and Issue Flight (which handed over tested aircraft to the Communication Unit for despatch to the Middle East.¹

Summary of Aircraft Erected to 31 December 1940

<u>1940</u>	<u>Blenheim</u>	<u>Hurricane</u>	<u>Glen Martin</u>	<u>Mohawk</u>	<u>Fulmar</u>	<u>Total</u>
Sept.	4	29	-	1	-	33
Oct.	2	3	-	-	-	5
Nov.	11	37	1	-	6	55
Dec.	21	8	2	(1) (crashed)	6	37
	38	77	3	(1)	12	130

Summary of Aircraft Despatched to Air. H.Q.,
Middle East to 31 December 1940

<u>1940</u>	<u>Blenheim</u>	<u>Hurricane</u>	<u>Glen Martin</u>	<u>Mohawk</u>	<u>Fulmar</u>	<u>Total</u>
Sept.	3	18	-	-	-	21
Oct.	3	16	-	-	-	19
Nov.	2	12	-	-	5	19
Dec.	20	22	-	-	7	49
	28	68	-	-	12	108

1. The detailed organisation of the Technical Section is given in Appendix "F".

IV. OPERATIONS AND ACTIVITIES JANUARY-JULY 1941Operation "Monsoon"

A.M.S. 62177
Part II

The success of Operation "Stripe" decided the Air Ministry to enlist the services of H.M.S. "Furious" in a further operation of a similar character to be known as Operation "Monsoon", and on 8 January (1941) the "Furious" -- accompanied by escorting Destroyers -- arrived at Takoradi carrying 40 tropicalised Hurricanes (fitted with long-range tanks) and 9 Fulmar aircraft for the Fleet Air Arm. A number of R.A.F. Officers, N.C.O's and airmen from Fighter Command¹ to ferry the Hurricanes to the Middle East and nine Fleet Air Arm pilots for the Fulmars were on board the "Furious", and also an R.A.F. Maintenance party to assemble the Hurricanes during the voyage from Great Britain.

The first aircraft to be flown off the "Furious" were a formation of Skuas which carried out anti-submarine patrols while the Hurricanes and Fulmars were being flown off. One of the Skuas crashed on landing at Takoradi and was damaged beyond repair. On the same day (8 January) 12 Hurricanes were flown off and landed at Takoradi. Each of the Hurricanes had six of its eight machine-guns fitted, the remaining two guns being landed from the escorting Destroyers for onward despatch to the Middle East by transport aircraft. The last Hurricane to fly off crashed while taking off: it was taken to Lagos by the "Furious" on 11 January, on the completion of the Operation.

The Hurricanes were despatched to the Middle East every day from 9 to 16 January in convoys of six² with one Blenheim as leader, and the Fulmars were despatched in two convoys, piloted by personnel of the Fleet Air Arm, on 17 and 21 January.

-
1. These personnel were also to reinforce the R.A.F. Middle East.
 2. The last convoy consisted of 3 "Monsoon" Hurricanes and 3 other Hurricanes erected at Takoradi: R.A.F. and Polish personnel of Takoradi Station piloted the latter.

Aircraft from the U.S.A.

A.M.S. 62177
Part II

Meanwhile the Air Ministry had arranged with the Government of the United States for the despatch of a considerable number of Tomahawk and Glen Martin aircraft to be shipped direct from America. At a Conference (under the chairmanship of the Director of Organisation Air Ministry), held on 14 January (1941) the following decisions as to the supply of aircraft overseas from the United States and Great Britain were made:-

Aircraft from U.S.A.(a) Tomahawk II.

207 to Takoradi
100 to Alexandria (by the long sea route).

(b) Glen Martin.

20 to Takoradi
55 to Alexandria or Takoradi according to shipping facilities.
75 to Cape Town (for South Africa).

Aircraft from Great Britain.(a) Glen Martin 167.

Approx: 68 to Takoradi

(b) Mohawk.

40 to Takoradi
80 to Mombasa (for the S.A.A.F. in East Africa)
20 to Aden.

The shipment of aircraft from the United States involved some difficulty as under the Neutrality Act¹ the United States were debarred from sending supplies and munitions of war in their own ships to any belligerent. However, in the case of the consignment of the Tomahawks, this difficulty was surmounted by chartering a Norwegian vessel, the S.S. "Tamerlane".

The S.S. "Tamerlane" arrived at Takoradi on 8 February with 100 Tomahawks and 20 Glen Martins. These aircraft were found to be very well cased and protected against corrosion, and all vital parts were covered in grease-proof paper. The

1. It will be remembered that the U.S.A. did not enter the war until December 1941.

Glen Martins were in seven cases, each case containing a list of contents, and every seventh aircraft was accompanied by miscellaneous surplus material for use in connection with the erection of the aircraft in the event of A.G.S. items already supplied being lost in the course of erection. A small supply of Maintenance stores e.g. tyres, tubes, engine and airframe spares was also received.¹

The erection of these Tomahawk and Glen Martin aircraft necessitated certain modifications in the organisation of the Aircraft Assembly Unit. The method already in use for the erection of aircraft was that of "line" production which, besides being the most economical method, was capable of rapid expansion. As the commitments in the types of aircraft received were altered, so at the same time were the proportions of aircraft by type. This is illustrated by the following statement of the changing commitments:-

<u>Month.</u>	<u>Commitment.</u>	<u>Type of Aircraft.</u>	<u>Total per Month.</u>
July 1940	45	Hurricanes	127
	45	Blenheims	
	37	Miscellaneous	
Nov. 1940	ditto. with <u>pro rata</u> 20% increase		150
Jan. 1941	50	Hurricanes	180
	50	Blenheims	
	25	Glen Martins	
	5	Miscellaneous	

Owing to the above changes of type it was not possible to keep strictly to "line" production. In the initial stages "Crew" production had been adopted so as to have a nucleus of personnel from which to expand later, but by the end of 1940 "line" production had been begun for the Blenheim and Hurricane² aircraft, and on the arrival of the Tomahawks and Glen Martins (above mentioned) "line" production was also

1. Air H.Q., Middle East asked the Air Ministry to direct the Purchasing Committee to forward from U.S.A. emergency spares for 60 aircraft via Takoradi. These spares were required to help maintain Squadrons in the field until such time as a full complement of spares was received direct from U.S.A.
2. With regard to the Hurricanes; owing to the proportionately small amount of work to be done on them it was found more economical to adopt a compromise between "line" and "crew" production.

adopted for these aircraft. In the case of the Tomahawks the necessity for several pre-erection modifications required a specialist crew working in a separate hangar before normal erection was begun.

On 21 February a start was made with the tropical trials of the Tomahawks. Certain technical troubles were encountered and the despatch of these aircraft was thereby delayed until March during which month 8 Tomahawks were despatched. A further 39 Tomahawks were despatched to the Middle East during April. From the flying point of view the tropical flying tests of these aircraft were quite satisfactory, a tendency to "ground-loop" (of which the Air Ministry had sent warning) had not proved serious in the hands of the test pilots.

Dual Instruction for Pilots.

Meanwhile the question of instruction of pilots for flying twin-engined aircraft had been considered and it was decided to hold courses of instruction for single-engine pilots accordingly. For this purpose a Blenheim was fitted with dual control and training courses were started. Later on, with the arrival of twin-engine pilots, similar courses were inaugurated for them for flying single-engine aircraft, and it was thus ensured that all pilots were qualified to fly any of the types of aircraft which were to be despatched from Takoradi to the Middle East.

Formation of War Flight.

In the meantime, on instructions from the Air Ministry, a War Flight had been organised at Takoradi as a defence against seaward naval attack. This Flight consisted of three Blenheim aircraft awaiting despatch to the Middle East.¹ The Flight was placed under command of the Officer i/c Test Flight, the operational control being effected from the Air H.Q., Operations Room.

The aircraft of the War Flight were kept ready for action

1. This necessitated a constant change of individual aircraft.

with bombs fitted and guns loaded, and their crews were available to take off at 15 minutes notice.

Aircraft Received and Despatched During February (1941)

During the month of February 182 aircraft arrived at Takoradi and 61 aircraft were despatched to the Middle East.¹

Revision of Station Routine, Takoradi

On 3 March the O.C., Takoradi² received the following signal from the A.O.C.-in-C., Middle East:-

"Very urgent that you speed up erection and delivery of aircraft from Takoradi We have intensive operations on four fronts and steady wastage is resulting with which supply coming from Takordi is hardly keeping pace apart from Squadrons awaiting re-equipment".

As a result of this signal a Special Order of the Day was issued, and a revised Station routine was brought into effect which increased the number of working hours to approximately 10½ per diem.

Operation "Pageant"

Meanwhile (in January) the Air Ministry had arranged with the Admiralty a similar operation to "Monsoon" (to be known as Operation "Pageant") by which H.M.S. "Furious" was to carry 40 Hurricanes for the Middle East and 12 Fulmar and 6 Swordfish aircraft for the Fleet Air Arm, together with a reinforcement of 25 R.A.F. pilots from Fighter Command. Owing to various unforeseen delays (including a period of three weeks while H.M.S. "Furious" was undergoing repairs) the date of sailing was postponed until 5 March. The "Furious" and her escorting Destroyers reached Takoradi on

A.M.
S. 62177
Part II

Ibid.
(Sig. X. 9446
of 7 Feb. '41
Admiralty to
Air Min:)

1. The total number of aircraft despatched from Sept. '40 to 28 Feb. '41 was 271, viz: -

101	Blenheims
143	Hurricanes
23	Fulmars
4	Glen Martins.
<u>271</u>	

2. Air/Comdre. Thorold (who had been promoted to this rank on 1 March).

20 March and the aircraft were flown off during the next three days: one of the Hurricanes forced landed on the beach some 50 miles east-north-east of Takoradi. During the operation the Fulmar and Swordfish aircraft carried out anti-submarine patrols and, as a further measure of security, two Bofor guns were manned on the aerodrome while eight Lewis guns covered each of the main runways and hangars.

Inspection by Group-Captain Lydford.

A.M.
S.5137
Part I

Early in March the Air Ministry decided to increase further the flow of aircraft to Takoradi to approximately 180 per month as follows:-

60 Blenheims
50 Hurricanes
20 - 25 Glen Martins
50 Tomahawks (approx.)

This intended increase necessitated certain modifications to the organisation at Takoradi and of the Reinforcement Route, and Group-Captain Lydford (the D.D.O.2 at the Air Ministry) was sent to discuss these matters with the Commanding Officer, and to proceed thence to Cairo to consult with the A.O.C.-in-C., Middle East.

File D.Ops.
(Overseas)
A.H.B.
II J/15/9
(containing
Report by
D.D.O.II on
Takoradi Rein-
forcing Route)

Group-Captain Lydford arrived at Takoradi by air on 25 March and investigated the Station organisation. A conference was then held with the Commanding Officer and his Staff when all aspects of the organisation were discussed. These included a "leap-frog" scheme for the Staging-posts of the Reinforcement Route. The object of this scheme was twofold:-

- (i) To allow the despatch of two convoys in one day without overstraining accommodation and maintenance facilities at any one Staging-post, and
- (ii) To provide two alternative series of landing-grounds for the use of convoys and thus to prevent hold-ups on the Route should any landing-ground become temporarily unservicable.

The scheme, as finally adopted, included the use of some additional "Minor" Staging-posts, namely:-

/West.....

West African Section

Oshogbo, Minna and Kaduna (between Lagos and Kano)

Fort Lamy and Ati (between Maiduguri and Geneina).

Two intermediate Staging-posts were (later) established in the Sudan-Egypt sections of the Route, namely:-

Atbara (between Khartoum and Wadi Halfa)

Luxor (between Wadi Halfa and Abu Sueir).¹

The function of the various Staging-posts was then as follows:-

- | | | |
|-----------|---|-------------------------------------------------------------------------------------------|
| Lagos | - | Major Staging-post |
| Oshogbo | - | Minor Staging-post to allow Lagos to be "leap-frogged". (Full night stopping facilities). |
| Minna | - | Emergency Staging-post (No night stopping facilities). |
| Kaduna | - | Minor Staging-post to permit Kano to be "leap-frogged". (Night stop in emergency only). |
| Kano | } | Major Staging-posts |
| Maiduguri | | |
| Fort Lamy | - | Minor Staging-posts to permit Maiduguri to be "leap-frogged". |
| Ati | - | Minor Staging-post (Night stop in emergency only). |
| Geneina | } | Major Staging-posts. |
| El Fasher | | |
| El Obeid | | |
| Khartoum | | |

For administration the Minor Staging-posts were organised under the control of "parent" Staging-posts, viz. Lagos administered Oshogbo, Kano administered Minna and Kaduna, and Maiduguri administered Fort Lamy and Ati. The supply of personnel for the West African Staging-posts remained the

1. Three Route schedules were drawn up, "A", "B" and "C" (see Appendix "H"). Schedules "A" and "B" were for Hurricanes, Blenheims and Glen Martins; and schedule "C" was for Tomahawks and Fulmars owing to the Limited range of flight of these aircraft.

responsibility of Takoradi; those in the Sudan section were the responsibility of No. 203 Group, Khartoum, and drafts were shipped from Great Britain direct to East Africa for this purpose.

Revised Establishment, Takoradi

Meanwhile information had been received from the Air Ministry regarding the final Establishment for Takoradi to cope with the monthly erection and despatch of 180 aircraft: the details of this revised Establishment¹ (dated 1 April, were as follows:-

86 Officers
1898 N.C.O's and airmen
<u>535 Civilians</u>
<u>2519</u>

Equipment and Supplies.

The revised programme for the erection and despatch of 180 aircraft per month necessitated an increase in the Establishment of the Equipment and Supplies Section and also the posting of additional Maintenance personnel to the new Staging-posts under the "leap-frog" scheme. A complete revision of Stocks and extra equipment was carried out and as a result of this demands were signalled to the Air Ministry.

Arrangements were also made with the Shell Company to increase stocks of petrol at the Staging-posts and to lay down stocks at the new Staging-posts including a nine months' supply of aviation fuel and oil at Fort Lamy, Ati and Bokoro,² as during the rainy season the roads to these places were closed. For this purpose the Nigerian Government was asked to requisition transport as the Syrian contractor -- normally employed by the Shell Company -- had insufficient transport to ensure the stocks of petrol reaching their destinations before the rains broke.

-
1. A schedule of this revised Establishment is given in Appendix "J".
 2. Bokoro was an emergency landing-ground between Fort Lamy and Ati.

Supplies to "Topic" Force.

About this time (on instructions from the Air Ministry) stocks of petrol and oil representing six months' estimated requirements for the Free French "Topic" Air Force were laid down at Brazzaville, Bangui, Pointe Noire and Fort Lamy, and arrangements were made for one year's stock of explosives, half of which was consigned to the Free French Air Force and half retained at Takoradi for the R.A.F. Meanwhile an Officer of the Free French Air Force was posted to Takoradi on equipment liaison duties: this appointment facilitated the provision and supply of aircraft engines and M/T. spares and replenishments for the Free French Air Force in Africa.

Aircraft Storage Pool, Takoradi.

During the month of May the increase in the number of aircraft erected outstripped the rate of despatch. This continued until the middle of June when there were some 75 aircraft awaiting despatch for which no pilots were available. As a temporary measure to alleviate this congestion a Storage Pool was designed: its function was to accept those aircraft which had been tested in the Test Flight and to hold them until they were required for despatch. The Officer i/c the Test Flight was put in charge of the Storage Pool (in addition to his Test Flight duties) and he was responsible for the regular maintenance and inspection of these stored aircraft and for ensuring that all necessary anti-corrosive action was taken on them.

At the end of May, 25 Fighter pilots for the Middle East arrived from England and were utilised in ferrying Hurricane and Tomahawk aircraft on their journey to Air H.Q., Middle East. These pilots, in addition to several pilots sent to Takoradi by Air H.Q., Middle East who were to ferry one aircraft each from Takoradi, relieved the increasing

/congestion...

congestion of the Storage Pool, but at the end of May there was still 47 serviceable aircraft which would have been despatched to the Middle East if the necessary pilots had been available. The position was aggravated by the return of air crews from the Middle East which was very slow. This was partly due to the Transport aircraft (Bombays) used for this purpose (in addition to B.O.A.C. aircraft) becoming unserviceable en route from Khartoum to Takoradi. During May, 94 pilots were employed on convoys to the Middle East from Takoradi and only 80 of these returned to Takoradi. However, in spite of the foregoing difficulties, the one hundredth despatch flight had been made on 14 May, and by the end of that month the number of aircraft despatched since the formation of Takoradi Station had reached a total of 613.

By the end of June a considerable reduction had been made in the number of aircraft held in the Storage Pool (182 having been despatched and 150 erected) and in consequence the Pool was amalgamated with the Despatch Flight. An Engineer Officer was posted to the Despatch Flight and was responsible for ensuring the serviceability and maintenance of all aircraft awaiting despatch.

Re-Organisation, Takoradi.

In view of the recently revised Establishment the Technical Section (which had been formed in January 1941)² was now re-organised and comprised:-

1. Headquarters
2. Aircraft Assembly Unit (comprising the Base Erection Section and the Test and Issue Flight)
3. General Engineering Section (comprising Engine Repair Sections and Workshops)
4. Mechanical Transport Repair Section

-
1. viz: 195 Blenheims
 279 Hurricanes
 32 Fulmars
 25 Glen Martins
 82 Tomahawks
 613

2. See page 31 supra.

5. Route Technical & Maintenance Liaison Officer.¹

This organisation was somewhat modified (on 29 May) by the division of the Aircraft Assembly Unit into two Sections:-

1. Assembly Unit

2. Test Flight

which were put under the direct control of the Senior Technical Officer for co-ordinating their requirements and output.²

Buildings.

Takoradi.

During the month of May an additional hangar was erected at the north end of the aerodrome complete with its own gantry and trolleys; this was used exclusively for the erection of Hurricane aircraft. On the completion of one further hangar (then being built) the final distribution of aircraft erection was intended to be as follows:-

Nos. 1 and 2 hangars -- Blenheims; (No. 3 hangar -- Airframe Repair Section); Nos. 4 and 5 hangars -- Glen Martins; Nos. 6 and 7 hangars -- Hurricanes and Tomahawks. A Receipt and Issue Storehouse was also completed and put in use, and two other Storehouses were in course of erection.

Staging-Posts.

It had been decided to construct additional buildings at the Staging-posts, and the Public Works Department, Nigeria, was instructed to put this work in hand. Meanwhile the landing-ground at Bokoro had been found to be unsuitable and the additional buildings intended for this place were therefore cancelled.

-
1. The detailed composition of the Technical Section with a diagram of its organisation - is given in Appendix "K".
 2. A diagram of this modified organisation is given in Appendix "K.1"

A.M.
S. 62177
Part III

Accra.

In order to relieve strain on the runways at the Takoradi aerodrome and to provide for the adequate dispersion of aircraft the Air Ministry decided to move the Despatch Flight from Takoradi to Accra. Plans were accordingly drawn up for the construction of a satellite aerodrome at Accra -- which was to have an establishment of 5 Officers and 103 N.C.O's and other ranks -- and arrangements were made for the supply of petrol, oil, rations etc. for this aerodrome.

Apapa (Lagos).

Meanwhile the Apapa aerodrome (near Lagos) was being extended but the work was brought to a standstill by the loss of the dredger by enemy action (a mine). In view of this delay a satellite aerodrome was constructed by the Public Works Department, Nigeria, at Ikeja, situated some ten miles inland from Lagos and close to the Lagos-Kano Railway.

American Aircraft.

A.M.
S. 10713

In May (1941) the Air Ministry decided to send no more short-range American aircraft to Takoradi as the erection capacity was already fully employed on Blenheims and Hurricanes and, moreover, unless there was a modification of American policy in respect of neutrality, the shipment of American aircraft would have to be made in British ships which -- by an agreement with the Admiralty -- would be subject to the limitation of only 20 aircraft per ship. However, the scheduled commitments for Takoradi were now increased to 200 aircraft per month from Great Britain.

Formation of General Reconnaissance & Anti-Raider and Defence Flights.

A.M.
CS. 8702

At the end of May (1941) the Air Ministry received a copy of a telegram from the West African Governors' Conference (then in session) to the Secretary of State for the Colonies which stressed the need for reconsidering the whole question

/of...

of defence for Takoradi in view of recent occurrences in Syria, and the reported terms of agreement between the Vichy Government and Berlin which indicated that the Germans would demand from Vichy the use of African air bases. The West African Governors believed that there would be no French resistance to such a demand in North Africa and that -- unless the United States were to take positive action -- the Germans would almost certainly be in a position to make heavy air attacks on Takoradi and other places on the West African Reinforcement Route. To combat this grave menace the West African Governors postulated that there were only two alternatives, viz. (1) to abandon Takoradi in favour of a more remote line of supply or (2) to provide adequate air defences for Takoradi which would not only be capable of defending Takoradi and the Reinforcing Route but would also enable the Royal Air Force to anticipate attacks by taking offensive action on the French aerodromes should they be occupied by the Germans.

Ibid.

As a result of this warning the Air Ministry gave instructions to form a General Reconnaissance and Anti-Raider Flight at Takoradi. This Flight consisted of 3 Blenheims; it was later increased to 15 Blenheims of which 12 were kept as a minimum reserve.

On further instructions from the Air Ministry a Fighter Defence Flight was formed at Takoradi early in June consisting of 8 Hurricanes. The General Reconnaissance and Fighter Flights were manned by temporarily improvised crews, and pilots from Takoradi who had operational experience, until the arrival of trained crews and Fighter pilots from England.

Defence of Staging-Posts.

A.M.
S.49953.

While these defence preparations were being made at Takoradi the G.O.C., West Africa¹ and the G.O.C. Sudan² /were making

1. Lieut-Genl. G.J. Giffard.
2. Lieut-Genl. W. Platt.

were making arrangements for the improved defence of the Staging-posts in view of the possibility of air borne raids by Italian long-range aircraft (Savoia 82's) based in the Murzuk area (North-west Libya). Although it was not possible to obtain Field Artillery guns for the Staging-posts they were provided with machine-guns for anti-aircraft use and were garrisoned with detachments of ground troops in addition to the armed R.A.F. ground staffs.

Observer Posts.

During the month of July a chain of Observer Posts was established at eleven places in the Gold Coast Colony for reporting the presence of enemy aircraft. These posts were manned by local officials, the personnel of each post consisting of the Postmaster, Postal Agent or Preventive Officer, and two Watchers.

Air Reinforcement Controller, Middle East.

Meanwhile in June (1941) as a result of information brought back by Mr. Brabner, M.P., the Prime Minister had pressed for an officer to be put in charge of the West African Reinforcement Route as distinct from the Takoradi organisation, Group-Captain B.H.C. Russell (the Deputy Director of War Organisation of the Air Ministry) was selected for this post with the title of Air Reinforcement Controller, attached to Air Headquarters, Middle East. Group-Captain Russell left by air for Takoradi en route for Cairo on 20 June and arrived on 15 July in a Hurricane which he ferried from Takoradi.

The duties of the Air Reinforcement Controller were as follows:-

He was responsible to the A.O.C.-in-C., Middle East, for the delivery of aircraft by air from Assembly Units to Maintenance or other Units in the Command, and for all organisation development along the Reinforcement Route. This responsibility included:-

/(i)..

A.M.
CS.9703

A.M.
CS.9703

- (i) The regulation of aircraft movements (except Civil aircraft) over the Route
- (ii) The welfare, flying discipline and training of the flying personnel engaged on the Routes (through the appropriate Unit Commanders).
- (iii) The adequacy of the maintenance organisation at the Staging-posts and their administration (through the appropriate subordinate R.A.F. formation Commanders).
- (iv) The adequacy of accommodation, construction and improvement of aerodromes and landing-grounds (in conjunction with the Works Service or local authorities concerned).
- (v) The adequacy of the Signals organisation¹ and the Air Route Meteorological Service organisation (in conjunction with the Chief Signals Officer and the Command Meteorological Officer respectively).
- (vi) Liaison with the B.O.A.C. and other transport organisations whose services were employed and who used the Reinforcing Routes.
- (vii) The aviation fuel and oil arrangements affecting the Reinforcement Routes (in conjunction with the Senior Equipment Staff Officer).

To assist Group-Captain Russell in these duties Wing-Commander J.B. Sims was appointed Deputy Air Reinforcement Controller.

/SUMMARY

1. And its development.

V. SUMMARY OF ACTIVITIES AND ORGANISATION
JULY 1940 - AUGUST 1941

From the inauguration of Takoradi (July 1940) and the Reinforcement Route (August 1940) the organisation was expanded on the lines which have already been indicated. The rate of aircraft received, erected and despatched to Air Headquarters, Middle East, increased steadily while at the same time ancillary organisations were expanded as became necessary. In this connection the Signals organisation evolved into an independent Royal Air Force point to point system working in parallel with a civil ground to air organisation.¹ At the same time the construction of an R.A.F. Hospital was begun. During the course of its erection one of the Civilian bungalows was used as a convalescent home to augment the available accommodation in the Civil European Hospital.

Production of Aircraft.

As the production at Takoradi developed so its commitments were increased by the Air Ministry. From 125 aircraft per month in October 1940 the scheduled commitments were increased to 130 per month in November 1940, to 180 in January 1941, and 200 in May 1941.

Increase in Personnel.

This expansion necessitated a corresponding increase in the number of personnel and regular drafts were sent to Takoradi from England at intervals of approximately six weeks. In October 1940 the personnel numbered some 400 which had grown to about 800 in February 1941 and was established at nearly 2,000 in the spring of 1941.²

Operations "Stripe", "Monsoon" and "Pageant".

The expansion of the production capacity

1. See page 64 infra
2. i.e. excluding civilians

resulting from the increase in personnel soon became in advance of the number of aircraft arriving at Takoradi, but in December 1940 the arrival of a complete Hurricane Squadron in H.M.S. "Furious" (Operation "Stripe") provided the necessary additional aircraft to fill the erecting capacity of Takoradi Station. The successful operation of flying the Hurricanes off the "Furious" was repeated in January and March 1941 in Operations "Monsoon" and "Pageant".

American Aircraft.

The arrival from America on 8th February 1941 of 100 Tomahawks and 20 Glen Martins provided a pool of crated aircraft on which the Station worked to its full capacity. During March further consignments of American aircraft followed until 222 Tomahawks and 64 Glen Martins had been received.

These large consignments of American aircraft - in addition to Blenheims and Hurricanes - taxed the erecting and testing resources of the Station to the utmost and all personnel were working longer hours than was desirable in view of the climatic conditions. At the same time the initial shortage of special equipment needed for the erection of the Tomahawk aircraft retarded progress considerably.

Calls for Maximum Effort of Output.

In March and July 1941 two calls were made on Takoradi for maximum efforts; the first (from Air Headquarters, Middle East) asked for every aircraft that could be despatched in the shortest possible time, and the second (from the Chief of the Air Staff) called for every available Blenheim that could be sent to the Middle East within a period of three weeks and resulted in 92 Blenheims

/being

being despatched in July. To cope with these demands the working hours at Takoradi were extended from 9 to 10 $\frac{1}{2}$ daily.

In May 1941 the Air Ministry decided that no further American aircraft were to be sent to Takoradi, but owing to the pool of American aircraft the production rose to its maximum of 203 aircraft erected in June, and 182 aircraft were despatched to the Middle East in July. This lag of despatch was due to the inadequate air transport for the return of the ferry pilots; however, in August sufficient transport aircraft became available for this purpose.

During July 1941 the hiatus between the deletion of American aircraft and the substitution of British aircraft in their place became evident. For that reason the erection figures fell to 150 in July and 125 in August, the number of aircraft despatched being 182 in July and 151 in August. But in fact if aircraft had continued to arrive at Takoradi in sufficient numbers the erection of 200 per month could have been maintained.

At the end of the first year from the inauguration of the West African Reinforcement Route a total of 1,273 aircraft were delivered at Takoradi, 1,177 aircraft were erected, and 1,099 aircraft were¹ despatched to the Middle East.

During the above period the number of aircraft which were written off owing to flying accidents etc. on the Takoradi - Ati Section of the Route was 31,² representing a percentage of 2,82. The corresponding
/wastage

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1. Summaries (A, B and C) showing numbers and types of aircraft delivered, erected and despatched during this period are given in Appendix "I".
 2. A Summary showing numbers and types of aircraft written off is given in Appendix "I.1".

wastage for the remainder of the Route (Ati - Abu Sueir)¹ is known to have been less than the above, and it can therefore be safely assumed that the wastage over the whole Route did not exceed 6% of the aircraft despatched, or, in other words, 94% reached Air Headquarters, Middle East, and were available for operational use.

Organisation (as at August 1941).²

As already stated Takoradi Station was in general divided into three main divisions:-

- (i) The Station Headquarters.
- (ii) An Aircraft Assembly Unit (which became merged in the Technical Section).
- (iii) The Communication Flight.

There was also a small Supplies Depot.

By the summer of 1941 certain modifications had been made from time to time and the organisation was then as follows:-

- (i) The Station Headquarters including the Equipment, Signals and Accounting sections each with an Officer in charge, and an Orderly Room under the Station Administrative Officer. The Senior Technical Officer and the Officer i/c Flying were attached to the Station Headquarters in addition to their respective Commands of the Technical Section and Communication Unit. For administrative and disciplinary purposes the Port Detachment came under the Station Headquarters but it was independent for executive matters.

- (ii) The Technical Section. The reorganisation /of

1. The exact figures are not available.
 2. On page 12 supra.

of this Section has already been described on page 42 supra.

- (iii) The Communication Unit had been sub-divided into a Servicing and Despatch Flight (to which the ferry pilots were attached) and the General Reconnaissance and Defence Flights. The Servicing and Despatch Flight including a small Training Section for the ¹ conversion of pilots.

The administration of Takoradi Station was organised on normal Royal Air Force lines. The internal administration of all the Departmental Sections was the responsibility of the Officers Commanding the Units in charge of the Sections, and similarly the Officers in charge of the various Sections of the Station Headquarters were responsible to the Commanding Officer for the organisation and efficiency of the Sections and to the Station Administrative Officer for internal administration of their Sections.

Maintenance.

General. The supply of equipment for Takoradi Station was based initially on a proportion of the War Equipment Schedule for an Aircraft Depot ² in the field. This was, however, a rough approximation of the probable needs of the Station, and it was found that there was a surplus in workshop equipment but insufficient supplies of such items as airframe and engine spares, tools and A.G.S. sundries.

Technical Equipment. A number of aircraft arrived at Takoradi deficient in various respects or

1. A diagram of the organisation of the Station is given in Appendix "M".
2. This proportion comprised one half of Column 9 of the Schedule equipment for erection of aircraft - and one-fifth of Column 10 - maintenance.

damaged. This was a grave handicap as it was not possible to obtain the missing items locally. For this reason it was necessary to "rob back" from other aircraft on the production line. When this was reported to the Air Ministry the home Maintenance Command took immediate action to improve the packing condition of aircraft before they were despatched to Takoradi. This improvement lasted until August 1941 when deficiencies began to recur and damaged aircraft again began to be shipped.

In general, it was necessary to supply all erection stores in adequate quantities and in advance of the arrival of aircraft: the extent to which improvisation and local purchase of erection items could be employed was very limited. Moreover the geographical position of Takoradi and the time taken for supplies from England made it necessary to hold surplus stocks in case of emergency.

Food Supply. The majority of rations for Takoradi were supplied from England and these were supplemented by locally-grown vegetables and fruit and the R.A.F. vegetable plantation.

The ration scale from England was designed on the basis of scales existing in the Middle East, but experience of West African conditions showed that this scale was inadequate in certain respects, and early in 1941 the Air Ministry agreed that a revised scale should be adopted which was based on the Army's ration scale at Sierra Leone. It was originally intended to keep a 30 days reserve of food supplies at Takoradi, but owing to sinkings of ships and other delays it was finally decided that a 90 days reserve should be held. /In

In the Spring of 1941 the increasing strength of the Army in West Africa resulted in a suggestion by G.H.Q. to the Air Ministry that the Royal Army Service Corps should take over the food supplies to Takoradi. It was thought at Takoradi that this suggested change would be a disadvantage as the system which had been built up was working efficiently. However, in July (1941) the Air Ministry decided that the R.A.S.C. should supply Takoradi and the change over was effected accordingly.

Clothing. The initial supplies of clothing for the R.A.F. personnel were quite inadequate, and local supplies of khaki cloth were small. As the year advanced, the supply of clothing from England improved considerably.

Supply of Staging-Posts. The supplying of the Staging-posts was complicated by the lack of sufficient air transport. Skeleton equipment was taken to the Staging-posts with the initial detachments of personnel, but it was generally necessary to supply additional technical equipment, spares and tools, by air transport, the alternative being sea and rail transport which occasioned very considerable delay. For this reason it was found to be impracticable to supply rations to the Staging-posts in Nigeria but this was obviated by the fact that local food supplies were adequate. It was therefore arranged that the Staging-posts should provide their own commissariat and, where necessary, a special ration allowance was issued.

/Petrol.

Petrol. Supplies of petrol were obtained from the Shell Company of West Africa for Takoradi station and its detachments, and throughout the year supplies were regular and adequate. By the Summer of 1941 it had been decided that a minimum of three months' supply should be held at Takoradi and of one month's supply at the Staging-posts, as the petrol supplies depended on a limited quantity of shipping which, although adequate, was liable to interruption.

Repair and Salvage.

Takoradi Station was responsible for the repair and salvage of all service aircraft on the section of the West African Reinforcement Route from Takoradi to
¹
 Abecher in the Chad Province of French Equatorial Africa, a distance of some 1,700 miles of sea, swamp, forest and bush. The Sudan section of the Route was the responsibility of No.203 Group, Khartoum.

²
 As already stated the casualties to aircraft along the whole Route amounted to approximately 5% to 6% of which nearly 3% occurred in the Takoradi - Ati Section. There were, therefore, between 3 and 6 aircraft damaged beyond repair each month for which salvage was necessary. Most of these casualties occurred in the vicinity of the landing-grounds, although cases of minor damage (necessitating the changing of engine, airscrew, etc.) were repaired where possibly by the fitting of new replacement parts.

Owing to lack of personnel in 1940 it was not possible to form an organised repair and salvage system along the Route, and work of this nature had to be performed by the ordinary servicing parties at the Staging-

1. Situated between Ati and Geneina.

2. On Page 52 supra.

posts. On the substantial increase of personnel in 1941 small salvage parties (consisting of three N.C.O's and nine airmen) were attached to each "major" Staging -post, and at the same time the Route was divided into salvage areas, each "major" Staging-post being responsible for all salvage in its area.

In July 1941 an R.A.F. Engineer Officer, known as the Route Technical Officer, was posted at Takoradi to liaise between Takoradi and the Staging-posts of the Takoradi - Ati Section of the Route. He was responsible to the Senior Technical Officer for the co-ordination of maintenance, repair and salvage of aircraft at Staging-posts and for collecting and consolidating technical data and reports.

Buildings.

Takoradi.

During the period September 1940 to August 1941 Takoradi grew from a station consisting of one Officers' Mess, one Airmen's Barrack Room, one Office Block and one hangar to a station of some sixty buildings including six hangars. The building programme at Takoradi may be divided into the following sections:-

(i) Additional Accommodation.

Additional accommodation had to be provided according to the increases of personnel and it was carried out by the Gold Coast Public Works Department. It included the erection of wooden bungalows (each holding 30 men) with a dining-hall, a Sergeants' Mess and Sergeants' quarters (constructed of timber) and a N.A.A.F.I.

The dining-hall, Sergeants' Mess and N.A.A.F.I. were built of sandcrete, and all buildings had concrete floors.

After the original site of the airmen's bungalows had been filled a new camp was made half a mile to the west of the Technical School where five further bungalows were erected.

(ii) Hangars and Workshops.

In addition to the one existing hangar and two Bellman hangars sent out by the Air Ministry four further hangars were demanded as the work at Takoradi expanded, making a total of seven in all. With the reduction of aircraft commitment consequent upon the deletion of American aircraft the seventh hangar (which was only partially erected) was removed to Lagos for use as a subsidiary and emergency assembly point.

Parallel with the erection of the hangars concrete concourses were laid down and workshop buildings were erected, and light railway tracks and gentries for handling aircraft cases were laid and erected by the Gold Coast Railways Department.

(iii) Administrative Buildings and Storehouses.

Two additional Office Blocks and a series of storehouses were erected (in sandcrete) and a Mechanical Transport Office and park and Signals and Cypher Offices were also constructed.

Staging-Posts.

The buildings at the Staging-posts included Officers' and airmen's accommodation, except at

Ati where existing huts were taken over.

At Maiduguri the old Residency was used as an Officers' Mess and the airmen's¹ accommodation was provided by "swish" huts.

At Lagos, Oshogbo and Kano the Officers' Messes were built in sandcrete while the airmen's accommodation was similar to that at Takoradi.

During the year mosquito proofing was carried out in all these quarters with the exception of the Officers' and airmen's quarters at Maiduguri. All these works were undertaken by the Nigerian Public Works Department,

Several delays occurred in the above building programmes as a whole chiefly due to the shortage of local building materials, but the programme was speeded up considerably on the Air Ministry authorising the purchase of cement (and tar for the aerodrome runways) from South Africa. The want of an R.A.F. Works and Buildings Engineer was particularly felt as although one of the Gold Coast Public Works Department's Engineers was permanently attached to Takoradi aerodrome his commitments to his own department necessarily absorbed a considerable amount of his time and activities.

Operating Detail.

By September 1940 the major portion of the preliminary work at Takoradi had been completed and the organisation of the Station had been formulated and satisfactory results obtained.

1. "Swish" huts were built of mud with a thatched roof.

Initially, Taboradi was designed to deal with 120 aircraft per month, but this figure was increased to 150, then to 180 and later to 200. In spite of these increases it was found that the original organisation was sound. Although detailed alterations were made in the methods of erection of aircraft, despatch flight schedules were amended and changes in administration occurred, the initial internal policy of the Station was maintained and expanded. The extension of this internal policy, together with the detailed amendments in organisation are contained in Appendix "N" under the headings of Port Detachment, Aircraft Assembly Unit, Servicing and Despatch Flight, and Repair and Salvage. Communications.

Civil.

Prior to 1940 the establishment of aircraft Wireless services across Africa by the Colonial Governments concerned (with the help and advice of the Civil Aviation Department of the Air Ministry) provided communication facilities for the Civil Aviation Companies which were operating for five years before the outbreak of war. From this system arose a heterogeneous collection of parochial Wireless Stations whose essential concern was that of communication with aircraft in their vicinity. These stations were not linked by any complementary "ground to ground" system, and although they could and did communicate with one another on the aircraft wavelengths this communication was a subsidiary arrangement only made possible by the very infrequent movements of aircraft. These Wireless Stations, therefore, did not constitute the communication system which is vital to the operation and administration of an extensive air route, although they were of great value to the captains of aircraft while in flight.

/Situation

Situation in July 1940.

The Civil Wireless stations available across Africa in July 1940 (when the Reinforcement Route was about to be inaugurated) are detailed in Appendix "O". The limitations of these Wireless stations were realised to some extent after the arrival of the R.A.F. Advanced Party at Takoradi but the time factor was of such great importance that it was impracticable to obtain and instal adequate R.A.F. Signals apparatus along the Route before the ferry flights began. For this reason it was decided to utilise the scanty R.A.F. apparatus and few personnel which were available so as to bolster up the weakest parts of the Civil system.

The signal organisation drawn up when ferrying of aircraft began in September 1940 is given in Appendix "O.1". The difficult flying country to be traversed required that all available Wireless facilities should be concentrated to assist aircraft in flight. Accordingly aircraft type receivers with Direction Finding loops were installed at Maiduguri, Geneina and El Fasher in order to offset to some extent the lack of permanent Direction Finding equipment at these Staging-posts. R.A.F. Wireless Operators were also attached to some Civil stations to replace African operators when it was considered undesirable to employ in handling R.A.F. messages which, in the absence of cyphers, had to be in plain language.

As no independent point to point Signals system existed, the Civil Wireless stations were organised into sections for passing aircraft movement and meteorological information along the Reinforcement Route. To prevent interference with aircraft, stations

/were

were permitted to work point to point only when no aircraft were flying in their section.

For the sake of security aircraft were instructed to keep Wireless silence throughout the first despatch flight (19 September 1940) except in emergency. The first flight therefore did not test the efficiency of the Wireless navigational aids along the Route. It did, however, show up the extreme weakness of the point to point arrangements; and in fact movement and meteorological signs were so seriously delayed as to be valueless. But without additional apparatus and personnel little could be done to improve matters.

Development of the R.A.F. Signals System.

Meanwhile at Takoradi a Wireless Station was being erected for communication with the Air Ministry and Air Headquarters, Middle East. The Civil Wireless station at Takoradi was not far from the harbour and the R.A.F. Station and it provided good accommodation for the R.A.F.'s two S.W.B.8.B. transmitters, although it was not ideal as a war site being too conspicuous from both the air and the sea. The two transmitters were in contact with the Air Ministry and Khartoum by 16 October (1940), and a few days later an A.1087 transmitter was in operation for communication with the Staging-posts.

At the end of 1940 the Takoradi Signals Section was becoming inundated with the increasing number of both the R.A.F. aircraft convoys and the B.O.A.C. traffic along the route, with the result that heavy demands were made on the flimsy point to point system. Moreover the inadequate personnel for cyphering duties was a serious disadvantage. As there were only three R.A.F. Cypher Officers the

/cypher.

cypher work at the Staging-posts had to be done by N.C.O's who were already fully occupied with the work of handling convoys. Later on, when Cypher Officers became available for the Staging-posts, they were in some cases the only officer at their station and were therefore responsible for the administration of their post in addition to their Cypher duties.

By the end of January (1941) more apparatus and personnel had arrived at Takoradi sufficient for one 1097 transmitter and four R.A.F. Officers to be established at Lagos, Kano and Maiduguri. By this time the Sudan Section of the route had also obtained added facilities (mostly pack sets) and it was then possible to establish a skeleton point to point system across the whole length of the Route. None the less there was little improvement in the speed of signalling between the Staging-posts as the R.A.F. Operators and equipment in the Nigerian section of the Route were still under the control of the Civil Wireless station Superintendents. These stations did not, therefore, link up easily with the Sudan section and it became apparent that with this lack of uniformity of method and direction the Signals system could not function satisfactorily.

Revised Signals Plan.

In view of these difficulties Air Headquarters,¹ Middle East, drew up a revised Signals plan which provided for independent R.A.F. aircraft and ground signalling systems throughout the Route, the control of these systems being placed under the R.A.F. Chief Signals Officer, West Africa.² This plan was approved by the Air Ministry in May (1941) shortly before

/Wing Commander

1. An outline of this plan is given in Appendix "O.2".
2. The Chief Signals Officer, Takoradi was also C.S.O., West Africa.

Wing Commander L.T. Keens arrived at Takoradi from England as Chief Signals Officer in succession to Squadron Leader Sheppard Smith who had been invalided to England two months previously.

The modified Signals plan involved the building of much additional equipment at the Staging-posts. Meanwhile it was necessary to organise the existing facilities into a basic system which could be expanded without dislocation. The control of the R.A.F. Wireless at the Nigerian stations was therefore removed from the Civil Superintendent and an independent point to point system was established.

From May (1941) the modified Signals plan was implemented and by the end of August (1941) it was functioning satisfactorily. During that month additional apparatus and equipment had begun to arrive and the building programme was nearing completion. The new apparatus was flown to the Staging-posts to ensure its arrival in an undamaged condition, 1087 transmitters and even 9 kilo Meadows petrol-electric sets being loaded into Bombay aircraft and transported securely.

Meteorological.

Inauguration of R.A.F. Service.

On the formation of the R.A.F. Station, Takoradi, it was decided to use the existing British West African Meteorological Service, but it was soon realised that it was necessary for this service to be expanded in order to provide meteorological information required for the ferry convoys of aircraft to the Middle East.

In September 1940 four R.A.F. Meteorological

/Officers

Officers arrived at Takoradi: two of these remained there but the other two were posted to Accra and Lagos respectively. Owing to the absence of a unified control there was at first some misunderstanding between the Civil and R.A.F Meteorological personnel, but these difficulties were overcome when the Air Ministry adopted a scheme put forward by Group-Captain F. Entwistle and appointed the Director of the British West African Meteorological Service in charge.

Summary of G/Capt.
Entwistle's Report
(D.Ops.Overseas
A.H.B.II.J/15/9)

This scheme was the result of investigations made by Group-Captain F. Entwistle (of the Air Ministry's Meteorological Office) who had been sent in November 1940 on a tour of Africa and the Eastern Mediterranean to investigate the meteorological organisation required for the West African and the (projected) United States - Trinidad¹ - Bathurst² - Great Britain Reinforcement Routes. During his tour Group-Captain Entwistle had discussions with the West African and Sudan Governments, Army Headquarters, Sudan, the A.O.C.-in-C. Middle East, the A.O.C. No.203 Group, Sudan, and the O.C. R.A.F. Station, Takoradi; his scheme included the reorganisation of the Meteorological Service in West Africa under Air Ministry control, with main forecasting stations at Bathurst,³ Freetown, Takoradi, Lagos and Maiduguri, and the absorption of the Sudan Meteorological Service in that of the Middle East.

Results Achieved.

During the year July 1940 - August 1941 the following results were achieved in the reorganised West African meteorological system:-

/(i)

1. West Indies.
2. Gambia.
3. Sierra Leone

- (i) The opening of meteorological observation stations at Axim,¹ Ada,² Elmina³ and Saltpond⁴ in the Gold Coast Colony and some additional stations in Nigeria.
- (ii) The recruiting and training of additional African Observers to staff the new stations.
- (iii) The installation of Wireless receivers at all meteorological stations for the reception and transmission of meteorological information.
- (iv) An increase in the number of meteorological reports received from the Belgian Congo, the French Cameroons, French Equatorial Africa and the Sudan.

These increased facilities enabled relatively complete synoptic charts to be compiled several times a day with a consequent improvement in the accuracy of forecasting.

The chief difficulties experienced throughout the year were in relation to communications and personnel. Owing to the congested state of the Signals system it was not possible to provide adequately for the transmission of meteorological reports by Wireless. At the same time the personnel of the R.A.F. meteorological staff was too few in numbers to cope with the work. However, the deficiency of personnel was to be overcome when an increased staff became available under the scale laid down in the "Entwistle Scheme".

Suggestions by the O. C. R. A. F. Station Takoradi.

The chief points which the O. C. R. A. F. Station, Takoradi, considered should be borne in mind if a similar scheme were to be put in operation elsewhere were as

follows:-

1. Situated approx. 30 miles east of Takoradi.
2. Situated approx. 65 miles west of Accra.
3. Situated approx. 30 miles west of Takoradi.
4. Situated approx. 60 miles west of Takoradi.

/(i)

- (i) R.A.F. Meteorological Officers should be posted immediately as liaison officers to any existing meteorological service which it might be intended to use.
- (ii) If no adequate meteorological service should exist a self-contained service should be developed with its own personnel and equipment on the following lines:-
 - (a) The Meteorological Station should have equal status with other Sections of the Headquarters Station.
 - (b) The Forecasting Officers should be given all available climatological data for study before being posted.

[Note. The climatic conditions of the West African Reinforcement Route are described in Appendix "H".]

Security.

General.

There were two main aspects which had to be considered, namely (a) the security of the R.A.F. Station, Takoradi and (b) the security of the Reinforcement Route.

- (a) The Gold Coast Colony (in which Takoradi is situated) was surrounded on three sides by Vichy-controlled territory which extended to and beyond Dakar and Senegal. This territory provided a good base for enemy aircraft at Dakar and also a number of advanced landing-grounds available on the Ivory Coast which could be used in any air operations against Takoradi. Moreover,

/Dakar

Moreover, Dakar and Senegal, Abijam and Port Mowe in Dahomey provided suitable bases for the operation of enemy submarines off the Gold Coast Colony.

- (b) Although that part of French Equatorial Africa over which the Reinforcement Route passes was secured by the French Colonies which had declared for General de Gaulle, the section of the Route from Kano to the vicinity of Fort Lamy was within 100 miles of Vichy territory.

At the same time that part of the Route which passed through French Equatorial Africa and beyond in the neighbourhood of Fort Lamy, Geneina and El Fasher was within range of long-range Italian aircraft from Libya.

Defence and Security Measures.

Air/Cmdre.
Grigson's
Report: A.M.
CS.10564

(i) From the Air.

According to Air-Commodore J.W.B. Grigson,¹ who visited Takoradi in June (1941), the general impression of Takoradi of an air observer in the air would be "What a lovely bombing target". The possibility of air attacks on Takoradi had been only partially met by some Bofor guns on and near the aerodrome, and two heavy anti-aircraft/civil defence guns on the shore whose primary role was coast defence. In July four more heavy guns were en route from England, and a further eight heavy and four light guns were expected to arrive between September and December (1941), but even then the total of these weapons was considered by the anti-aircraft gunners to provide only a minimum scale of

¹ Air/Cmdre. Grigson had been sent by the Air Ministry on a liaison visit to Army H.Q., West Africa.

protection for the aerodrome and harbour. (It was, however, expected that the armament would eventually be completed to a total of sixteen heavy and twelve light guns in 1942).

2

Ibid The formation of the Defence Flight provided active defence in the air, but (as its accommodation was limited) in the event of an alarm its activities were liable to be hampered by the landing of aircraft recalled from testing.

The question of the recognition of friendly aircraft was also considered, and local flying regulations (based on those already existing in the Middle East) were promulgated. Moreover, minimum and maximum flying heights were laid down, and a corridor system was used for aircraft proceeding to and from Takoradi on the Lagos and Freetown routes. In view of the amount of air testing which was carried out a close liaison was established between the Artillery control room and the R.A.F. Watch Office so that the gunners could be informed immediately of any abnormal flying which might occur.

In conformity with Army regulations the use of cameras was prohibited, and entrance to the aerodrome was only permitted on the production of a pass. As a precaution against attempted sabotage the Army authorities maintained standing military patrols over the whole aerodrome.

(ii) From the Sea.

The possibility of hostile attack from the sea had also to be considered. The situation of the aerodrome, which was shielded from the sea by a ridge of ground, made it probable that any attack from the sea would be centred on the harbour. Alternatively, if the aerodrome were shelled it would be necessary for the ship's guns to

2. See page 45 supra.

be directed by "spotter" aircraft. After the formation of the Defence Flight this latter danger was considered to be negligible as a Hurricane of the Defence Flight could deal effectively with any "spotter" aircraft. The chief danger, therefore, would be long range shelling of the harbour but this would be countered by the General Reconnaissance Flight.

During the Spring of 1941 a ship sailing from Takoradi to Lagos was torpedoed off Accra, the harbour dredger at Lagos was sunk by a mine, and Takoradi and Lagos harbours were closed for some days by magnetic mines which had probably been sown by an enemy submarine. In view of the possible further closing of Takoradi harbour the Air Ministry agreed that a small alternative aircraft assembly base should be formed at Lagos. This was done, one hangar from Takoradi (which had become redundant on the deletion of American aircraft) being dismantled and moved to Lagos for this purpose.

Defence of Staging-Posts.

The defence of the Staging-posts of the Reinforcement Route was undertaken (as already described)¹ by the Army with the addition of R.A.F. ground staffs. In this connection the G.O.C.-in-C., West Africa² made representations to the War Office that an alternative route from Lagos via Enugu³ and Yola⁴ should be provided in case the northern section of the Reinforcement Route should become the scene of military operations. The O.C. R.A.F. Station, Takoradi, considered this suggested alternative route unsatisfactory on the grounds that it was not sufficiently far removed from the existing route to ensure safety as it would still be necessary for an alternative stop to be made between Yola and Geneina which would imply

1. On page 46 supra.

2. Lieut-Gen. G.J. Giffard

3. Situated approx. 270 miles east of Lagos.

4. Situated approx. 400 miles north-east of Enugu.

the use of Fort Lamy and Ati: moreover, in his opinion, it would require the siting of a parallel organisation which would be wasteful

unless it were completely secure. He therefore

suggested to the Air Ministry that an alternative route (if considered necessary) should be in the

nature of a wide diversion from the existing route

by passing through Douala¹ and the French and Belgian² Congos.

Medical.

General.

Although most tropical diseases are endemic in West Africa only two seriously affected the R.A.F. personnel, namely:-

(i) The Dysenteric Group of infections.

(ii) Malaria.

(i) Dysenteric Group.

Infections from both bacillary and amoebic dysenteries occurred, but were mild and relatively infrequent. The low incidence rate was a proof of the efficacy of the standardised precautions against these diseases in the Tropics.

(ii) Malaria.

Malaria was the main problem of the Medical Staff. The introduction of a large number of non-immune personnel into a highly endemic area is inevitably followed by the disease in epidemic form and, as could be foretold, the peak of malarial incidence occurred during the rainy season. Every possible precaution was taken to minimise this incidence and

1. Situated (in the French Cameroons) approx. 450 miles south-east of Legos, /the

2. The subsequent arrangements for this alternative Route are narrated on pages 89 - 92, infra.

the highest figure recorded (in June 1941) showed that some 20% of the whole strength of Takoradi Station were in hospital with malaria. At this time, however, the buildings of the R.A.F. camp had not yet been mosquito-proofed owing to the difficulty in obtaining material.

The introduction of a 66-hour week during March, April and May 1941 consequent upon the increased production drive was no doubt the cause of a steep rise in sickness which occurred with a peak in May. However, during that month some fifty debilitated personnel were posted back to England and this - in conjunction with the reduction of working hours in June - resulted in a nett fall of total hours of work lost.

Hospitalisation of the Sick.

The very limited accommodation in the Civil Hospital at Takoradi necessitated the building of an R.A.F. Hospital (which could be used as a Civil Hospital after the war) and a building for this purpose was designed to accommodate 80 - 100 patients. Owing to various causes the erection of this building progressed very slowly and was not completed until January 1942. In the meantime extra accommodation was provided by a small bungalow in the residential area of Takoradi which could accommodate up to 20 patients.

In May 1941 it was found necessary to ask the assistance of the Officer Commanding the 52nd General Hospital at Sekondi (five miles distant from Takoradi) and the O.C. (Colonel Spicer) arranged for part of this building to be used by the R.A.F. This hospital was intended for African troops; it was situated in a swampy malarial district and had not been mosquito-proofed. Nevertheless, in spite of these obvious disadvantages, this Hospital received at

/times

1. See page 37 supra.

times up to 40 R.A.F. patients.

In May 1941 a Barrack Block bungalow was handed over as an Emergency Sick Quarters: it could accommodate up to 20 less seriously ill patients.

An adequate Medical Inspection and Dental Centre was completed at the main R.A.F. camp in March 1941.

Staging-posts.

The malarial incidence was highest at Lagos but diminished progressively at each Staging-post along the Route.

Initially, all personnel of the Nigerian Staging-posts were in charge of Medical Officers of the Colonial Service; the detachments at Kaduna and Kano were later taken over by the Royal Army Medical Corps.

Welfare.

Takoradi.

The effects of the climate and the long working hours made it imperative that adequate recreational facilities should be arranged for the personnel. This was provided by cricket, football, hockey, and bathing facilities, visits by parties to places of interest (e.g. Cape Coast Castle), a band and concert party, and a small N.A.A.F.I., and (later) by indoor recreation rooms and a library. The arrival of an R.A.F. Chaplain greatly assisted the detail matters of welfare, the Chaplain studying the well-being of the personnel in addition to his duties of attending to their spiritual needs. The opening at Takoradi of a Church of England Chapel (sited near the airmen's quarters) on Whitsunday, 1 June 1941, met with general appreciation.

Staging-posts.

The problem of welfare at the Staging-posts

/was

was easier in many respects than at Takoradi, as the detachments were comparatively small and could be absorbed into the social activities of the local civil communities. Regular supplies of N.A.A.F.I. goods and comforts were organised for the Staging-posts from Takoradi and all mails were forwarded promptly.

VI. EXPANSION OF THE REINFORCEMENT ROUTE, 1941-1943.

Pan-American Airways.

During the Summer of 1941 the organisation for the supply of aircraft to the Middle East along the Reinforcement Route was expanded considerably by the offer and acceptance of assistance from the United States Government.

Sig. A.482
of 31 May '41.
A.O.C.-in-C.,
M.E., to C.A.S.
(Personal File,
A.O.C.-in-C.,
Parts I & II
"Corresp:
with the P.M.,
Sec.of State,
and C.A.S.")

In May (1941) Captain James Roosevelt (a son of the President of the U.S.A.) while on a visit to Air Headquarters, Middle East, suggested to the A.O.C.-in-C., (Air Marshal Tedder) that the United States Government should assist Great Britain by inaugurating a supplementary Reinforcement Route to Egypt.¹ The Scheme envisaged the leasing to the United States of an "all-American" base at Bathurst (Gambia) to which American bomber aircraft would be flown from the U.S.A., and thence by an American pilots organisation to the Middle East. By this means the supply of American aircraft would be materially accelerated and the R.A.F. Station, Takoradi, would be able to concentrate on the erection and despatch of British types of aircraft.

Meanwhile Mr. W.A. Harriman (President Roosevelt's Commercial Envoy) was on his way to the Middle East to investigate the question of supply on a large scale of munitions of all kinds from the United States to the British Forces in Africa. On instructions from the Air Ministry the O.C., R.A.F. Station, Takoradi, (Air Commodore Thorold) accompanied by his Senior Technical Officer (Wing Commander Beckwith) arrived at Bathurst on 10 June to meet Mr. Harriman. They found Captain James Roosevelt (who was accompanied by Captain Lord Louis Mountbatten, R.N.) at Bathurst but Mr. Harriman's arrival was delayed. Air Commodore Thorold prepared a memorandum for Lord Louis Mountbatten which

/detailed

1. Capt. Roosevelt also suggested the building of an American base at Port Sudan for the erection of American aircraft, tanks and M.T. for delivery to the British Army and the R.A.F. Ibid.

detailed the requirements in personnel and equipment which would be necessary to establish a small scale erection and despatch Section at Bathurst to handle crated aircraft from America, and the requirements for a large scale trans-Atlantic ferry stage (on the lines of Captain Roosevelt's suggestion to the A.O.C.-in-C., Middle East) were also discussed. Mr. Harriman and his party¹ arrived on 12 June and having inspected Jeswang aerodrome (some six miles south of Bathurst) left by air with Air Commodore Thorold for Freetown to see the aerodrome at Hastings (near Freetown). On 15 June the party flew to Lagos and proceeded on the following day to Takoradi where the flying organisation was inspected. Before their departure next day the party visited the Gold Coast Railway Workshops at Sekondi, and Mr. Harriman was given a memorandum containing a brief description of the growth and organisation at Takoradi. Before leaving, Mr. Harriman sent a signal to the Prime Minister stating that he considered the erection situation in Takoradi satisfactory but expressing his surprise at the quantity of imports to the Gold Coast from Great Britain which, he considered, could be more easily supplied direct from America under "lease-lend".

The investigations of the "Harriman Mission" resulted in an offer (in June) by the U.S. Government to undertake:-

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- (a) The ferrying of (complete) aircraft from the U.S.A. via Brazil across the South Atlantic to West Africa.
- (b) The assembly at Takoradi of aircraft that could not be flown across the South Atlantic, and the onward ferrying to Khartoum, or some other agreed point near the operational zone in the Middle East, of these aircraft and of those that had been flown across the South Atlantic.

/(c)

1. Which included Gen. Royce (U.S. Army Air Corps), Col. Green and Col. Clarke.

- (c) The operation of a transport service for conveying the ferry pilots employed on this work back to West Africa from the delivery point in the Sudan or Egypt.

The United States Government proposed that Pan-American Airways (through a subsidiary company known as Pan-American Airways - Africa¹) should operate these services by direct agreement with the British authorities.

Ibid

The British Government gratefully accepted these proposals, and on 25 June it informed the U.S. authorities that if Pan-American Airways would take over the ferrying of British as well as American types of aircraft, the full responsibility for the ferrying from Takoradi to the Middle East could be left in the hands of the United States.

The acceptance by the British Government of the United States' proposals was followed (in July) by negotiations at Washington between the U.S. authorities and the Royal Air Force Delegation (headed by Air Marshal A.T. Harris). On

Ibid (passim)
and Air Min.
Publication
"Agreements
between the
U.K.Govt.,
the U.S.A.
War Dept.,
Pan-American
Airways
Inc., etc."

the completion of these negotiations (which were somewhat protracted owing to the many complex details and safeguards contingent upon the scheme) contracts were made (on 12 August) between the United States War Department, Pan-American Airways, and its subsidiary companies² which, briefly, provided for the operation by these companies of ferrying services across the South Atlantic and the Trans-African Route³. A supplementary agreement was also made on 12 August between the British Government and "African" regarding the operation by the latter of the Trans-African Transport Service. The principal provisions of this supplementary agreement were as follows:-

/(i)

1. Hereafter referred to as "African".
2. i.e. "African" and Pan-American Air Ferries, (hereafter referred to as P.A. Air Ferries).
3. Details of the salient points contained in these contracts are given in the next paragraph.

(i) "African" agreed to initiate a Trans-African Transport Service including the carrying of passengers and cargo.

(ii) The British Government agreed:-

- (a) To use its best endeavours to secure the necessary permits from the Colonial Governments concerned, the Sudan and the Free French authorities, for "African" to operate a regular transport service on the Trans-African Route, for a period of one year (in the first instance).
- (b) To obtain for "African" the right to use free of charge all ground organisations (including rest-houses) and any additional land that might be required.
- (c) To indemnify "African" against all taxes, duties etc. and to secure the expeditious entry and exit as required of equipment, material and personnel.
- (d) To ensure that "African" should have control for safety purposes of traffic at all ports of call on the Route.
- (e) To provide "African" with £30,000 to defray the cost of necessary African labour in West Africa.

(iii) The British Government was to have over-riding powers to take complete control of all air ports, radio and other facilities on the Route in case of military necessity, and the A.O.C.-in-C., Middle East, was to have the unfettered right of decision as to the existence of such military necessity.

The details of the salient points contained in the contracts made by the United States War Department with Pan-American Airways¹ and its subsidiary companies were as follows:-

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Part II.
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/1.

1. Hereafter referred to as P.A.A.

1. Contract between the U.S. War Dept., P.A.A., and "African".

This provided that "African" would operate an air transport service between Bathurst and Khartoum, with intermediate stops at Freetown, Monrovia (Liberia), Takoradi, Accra, Lagos, Kano, Maiduguri, El Fasher and El Obeid, or between such other terminal points and/or such other intermediate stops as might be mutually agreed upon.

Four trips weekly were to be made in each direction between Bathurst and Takoradi, and two trips daily in each direction between Takoradi and Khartoum - this frequency to be varied as mutually agreed upon.

For the purpose of this service the U.S. Government was to furnish "African" with twenty D.C.3's or similar type of aircraft.

2. Contract between the U.S. War Dept. and P.A.A.

This provided that P.A.A. would inaugurate an air service between New York and West Africa via San Juan, Porto Rico, Port of Spain (Trinidad), Belem and Natal (Brazil).

3. Contract between the U.S. War Dept., P.A.A., "African" and P.A. Air Ferries.

This provided for the ferrying of aircraft from the United States to West Africa and thence to Khartoum: P.A. Air Ferries agreed to use their best endeavours to effect delivery of such aircraft as the U.S. Government should request from time to time.

The arrangements described above gave important facilities along the Trans-African Route to the United States War Department and P.A.A., but as the United States Government insisted on the necessity of all these facilities the British authorities had no option but to concur. However, P.A.A. gave assurances that they did not intend to interfere with the rights of other users of the Trans-African Air Route: this was particularly important for the B.O.A.C. which did not /intend

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intend to retire from the Route until P.A.A. was in a position to carry all traffic that offered, to the satisfaction of the Air Ministry.

On 13 August 1941 (the day after the foregoing agreements were made) the A.O.C.-in-C., Middle East, had a meeting at Cairo with Mr. Gledhill (the Vice-President of P.A.A. who had been put in charge of the Trans-African air service) and the Chief Maintenance and Supply Officer.

On the following day a meeting was held by the Air Officer i/c Administration, Middle East, with Mr. Gledhill, Mr. Leeder (P.A.A.), Major Perrin (U.S. Army), Messrs. Maxwell and Crudge of the B.O.A.C., the Air Route Controller (Group Captain Russell) and other R.A.F. Officers. After various questions had been discussed it was arranged that Mr. Gledhill and Group Captain Russell should make a reconnaissance of the route.

P.A.A. Plan of Operations

On the completion of this reconnaissance Group Captain Russell submitted a Report which outlined the general plan by which P.A.A. intended to conduct their operations. The plan was, briefly, in two stages as follows:-

Report by
Ep. Capt.
Russell
dated
13.9.41
A.M.
S.10713
Part II

1. To ferry up to 200 bombers¹ per month from the U.S.A. to Khartoum and, later, to ferry British (or American) built aircraft erected by the R.A.F. at Takoradi.

Meanwhile there would be a dual flow of aircraft over the West African Reinforcement Route, one part being flown by P.A.A. and the other by the R.A.F.

1. General Plan

P.A.A. planned to operate the Route in four sections:-

(i) South Atlantic

Bombers would be flown from Natal (Brazil) to Bathurst, the crews returning to South America after each crossing by P.A.A. flying-boats.

/(ii)

1. This figure was found to be too high and was later altered to 125. (No.70A File S.10713, Part II).

(ii) Bathurst to Accra

Crews for this section were to be based on Accra and conveyed to Bathurst in P.A.A. transport aircraft based at Accra.

(iii) Accra to Maiduguri

Crews for this section were to be based on Accra and return from Maiduguri by transport aircraft based on Accra.

(iv) Maiduguri to Khartoum

Crews for this section were to be based on Khartoum and conveyed to Maiduguri in aircraft based on Accra but operating as a detachment at Khartoum.

The general lay-out of the P.A.A. organisation was therefore:-

- (a) Main base - Accra
- (b) Terminal Stations - Bathurst and Khartoum
- (c) Intermediate Station - Maiduguri.

The P.A.A. establishments at these places would be self-contained.

There were also to be ancillary and emergency stations as follows:-

(a) Portuguese West Africa

A flying-boat and land plane base at Bolama.

(b) Liberia

A land base at Marshall and a flying-boat base at Fisherman's Lake (which were in course of development by the Firestone Company).

(c) West Africa

Waterloo aerodrome (near Free Town)	} Equipped with Wireless Stations and small servicing parties to deal with air- craft making "off schedule" stops.
Takoradi	
Lagos	
Oshogbo	
Kano	
Geneina	
El Fasher	

2. Personnel and Establishments

P.A.A. American personnel would comprise two categories, viz: Senior Staff and Flying Crews, (corresponding to R.A.F. /Officers)

Officers) and Ground Engineers, Wireless Operators etc.

(corresponding to R.A.F. Senior N.C.O's). There would be no personnel corresponding to R.A.F. airmen.

The establishments of the various bases and stations were to be approximately as follows:-

Bathurst	100)	Proportion of 5 Senior Staff or Flying Crews to 3 Mechanics.
Accra	350)	
Maiduguri	100)	
Khartoum	85)	

West African
Stations (see
(c) above) 12 - 26. 4 Senior Staff or Crews
Remainder Mechanics.

3. Accommodation

In general P.A.A. were prepared to bring their own accommodation in the form of sectional buildings and to utilise any existing suitable buildings which could be spared. The following agreements with Air H.Q. R.A.F. Middle East and P.A.A. were reached:-

- (i) Bathurst. A building site at Cape St. Mary adjacent to the projected British Airways accommodation and within reasonable distance of Jeswang aerodrome (Bathurst) was allotted to P.A.A.
- (ii) Freetown. P.A.A. selected a site near the Waterloo aerodrome.
- (iii) Accra. The buildings for the R.A.F. Despatch Flight (which was to have been moved to Accra - see page 44 supra) were still in process of construction. It was now decided that the Despatch Flight should remain at Takoradi and that the buildings, when completed, should be handed over to P.A.A. P.A.A. arranged with the Gold Coast Public Works Department to erect additional accommodation, materials not available locally being imported from the U.S.A. P.A.A. also arranged for two hangars to be imported from the U.S.A. to be erected on sites selected by the Public Works Department in consultation with the O.C. R.A.F. Station, Takoradi.

/(iv)

(iv) Maiduguri. The existing spare accommodation being very limited P.A.A. decided to import sectional buildings to house 100 personnel, and also the necessary plant and piping for installing a piped water supply.

(v) Khartoum. It was agreed that Khartoum was to be the junction of the P.A.A. and R.A.F. Ferry service which - it was suggested - should be organised as one composite unit comprising three sections, Receipt, Maintenance and Despatch. The R.A.F. Station, Khartoum, was examined as a site for this unit, but it appeared that this station was already congested and there was no room for further expansion. It was therefore decided to establish the unit at the Gordon College buildings¹ at Wadi Saidna (some fifteen miles north of Khartoum on the west bank of the Nile), which provided suitable accommodation for the P.A.A. and R.A.F. personnel.

Sign X.9825
of 23.9.41
from HQ
R.A.F.M.E.
A.M.
S.10713

4. Aerodromes

(a) Jeswang (Bathurst)

The aerodrome at Jeswang consisted of a single runway with a laterite extension. Instructions were given for another runway to be constructed as a satellite to the Jeswang aerodrome on a site about five miles inland.

No. 70A
Ibid

(b) Freetown. (Hastings and Waterloo aerodromes)

Hastings was suitable for service operations but not a good aerodrome for transport aircraft owing to hills in the vicinity. Waterloo was still under construction and would be suitable for all purposes. P.A.A. proposed to use Hastings temporarily until Waterloo was ready.

/(c)

1. These buildings had been used by the Army as a hospital during the East African campaign: they were now no longer required for this purpose and the Sudan Govt. agreed to lend them to the R.A.F.

(c) Maiduguri

The aerodrome surface "ravelled" in dry weather and was hard on tyres, and it was proposed that a tarred strip should be provided on its No. 1 runway.

(d) Geneina

The extension at the south end of the North/South runway was unserviceable in heavy rain: this needed rectifying.

(e) Wadi Saidna

Sites for two aerodromes¹ had already been reconnoitred: it was estimated that it would take six weeks to clear them.

The aerodromes at the other stations were satisfactory.

5. Signals

P.A.A. intended to instal their own Signals system, and to site and erect the necessary accommodation at the various stations.

6. Security

It was decided that P.A.A. Staff should be put under similar restrictions as regards correspondence as were the British personnel serving in the same territories.

7. Meteorological

P.A.A. decided to use existing meteorological services and to man three additional stations in South-eastern Nigeria with their own personnel so as to improve the weather information for aircraft operating on the direct route from Lagos to Maiduguri.

8. Air Transport Facilities

The Air Ministry decided to send three "gutted" Hudson aircraft to Bathurst for the assistance of P.A.A. advance parties who were expected to visit the Gold Coast, Nigerian and Sudan stations before their own transport aircraft crossed the South Atlantic.

70A
Ibid

/9.

1. It was considered that two aerodromes might be necessary.

9. Aerodrome Control

Under the terms of the Agreement P.A.A. was given the right to exercise control of traffic at aerodromes, but they decided not to exercise it at aerodromes in the Gold Coast and Nigeria where Civil Controllers had already been appointed. With regard to the R.A.F. aerodromes in the Sudan and at Jeswang (Bathurst) it was agreed that the R.A.F. Duty pilots at these places would exercise control.

10. Operational Control

The Air Ministry ruled that instructions for Operational Control should be given by the A.O.C.-in-C., Middle East, in consultation with the A.O.C., West Africa¹.

11. Fuel Supplies

61A
Ibid

P.A.A. made their own arrangements for Fuel Supplies with the Socony Vacuum Company, but by an agreement made between that Company and the Shell Company of West Africa the latter undertook to make all deliveries, and at the same time to continue its delivery of stocks along the route for the R.A.F. as hitherto. P.A.A. arranged to provide their own re-fuelling equipment.

12. Transport

P.A.A. arranged to bring their own motor transport but not to move their heavy equipment and buildings from rail-head to the sites. The latter requirements were heaviest at Bathurst, Accra, and Maiduguri, at which places Military Headquarters, West Africa, undertook transport.

13. Shipping

It was arranged that all stores and vehicles of P.A.A. would be shipped to West Africa in American vessels, and similarly for the Sudan stations to Port Sudan.

14. Relations with Colonial Governments

It was arranged that P.A.A. would deal direct with the British Colonial authorities in the territories through
/which

1. Air H.Q., West Africa, was inaugurated in September (1941), (see page 87 infra)

which their Reinforcing Route passed, namely the Gambia, Sierra Leone, the Gold Coast, Nigeria and the Sudan, their contacts including such matters as Air Regulations, Finance and Currency exchange, Works and occupation of Land.

Note on P.A.A. Operations

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78A.

Sqdr./Idr.
Blake's
"Notes"
from his
W.A. tour,
March '41
Ibid

The arrangements with P.A.A. having been concluded the first American personnel and stores arrived at Lagos on 28 October (1941), and thereafter American aircraft were ferried across the South Atlantic to West Africa. During the first four months the deliveries of American aircraft were much below the numbers which had been expected. For instance, it had been arranged that 78 Flying Fortresses were to be delivered at the rate of three a day commencing at the beginning of December (1941), but by the beginning of March (1942) only about 30 had arrived. On the other hand P.A.A. carried out excellent communication services between Bathurst to Khartoum and Cairo. In Gambia and Sierra Leone co-operation between P.A.A. and the R.A.F. was generally very good, P.A.A. personnel doing everything that they could to assist the R.A.F. and even going beyond their own sphere of operations in this respect.

The "South Atlantic Bridge"

In December 1942 the so-called "South Atlantic Bridge" was inaugurated from South America to West Africa when an agreement was made with the United States Army Air Force whereby the R.A.F. Ferry Command¹ undertook the responsibility for the

/delivery

1. The R.A.F. Ferry Command was formed on 20 July 1941 under Command of Air Chief Marshal Sir Frederick Bowhill. It superseded the organisation known as "Atfero" organised in Canada in July 1940 to ferry aircraft delivered by the manufacturers at Montreal across the North Atlantic to Great Britain. The H.Q. of the R.A.F. Ferry Command was at Montreal; an airport at Dorval (10 miles from Montreal) was completed in the autumn of 1941. (Air H.Q. Ferry Command, Form 540, Initial entry and Appx. "A" to entry of 28 June '41: Lecture by Sir F. Bowhill, A.H.B.H.R/23). An account of the ferry services controlled by the R.A.F. Ferry Command will be found in "Atlantic Bridge" - The Official Account of R.A.F. Transport Command's Ocean Ferry (H.M. Stationary Office, 1945).

delivery of R.A.F. aircraft from the United States production plants across the South Atlantic to West Africa. An R.A.F. receiving point was established at Nashville, Tennessee, where twenty-five fully trained air crews were sent from Dorval; the main base for the South Atlantic "take-off" being West Palm Beach, Florida.

The first main Staging-post of the South Atlantic Route was in Trinidad, the next two Stations being Belém and Natal in Brazil. From Natal the next stopping place was Ascension Island from whence the final "hop" (of nearly 1,400 miles) was made to Accra¹. The return flights for the R.A.F. Ferry Command pilots were undertaken by the B.O.A.C.

During the month of January (1943) the R.A.F. Ferry Command delivered (in addition to aircraft to other destinations) 37 Baltimores, 1 Hudson VI and 2 Venturas to West Africa for the Middle East.²

In February (1943) the R.A.F. receiving point was moved from Nashville to Nassau in the Bahamas, and the first flight of aircraft from the United States arrived there on 5 March. In May (1943) 177 aircraft were despatched from Nassau along the South Atlantic Route.

Inauguration of Air Headquarters, West Africa

A.M.
CS.71914

Meanwhile, in May (1941), the Air Ministry had decided to send two reinforcing Squadrons (No.200 - Hudsons - and No.228 - Sunderland Flying Boats³) to West Africa in view of enemy submarine activities in West African waters which had increased steadily since January (1941)⁴. At the end of May

-
1. A map of the South Atlantic Route is appended.
 2. During 1943 the number of aircraft flown over the South Atlantic Route is stated to have been 1,336 (see "Atlantic Bridge").
 3. No.204 Sqn. was later substituted for No.228 Sqn. as the latter had only 2 aircraft as against 6 of No.204. (No.100A, D.D.O.2's File 1401).
 4. In January (1941) 3 Sunderlands of No.95 Sqn. had been sent to Freetown to assist in combating the submarine menace. In May (1941) two heavy submarine attacks were made on our convoys off Freetown (Monthly Anti-Submarine Reports, C.B. 04050/41, Jan. & May 1941).

May it was proposed that a Group should be formed in West Africa to control these and other R.A.F. Units in that area and to co-operate with the Royal Navy and the Military forces. The Headquarters of this Group were to be located at Fourah Bay, near the Naval headquarters at Freetown. In July 1941, it was decided that this new Group should be known as Air

Headquarters, West Africa: its functions were to co-ordinate the activities of the R.A.F. in the Gambia, Sierra Leone and the Gold Coast and to work in close co-operation with the Naval and Military authorities as well as the Governors and Civil authorities of the West African Colonies.

Air HQ West
Africa, Form
540 &
apps.
Entries of
Sep., Oct.,
et seq.

On 23 September (1941) the personnel of the new Air Headquarters (consisting of the O.C., Air Commodore E.A.B. Rice, 45 Officers, 35 N.C.O.'s and 359 airmen) sailed from the Clyde and arrived at Freetown on 21 October.

The newly-formed West African Command consisted of Units in the Gambia, Sierra Leone and the Gold Coast, as follows:-

- (a) The Gambia. No.204 Squadron (Sunderland Flying Boats) based at Half-Die Bay, Bathurst.
No.200 Squadron (Hudsons) operating at Jeswang.
Flying Boat Control Unit at Marine Camp which included a Wireless Station and Direction Finding hut. Two aerodrome sites were selected at Yundem and Brikama.
- (b) Sierra Leone. No.95 Squadron (Sunderland Flying Boats) based at Fourah Bay.
No.128 Squadron (Hurricane I's) operating from the Hastings aerodrome (Freetown).
Five A.H.E.S. stations situated at Wilberforce, Aberdeen, Wellington, Kissy and Iaka.
- (c) Gold Coast and Nigeria. The R.A.F. Station, Takoradi and the Nigerian Staging-posts of the Reinforcement Route were included in the West African Command for administration purposes: (the responsibility for policy, erection and despatch of aircraft remained in the A.O.C.-in-C., Middle East.)

S.D.No.961/41 of
Secret Organisa-
tion Memoranda,
1941
(A.H.B. VD/2/3)

On 19 November a Communication Flight was formed consisting of one Hudson aircraft for a twice-weekly service between Bathurst, Freetown, Takoradi, Accra and Lagos, and on 1 December No. 176 Maintenance Unit, Sierra Leone, was formed as an equipment-holding depot for West Africa.

R.A.F. Alternative Route

In the meantime, as already mentioned,¹ the question of an Alternative Route for purposes of security in the event of hostile attacks on the R.A.F. Route had received further consideration, and in May (1941) the Air Ministry decided to utilize the route used by the S.A.B.E.N.A. (a Belgian Civil Airways Company) charter flights, namely Takoradi - Lagos - Enugu - Douala - Yaounde² - Batouri³ - Libenge⁴ - Bumba⁵ - Stanleyville⁶ - Irumu⁷ - Butiaba⁸ - Juba⁹ - Malakal¹⁰ - Khartoum. Accordingly, action was taken to obtain the permission of the Free French and Belgian authorities to use those Staging-posts which were situated in their territories, and instructions were given to the Asiatic Petroleum Company to lay down stocks of aviation fuel and oil at these places (with the exception of Juba and Malakal - in the Sudan - for which Air H.Q. Middle East was asked to arrange supplies). No action was taken, however, to provide accommodation or to post personnel to these Staging-posts for the present. The total length of this Route was 3,246 miles as against 2,585 miles of the R.A.F. Route, thus entailing an additional 661 miles.

Ibid

On 28 May the Belgian Ministry for Foreign Affairs agreed to the R.A.F. using the S.A.B.E.N.A. Route across the /Belgian

1. On page 71 supra.
2. Situated approx. 125 miles east of Douala.
3. Situated approx. 200 miles east of Yaounde.
4. Situated approx. 220 miles east-by-south of Batouri.
5. Situated approx. 280 miles south-east of Libenge.
6. Situated approx. 220 miles south-east of Bumba.
7. Situated approx. 225 miles east-by-north of Stanleyville.
8. Situated (in Uganda) on the eastern shore of Lake Albert.
9. Situated approx. 185 miles north of Butiaba.
10. Situated approx. 340 miles north of Juba.

File D.Ops
(Overseas)
Part II

passim

Belgian Congo with the proviso that they (the Belgians) should retain the direction of the administration of the Staging-posts where the R.A.F. would establish their stocks of petrol, spares etc. and that the R.A.F. should not use any Belgian stocks already built up in the Belgian Congo. The Free French authorities also agreed to the Staging-posts in their territory being used by the R.A.F. It was agreed with the Belgians and the Free French that the R.A.F. would only use the Route if enemy activity forced them to abandon the use of the ordinary Route.

Ibid

In spite of this agreement the Air Ministry were informed by the "Spears Mission"¹ (on 5 August) that General de Gaulle and Vice-Admiral Muselier now insisted that Bangui (some 80 miles north of Libenge) must be used as a Staging-post. It was ascertained that Bangui was a good aerodrome and had good facilities and as the distance of the Staging-posts to the west and east of it (viz: Batouri and Bumba) were much the same as from Libenge it was decided to accede to the Free French demands. This alteration necessitated the agreement of the Belgian authorities (Libenge being in the Belgian Congo) who, somewhat reluctantly, concurred in the proposal, and the stocks of R.A.F. fuel etc. laid down at Libenge were then transferred to Bangui.

Ibid

In October the O.C. R.A.F. Station, Takoradi, informed the Air Ministry that he considered the proposed Alternative Route altogether unsuitable for single-engined aircraft owing to the dense forests which would have to be flown over in the Belgian Congo section. In consequence of this it was eventually decided to use a route north of the Belgian Congo, and with this end in view permission was obtained for a reconnaissance to be made of Fort Archambault². The landing ground at this place was /considered

1. This was a Mission headed by Brigadier E.L. Spears to the Free French in Equatorial Africa.

2. Situated approx. 200 miles north of Bangui.

Ibid
(Sig.X.6316
Air Min. to
HQ R.A.F. ME
rptd HQ WA
and Takoradi
dated 23
Jan.42)

considered practicable if an extension of 200 yards was made to the runway and (in January 1942) it was arranged that this work - and some accommodation "bush huts" - should be constructed. It was also decided that the Alternative Route should follow the ordinary R.A.F. Route as far as Oshogbo and thence via Yola, Fort Archambault and Geneina; that spares and ground equipment should be held at Oshogbo and Geneina, and small fuel stocks should be laid down at Yola and Fort Archambault, but that no personnel were to be moved to these latter places unless and until the use of the ordinary R.A.F. route was likely to be denied by enemy action¹.

Ibid
(Sig.027945
Spears
Mission to
War Office
rptd C-in-C
ME, G.O.C.-
in-C WA,
& Comdr.
Nigerian
Area)

By a curious coincidence of circumstances on the day before this decision was reached by the Air Ministry, the Staging-post of Fort Lamy was bombed by unidentified aircraft, a stick of 12 German-made bombs hitting and setting the petrol dump on fire and wounding two personnel³. On the receipt of this information the O.C. R.A.F. Station, Takoradi, arranged to transfer stocks of fuel and oil from Bokoro to Fort Lamy.

Ibid

A month later the Air Ministry decided (on the suggestion of the A.O.C.-in-C., Middle East) that ten per cent of the flow of aircraft from Takoradi should use the Alternative Route, and instructions were issued for the preparation of establishments of personnel and equipment for Yola and Fort Archambault. In March the stocks of petrol and oil at the Staging-posts on both Routes were doubled on a basis of 400 aircraft per month passing over the Routes, and in April arrangements were made for increasing these stocks to three times the maximum monthly off-take figures (a basis of 840³ aircraft per month) in reserve.

/In

1. A map of the Alternative Route is given on that of the original route.
2. The bombing occurred on 22 January.
3. Including aircraft flown by P.A.A. The figures for the ordinary route (Takoradi - Fort Lamy) Staging-posts were calculated from the average consumption over the preceding six months, the Alternative (Yola) Route figures being approx: 20% of these.

In April (1942) the Air Ministry decided that Gencina should be deleted from the Alternative Route, which was finally fixed as follows:-

Lagos - Makurdi¹ - Yola - Fort Archambault - Nyala² -
El Obeid - Wadi Saidna (Khartoum)

and instructions were issued for the preparation of establishments at Makurdi and Nyala. It was intended to open this Route in July but owing to the unexpected deterioration of the landing grounds of Yola and Fort Archambault the opening of the Route had to be postponed. Meanwhile the Public Works Department, Nigeria, was engaged in erecting buildings at the Staging-posts, including Fort Archambault by arrangement with the Free French authorities.

FLYING CONTROL

Formation of No.216 (Ferry) Group

A.M.
S.9703

In April (1942) the Air Ministry received a request from the R.A.F. Headquarters, Middle East, to set up a Ferry Group in view of the increasing ferry commitments of reinforcing aircraft on the West African, Port Sudan and Mediterranean Reinforcing Routes, which were expected to be 500/600 aircraft per month. It was suggested that this Ferry Group should be formed at Cairo and that it should carry out the following duties:-

- (i) Control the movements of reinforcing aircraft to, from, and through the Middle East Command.
- (ii) Establish contact with the United States Ferry Command the South African Air Force and Air Headquarters, India.

Ibid

The proposal to form this Group was a natural development of the post of the Air Reinforcement Controller, Middle East³ and early in May (1942) the Air Ministry authorised the formation of this Group (known as No.216 Ferry Group) at Heliopolis under the command of the Air Reinforcement Controller /Group

1. Situated approx. 280 miles east of Oshogbo.
2. Situated (in the Sudan) approx. 490 miles east of Fort Archambault.
3. See page 46 supra.

No.IIIB
D.D.O's
File
21371.
Part I.

(Group Captain Russell). One of the main functions of the Group was to be the supervision of the ferry routes in Africa.

A.H.
S.81681
40A

In July (1942) in consequence of requests received from Air Headquarters, West Africa, and India for the inauguration of Flying Control, and of Air Headquarters, Middle East, for the extension of their Flying Control Organisation (under the new No.216 Group) a meeting was held at the Air Ministry on 24 July with the Director of Overseas Operations in the Chair. At this meeting it was decided that -

- (i) the existing Flying Control Organisation in the Middle East should be extended, if possible, to the extent required by the Middle East;
- (ii) Air Headquarters, India, should be asked to express their views as to their requirements;
- (iii) a central organisation should be provided for the West African Command.

To implement these decisions, Wing Commander J.H.A. Williams (D.D.A.S., Air Ministry, who had visited the Middle East in March (1941) to organise Flying Control) was sent on tour to West Africa, India and the Middle East.

11A,
Ibib

W/Cdr.
Williams'
Report,
Ibid

As a result of Wing Commander Williams' recommendations the establishment of four R.A.F. Officers (Flight Lieutenants) was authorised for Jeswang (Bathurst), Lagos, Kano and Maiduguri. (The reason for including these places under the requirements for West Africa was that although No.216 Group was responsible for the operation of the Reinforcing Routes, Air Headquarters, West Africa was responsible for the administration of the Staging Posts and Stations as far as Maiduguri).

Wing Commander Williams also recommended the posting of Flying Control Officers and Airfield Controllers (Sergeants) at the following Staging Posts:-

/Port

1. No.216 Grp. had already trained and posted one officer for Flying Control duties to Lagos, Kano, Geina, El Fasher and Wadi Saidna (Appx. "A" of W/Cdr. Williams Report - A.M. S.81681)

Fort Lamy, Makurdi, Yola, Fort Archambault, Nyala,

El Obeid, Wadi Saidna, Wadi Halfa and Luxor.

Of these, Lagos and Wadi Saidna (which had been made into Ferry Control Posts) were to have four Flying Control Officers and four Airfield Controllers who would act as a relief pool for the other Ferry Control Post in case of sickness etc. in addition to their duties at their own Post.

Ibid Control of American Aircraft

By this date (September 1942) P.A.A. had been made a part of the United States Army and was now known as the United States Air Transport Corps.¹ The aircraft of this Corps and of the American Reinforcing aircraft flew across the Southern Atlantic either via Ascension Island or direct to Accra, Robertsfield or Bathurst, and all these aircraft, except those going to Bathurst (which were only a few), were controlled by the U.S.A.T.C., those aircraft flying to Bathurst being controlled by the R.A.F. From Accra (which was now an "all American" station) American aircraft used the original R.A.F. and P.A.A. Route (No.1 W.A.R. Route) as far as Wadi Saidna, and it was anticipated that the U.S.A.T.C. personnel would welcome Flying Control on the Route from Accra and would co-operate with it. About 850² aircraft per month were now using No.1 (Accra and Takoradi) Reinforcement Route and it was intended to open No.2 (Yola) Reinforcement Route in the near future.³ It was anticipated that the number of aircraft per month would increase to about 1,250⁴, and the need for flying Control for these large numbers had become a matter of urgency.

Formation of No.298 Wing

Sig.OX5944
dated
29 Jun.42

In the meantime, it had become evident with the increased number of aircraft using the Reinforcement Routes

/that

1. Hereafter referred to as the U.S.A.T.C.
2. i.e. American and R.A.F. The figures for July and August (1942) were 830 and 699 respectively. (No.95B,D.D.O.II's A.II. 21371, Part I).
3. In fact the first convoy went along this route late in September (1942).
4. No.117A. Ibid.

that the O.C. R.A.F. Station, Takoradi, could not efficiently carry out his duties at Takoradi and at the same time supervise the Staging-Posts in Nigeria. The Air Ministry therefore decided (in June 1942) to form an R.A.F. Wing to take over the administration of the Staging Posts of the West African Section of the Reinforcement Routes and of all other R.A.F. Units in Nigeria and French Equatorial Africa. This Wing was also to provide liaison with the R.A.F. and American Aviation authorities in Nigeria and to supervise ground defence and aerodromes under its control. It was not, however, until October (1942) that the Wing (No.298) was formed with its headquarters at Igbobi College, near Lagos, under command of Group-Captain H.H. Brookes.

No.298 Wing
Form 540
Entry of
1 Oct.41.

The command of No.298 Wing comprised -

- (i) The Nigerian and French Equatorial African Staging-Posts of the R.A.F. Reinforcement Routes as follows:-

No. 1 Ikeja (Lagos)
Oshogbo
Kano
Maiduguri
Fort Lamy

No. 2 Apapa (Lagos)
Makurdi
Yola
Fort Archambault

- (ii) No.177 Maintenance Unit based at Apapa. This Unit was responsible for the erection of Hurricane aircraft in addition to the Aircraft Assembly Unit at Takoradi.
- (iii) A Flight of three Hudsons detached from No.200 Squadron (Jeswang) which was to operate from Ikeja on general reconnaissance operations connected with the Battle of the South Atlantic.
- (iv) No.1432 Flight of eight Hudson I's which was based at Kaduna (on No.1 Route). The role of this Flight was that of Army Co-operation and it was envisaged that it would be principally employed in low flying attacks against Armoured Fighting Vehicles.

/The

Ibid

The following stations (then under construction) were also placed under No.298 Wing:-

Oshodi which was to be the Engineering Repair shop for West Africa.

Otta¹ which was a satellite aerodrome for Ikeja.

Port Harcourt² which was to be used as an additional base for the erection of aircraft.

Re-formation of No.216 Group

No.216 Grp. By December (1942) the flow of aircraft from the United Kingdom and the United States was still increasing, and Form 540 Appx."A" to Entry of 1 Dec.42 in view of this and of the provision of additional air transport aircraft in the Middle East Command it was found necessary to concentrate ferry and transport operations under a single authority. For this reason it was decided to expand No.216 Group which was now to be known as No.216 (Air Transport and Ferry) Group, and was placed under command of Air Commodore W.W. Straight.

The ferry element of this reorganised Group comprised Ferry Controls, Staging-Posts and Aircraft Delivery Units, and the functions of the Group included -

- (a) Operational and administrative control of all transport, ferry and communication aircraft, Flights and Squadrons as might be allotted by Headquarters, R.A.F., Middle East.
- (b) Operational and administrative control of Ferry Controls in the Middle East which included No.2 Ferry Control at Wadi Saidna and also No.5 Ferry Control (then in process of formation at Ikeja (Lagos) in the West African Command³).

/It

1. Situated approx. 20 miles north of Lagos.
2. Situated approx. 280 miles south-east of Lagos.
3. The Ferry Control Staging-posts of Nos.2 and 5 Ferry Controls were as follows:-

No.2 (Wadi Saidna)

Geneina
El Fasher
El Obeid
Nyala
Wadi Halfa
Wadi Saidna

No.5 (Ikeja)

Takoradi	
Ikeja (Lagos)	Yola
Kano	Makurdi
Maiduguri	Fort Archambault
Fort Lamy	

It was laid down that the Staging-posts at Ferry Controls would normally be the "control" and would provide such briefing facilities as would be needed for the passage of aircraft to the next "control".

Formation of R.A.F. Transport Command

Appx. 2,
Organisation
Branch,
Transport
Command 1943

In February (1943) a meeting was held at the Air Ministry (Chairman, the Chief of the Air Staff) at which it was decided to set up a new central organisation to control all air transport in view of the substantial numbers of transport aircraft which would shortly be arriving from the U.S.A., and the production of York aircraft. This new organisation - known as the R.A.F. Transport Command - was formed on 25 March (1943) under command of Air Chief Marshal Sir Frederick Bowhill. The functions of the R.A.F. Transport Command included the operation of all transport, reinforcement and ferrying by the Royal Air Force: it took over the control of the R.A.F. Ferry Command¹ (which reverted to Group status as No.45 Group), No.44 Group and No.216 Group².

Appx. 1
Ibid.

Expansion of No.216 Group

Appcs. 22
and 38
Ibid.

In June (1943) a new Wing - No.114 - was formed at Accra, and it was agreed that No. 5 Ferry Control and the W.A.R.R. Stations at Takoradi, Ikeja (Lagos), Kano, Maiduguri and Fort Lamy should come under its operational control. No.114 Wing was placed under No.216 Group for operational purposes but was under the administrative control of the West African Command.

Appx.38
Ibid.

By September (1943) the responsibilities of No.216 Group had been expanded to include the control and Administration of R.A.F. Transport Command activities in North Africa,

1. See page 86, footnote 1, supra.

2. No.45 Grp. was organised with 2 Wings:- No.112 (North Atlantic) Wing and No.113 (South Atlantic) Wing. No.45 Grp. continued to exercise on behalf of R.A.F. Transport Command the functions of the former R.A.F. Ferry Command in Canada. No.44 Grp. functioned in the United Kingdom.

Africa, the air routes from Casablanca to Accra, the W.A.R.R., and thence eastwards to Karachi (India). It comprised:-

No.284 Wing (Algiers - formed in August 1943 - to control the North African area westwards from Cairo north of the 30th Parallel and Gibraltar)

No.282 Wing (Cairo - formed in September 1943 - to control the Cairo-Karachi air routes via Wadi Saidna (Khartoum) and Baghdad)

No.114 Wing (see above)

Appx. 91
Ibid.

On 1 October (1943) the R.A.F. Stations at Kano, Maiduguri and Fort Lamy were transferred from No.298 Wing to No.114 Wing.

VII. PROGRESS

VII. PROGRESS AND ACTIVITIES AT TAKORADI, SEPTEMBER 1941 -
OCTOBER 1943.

Signals:

During September (1941) steady progress was made in the development of the Reinforcement Route Signals system. At Takoradi a subsidiary transmitter station was built to prevent congestion of apparatus in the Civil W/T building which had hitherto accommodated all R.A.F. transmitters, and along the Route there was a decided improvement in communication across the Chad section by the installation of new apparatus at Maiduguri and Geneina.

Radar.

In November (1941) a Radar scheme for Takoradi was inaugurated comprising two Radar stations. One of these was employed to cover all seaward lanes of approach, lying some 45° on either side of the "line of shoot". The range bearing and height of all approaching aircraft within the area of this station could be obtained up to a distance of 100 miles. The other station operated a rotatable antenna, its function being to break up all low flying aircraft up to a range of 100 miles.

The sites of these two stations were surrounded by a fence, the only entry being by a gate at the Guard Room¹, and passes were issued to all members of the staffs of these stations.

Operation "Cross".

On 21 December (1941) instructions were received at Takoradi from the Air Ministry to requisition the fastest ship available and load her with thirty Hurricane IIB aircraft for despatch to Durban. Accordingly the S.S. "Cefn-y-Bryn" (which had off-loaded some Blenheims on 12 December) was employed for this duty. Thirty cased Hurricanes were loaded in her between 28 and 30 December and the ship sailed on the following day.

/Operation

1. Pending the arrival of R.A.F. Service Police (as provided in the R.A.F. Establishment at Takoradi) the O.C., Gold Coast Regt., provided a 24-hour armed guard.

Operation "Churn".

Meanwhile further instructions were received that H.M.S. "Athene" would arrive at the end of December with 23 Hurricanes fitted with V.H.F. which were to be off-loaded and flown to the Middle East, and that 40 Hurricane IIAs or IIBs were to be prepared at Takoradi for loading onto the "Athene" naval fashion (i.e. with tail and propeller assembled and wings crated). At this time 35 Hurricanes were assembled (or in process of assembly) at Takoradi and it was therefore necessary to stop the flow of Hurricanes IIA or IIB to the Middle East and to dismantle and prepare these 35 aircraft. The balance of 5 aircraft were received in cases by sea at the end of the month and these were prepared to complete the required number (40).

H.M.S. "Athene" arrived on 3 January (1942) and having discharged 24 Hurricanes¹, 2 Hurricane IIA's and 37 Hurricane IIB's were loaded in her. It was found that this total of 39 Hurricanes was the absolute maximum of the stowage capacity of H.M.S. "Athene", which sailed on 8 January to an unknown destination.

On 1 April a new Staging-post was opened at Ikeja (near Lagos) which was to be used instead of Lagos for normal convoys ferried over the Reinforcing Route. This station was inspected on the same day by the Governor of Nigeria who was much impressed with the aerodrome and the conditions under which the personnel were living.

New Commandment, Takoradi.

On 23 December (1941) Group-Captain E. Burton arrived at Takoradi to take over command of the R.A.F. Station from Air Commodore Thorold who left by P.A.A. aircraft for Freetown en route for England on posting.

Inspection of Staging-posts.

During the month of January (1942) the A.O.C., West Africa, (Air Commodore Rice) inspected the Staging-posts at

/Lagos

1. i.e. one more than had been signalled by the Air Ministry.

Logos, Oshogbo, Kano and Maiduguri. The R.A.F. detachment at Kaduna was withdrawn on 25 January and the Staging-post closed down.

Supplies (Petrol).

On 9 January a new Supplies Committee known as the Petrol Board met at Lagos, at which the Senior Equipment Officer, Takoradi, attended. At this meeting Major Vesey Brown was appointed Petrol Control Officer for the West Coast with the responsibility of the co-ordination of all service demands for fuel and lubricants, (both British and Free French) including those of the Air Services.

With regard to Takoradi, it was considered that no difficulties need be anticipated in the shipment of petrol from Lagos for a further two months, except in the case of demands made at short notice.

Receipt of American and New Types of Aircraft.

In February (1942) the first supply of aircraft direct from the United States, viz:- 50 Kittyhawks arrived at Takoradi for erection and despatching (by American Ferry personnel) to the U.S. Army Corps, Accra. Four Boston III aircraft arrived at Lagos for erection and an R.A.F. party of one Engineer and 30 N.C.Os and aircraftsmen was sent to Lagos to form an erecting party.

In April, 15 Spitfires, 6 Bostons and 5 Beaufighters were delivered at Takoradi for erection and despatch to the Middle East, and these were followed throughout the succeeding months by other aircraft of these types. In October a further type of aircraft - Beaufort - was also shipped to Takoradi for erection and despatch.

Receipt of Aircraft Policy.

Sig. OX.5206 of
13 May '42.
D.D.O 2's File
2137, Part I.

In May (1942) the Air Ministry issued a new policy of aircraft work which enumerated the following monthly commitments for erection and despatch:-

Blenheim V's	80
Hurricanes	72
Spitfires	150
Beaufighters	36
TOTAL	<u>338</u>

and also the following to be received direct from the United

/States

States on the South Atlantic Ferry Route for (a) Modification and fitment with A.S.V. and (b) Servicing:-

(a) Hudsons 28

(b) Baltimore 26's 40

A.M.S. 81681,
28B.

The first of these Hudsons and Baltimores did not in fact arrive until October (1942).

Record Erection and Despatch of Aircraft.

In the month of June (1942) Takoradi achieved the highest number of aircraft erected and despatched since the formation of the Station, the output being 231 aircraft erected and 186 despatched¹. This high output was due to four factors:-

- (i) The receipt of aircraft from the U.K. and the U.S.A.².
- (ii) The urgent requirements of Air Headquarters, Middle East, for operations in Libya.
- (iii) The increase of normal working hours.
- (iv) The loan to Takoradi of some 90 R.A.F. tradesmen from other Units in West Africa and the Middle East.

This record was broken during the following month (July 1942) when 224 aircraft were erected and 249 despatched.³

1. The types and numbers of aircraft were:-

	<u>Erected</u>	<u>Despatched</u>
Blenheims	30	24
Hurricanes	84	73
Kittyhawks	75	58
Bostons	9	9
Spitfires	9	9
Beaufighters	24	13
	<u>231</u>	<u>186</u>

2. Viz:- Blenheims 49, Hurricanes 122, Kittyhawks 35,
Spitfires 9, Beaufighters 31 - Total - 246

3. The types and numbers of aircraft were:-

	<u>Erected</u>	<u>Despatched</u>
Blenheims	55	60
Hurricanes	87	91
Kittyhawks	-	16
Bostons	9	9
Spitfires	44	38
Beaufighters	29	35
	<u>224</u>	<u>249</u>

The aircraft received at Takoradi during this month were:-

Blenheims 137, Hurricanes 79, Spitfires 46, Beaufighters 29
Total - 291

Visit of Middle East Establishments Sub-Committee.

Report by M.E.
 Estab. Sub-Ctte.
 Sept. '42.
 (D.D.O. 2's File
 2137, Part I.)

In September (1942) the Air Headquarters, Middle East, Establishments Sub-Committee (Chairman, Group-Captain F.J. Manning) visited Takoradi during their tour of West African Air Stations, and proposed a re-organisation of the Establishment which, in fact, had already been adopted by the Station and had been found more successful. The revised organisation did not of itself require any increase in the Establishment, but some increases were necessary owing to the considerable expansion of work which had been undertaken by the Station.

The existing organisation of the Station Headquarters had already been modified some time previously by the formation of No. 116 Maintenance Unit¹ and the inclusion of an Operations Room. No. 116 M. U., was responsible for the reception, uncasing, erection, testing and despatch of leased aircraft shipped from the United Kingdom and the United States. It also included the South Atlantic Ferry Section for the inspection and modification of aircraft flown from the United States direct.

The established organisation of the Station Headquarters and the revised organisation as recommended by the Establishments Sub-Committee are shown in diagram form in Appendix "P".

The revised organisation introduced a Flying Unit comprising the (unaltered) Defence and Communication Flights with the addition of a Test and Issue Flight and Despatch Flight which were to take over the testing and despatching of aircraft carried out heretofore by No. 116 M.U. The reason for this reorganisation was to allow each Unit to specialise in its main function. Thus, No. 116 M.U. was no longer responsible for flying or despatching aircraft, and all flying at the Station would now be grouped together and controlled by the new Flying Unit.

The organisation of No. 116 Maintenance Unit comprised:-

- (i) Assembly Section.
- (ii) Workshop Section.
- (iii) South Atlantic Ferry Section.
- (i) The Assembly Section comprised the various production lines according to the different types of aircraft to be erected, and it was backed up by the Workshops.
- (ii) The Workshop Section comprised:-

Blacksmith and Welders Shop
Coppersmiths and Sheet Metal Workers Shop
Airframe Component Repair Shop
Engine Inspection Bay
Machine Shop
Carpenters Shop

It was recommended that an M.T. Repair Shop should be added to the Workshop Section.

- (iii) The South Atlantic Ferry Section was responsible for the minor inspection and certain modifications of Hudson, Baltimore and Marauder aircraft flown from the United States.

Further Record Erection and Despatch of Aircraft.

During the month of October (1942) the R.A.F. Station, Takoradi, achieved a further record output of erection and despatch of aircraft, 302 being erected and 254 despatched, of which 91 were despatched during the last week of that month¹. This achievement, which coincided with the advance of the 8th Army in Egypt, evoked the following signal from the Chief of the Air Staff:-

/ "I

1. The types and numbers of aircraft were:-

	<u>Erected</u>	<u>Despatched</u>
Blenheims	67	44
Hurricanes	53	41
Kittyhawks	43	46
Spitfires	88	83
Beaufighters	51	40
	<u>302</u>	<u>254</u>

(In addition to these, 39 Hurricanes were erected and despatched by No. 177 M.U. at Apapa (Lagos)).
The number of aircraft received at Takoradi during this month were:-
Blenheims 41, Hurricanes 50, Kittyhawks 16, Spitfires 100,
Beaufighters 37, Beauforts 6 - Total 250.

Sig. AX.682 of
3 Oct. '42
(quoted in R.A.F.
Station, Takoradi,
Form 540, Entry of
31 October '42).

"I have just been informed of the number of aircraft despatched by Takoradi during the week ending 30 October. Heartiest congratulations on this splendid achievement which reflects great credit on you and on all under your command."

File D.Ops.
(Overseas).
ILJ 15/1.

In view of the success of our Forces in North Africa the Air Ministry decided (in January 1943) that twin-engined aircraft were to fly to the Middle East (and beyond) via the Mediterranean instead of being shipped to Takoradi as formerly. This meant that there would be a considerable reduction of work at Takoradi. From then onwards the establishment of No. 116 M.U. was to be based on the erection of 150 single-engine aircraft (Hurricanes and Spitfires) per month and the handling and inspection of 60 Baltimores or other types of aircraft which were being flown across the South Atlantic for the R.A.F. At the same time there would be corresponding reductions at the various Staging-posts of (No. 1) Reinforcement Route.

In consequence of this reduced flow of aircraft through Takoradi it was decided to place No. 2 (Yola) Reinforcement Route on a "care and maintenance" basis, and to cancel the Erection Depot at Port Harcourt, and No. 177 M.U. at Apapa (Lagos). Accordingly the Establishments of the Staging-posts of No. 2 Reinforcement Route (viz: Makurdi, Yola, Fort Archambault, Nyala and El Obeid) were cancelled, and revised Establishments were issued for No. 116 M.U. and the Staging-posts of No. 1 Reinforcement Route.

Closing of Fighter Defence Flight and Arrival of No. 26 Squadron, S.A.A.F.

No. 162A Pt. I and
No. 1A, Pt. II of
D.D.O. 2's File
2137 and
Schedule of
S.A.A.F. Flying
Units, Operational duties.
June '40-Sept. '45
(B.F. A.H.B. II/35).

In March (1943) it was decided that No. 26 Squadron of the South African Air Force (equipped with Wellington aircraft) should be stationed at Takoradi for coastal reconnaissance. The Fighter Defence Flight at Takoradi was abolished, and 10 Wellington XI's and 2 Wellington X's (dual control) of No. 26 Squadron S.A.A.F. arrived during April.

/The

The Establishment at Takoradi was again revised to cover:-

- (i) the administration of No. 26 Squadron, S.A.A.F.
- (ii) the erection of 125¹ single-engined (instead of 150) aircraft and 10 Ansons by No. 116 M.U.

- (iii) the handling and inspection of 70 Baltimore and 40 Dakota aircraft flown across the South Atlantic.

13A, Ibid.

In July (1943) the commitment for the erection of 40 Spitfire aircraft at Takoradi was directed to Casablanca and the Establishment of No. 116 M.U. was accordingly reduced to allow only sufficient personnel to handle a flow of 85 single-engined fighters (Hurricanes) and 15 twin-engined aircraft of various types per month.

American Transit Aircraft.

Meanwhile, on 1 July, the flow of transit aircraft from the United States began with the arrival of one Ventura, followed by a further six during that month. These aircraft were inspected and serviced and were then despatched to the Middle East.

New Commandment, Takoradi.

In the meantime, on 11 June, Group-Captain Burton had been succeeded in the command of the R.A.F. Station, Takoradi, by Group-Captain R.H. Hanmer who arrived by air from the United Kingdom on 1 June.

Erection of the 5,000th Aircraft at Takoradi.

30 July (1943) was a red-letter day at Takoradi when Lieut. W.R. Roberts, S.A.A.F., tested and passed the 5,000th aircraft² erected at Takoradi since the first aircraft was erected and tested on 13 September 1940.

/Further

1. <u>i.e.</u>	Hurricane II's	85
	Spitfire V's	40
	Total	<u>125</u>

2. This aircraft was a Spitfire - No. M.A. 264. Summaries of aircraft erected and despatched, September 1940 - 31 October 1943 are given in Appendix "Q"

Further Reduction of Establishment, Takoradi.

22A, D.D.O.2's
File 2137,
Part II.

In August the Air Ministry decided that the flow of Hurricanes for the Middle East were to be routed via Casablanca and no longer sent to Takoradi. The Establishment of No.116 H.U. was therefore further reduced, only sufficient personnel of the Erection party being retained to erect up to 25 single-engined and 10 twin-engined aircraft per month. In consequence the numbers of aircraft erected decreased steadily during the next few weeks and ceased altogether in October as no further aircraft (either British or American) were being sent to Takoradi.

17A, D.D.O.2's
File 2137,
Part II.

By this time the North African air route was in full operation and there appeared to be no likelihood of it becoming congested - in spite of the large numbers of British and American Army aircraft passing over it - as there were many alternative airfields that could be used as Staging-posts along that route. Nevertheless it was decided to maintain the R.A.F. Station at Takoradi for any emergency or other circumstance that might arise, and also to use the West African Reinforcement Route. The reason for keeping open the W.A.R. Route was the political desirability of British aircraft using the route and thus preventing the Americans from getting complete control of it, which - it was apprehended - would occur if the R.A.F. personnel of the Staging-posts was withdrawn and the route was abandoned.

49A, Ibid.

With the cessation of erection of aircraft the Establishment at Takoradi was again reduced, only sufficient personnel being retained for the maintenance and servicing of the Wellingtons of No.26 Squadron S.A.A.F., the handling of transport aircraft, the salvaging of aircraft from the Reinforcement Route, and the occasional erection of aircraft should such be required.

VIII. GENERAL SUMMARY.

The need for an air Reinforcing Route for supplying aircraft and transporting personnel and stores to the Middle East (which became essential in June 1940 on the entry of Italy into the war) was met by the inauguration of the West African Reinforcement Route across the waist of Africa from the Gold Coast to the Sudan. Within one month of the decision to build up this reinforcing route an R.A.F. Advanced party had landed at Takoradi, and this former West African trading post was gradually transformed into a modern R.A.F. Station equipped with offices, workshops and hangars, messing and living accommodation for personnel, a hospital, chapel, and library and extensive recreation grounds.

By the end of July 1940, the Reinforcement Route had been surveyed and a month later the Staging-posts had been consolidated and maintenance parties sent to man them. On 18 September - within two months of the Advanced party's arrival - the first convoy of aircraft erected in the Takoradi Assembly Unit was despatched to the Middle East.

The work of building the R.A.F. Station at Takoradi and the accommodation of the Staging-posts - several of which existed in embryo since 1936 when Imperial Airways opened their service from West Africa to Cairo - was mainly carried out by the Public Works Departments of the Gold Coast and Nigeria. The Nigerian Department alone built seventeen new airfields and made extensions to a further nine existing airfields. This co-operation by the Civil authorities of the Colonies concerned, and the assistance given by the B.O.A.C. flying "leaders" of convoys in the earlier stages of the Route, and by the B.O.A.C. chartered aircraft in returning R.A.F. ferry

/pilots

pilots from Egypt to Takoradi, proved of great value to the successful working of the scheme.

The convoy system soon produced its own experienced navigator "leaders", and its success with fighter aircraft justified its employment with the light bombers when these arrived (later on) from America across the South Atlantic.

The employment of a number of specially selected Polish pilots augmented the Ferry Pilot's Pool which - owing to the shortage of trained personnel - soon became unable to cope with the increasing numbers of aircraft flown to the Middle East. Other nations represented among the flying crews were South Africans, Yugoslavs, and Free French pilots who convoyed British aircraft loaned to the Free French air station at Fort Lamy.

In November (1940) the lack of shipping to transport aircraft to Takoradi resulted in operation "Stripe" in which (erected) Hurricanes (and some Fulmars for the Fleet Air Arm) arrived in H.M.S. "Furious" and were flown off the carrier by pilots who had accompanied the aircraft on the sea voyage. In this manner a whole fighter squadron was moved from the United Kingdom to the Middle East. This operation was repeated successfully in operations "Monsoon" and "Pageant" in January and March 1941.

With the arrival of American types of aircraft early in 1941 the commitment of aircraft erection at Takoradi increased considerably and this necessitated a revised establishment of personnel to cope with the work. By the middle of that year the scheduled commitment had risen from 125 aircraft per month (in October 1940) to 200, and the original establishment of some 400 personnel had expanded to approximately 2,000. Nevertheless, in response to urgent calls for maximum output, the working hours at Takoradi had to be extended. The ground

crews, working fantastically long hours in the tropical climate, were able to assemble a Hurricane ready to take off on its test flight within twelve hours of its wooden crate being landed at the harbour. One result of these strenuous efforts was a steady increase in the daily sick returns, but in spite of this the required output of erected aircraft was maintained.

Meanwhile the organisation of the Signals, Meteorological and other branches of the command were undergoing steady development and improvement both at Takoradi and along the Reinforcement Route.

Among other matters the defence of Takoradi had to be considered. For some months the existing defence precautions were inadequate, but the formation of a War Flight and (later) the inauguration of General Reconnaissance and Anti-Raider and Defence Flights and the mounting of heavy and anti-aircraft guns at the aerodrome and harbour, provided a fair measure of protection. The defence of the Reinforcement Route was undertaken by the Army which maintained garrisons of ground troops at the Staging-posts in addition to the armed R.A.F. ground staffs. Moreover, the inauguration of an alternative route via Yola and Fort Archambault ensured a safe passage for the convoys in the event of any hostile airborne attacks being made on the original route.

With the appointment (in June 1941) of an Air Reinforcement Controller a system of Flying Control was organised for the Middle East Command. This was expanded on the formation of No. 216 Group which, on its re-organisation in December 1942, took over the newly-formed Ferry Controls at the West African and Sudan Staging-posts of the Reinforcement Route.

The ferrying of complete aircraft from the United States across the South Atlantic (under the terms of the agreements with Pan-American Airways and its subsidiary Companies) revolutionised the original conception of the West African Reinforcement Route. The peace-time airfield at Accra (built by the Gold Coast Public Works Department) became the Americans' arrival base, and thenceforward increasing numbers of aircraft - both R.A.F. and those operated by Pan-American Airways - utilised the route. During the month of July (1942) 830 American and R.A.F. aircraft flew over the route.

These achievements were not without their grimmer aspects. The convoys flying over the Reinforcement Routes experienced the blinding African sun, the "Harmattan" dust storms and torrential downpours of tropical rain, their pilots sitting in the cramped space of a fighter cockpit flying hundred of miles in formation in the wake of the navigator "leader" in a Blenheim. Sometimes aircraft were forced landed in the jungle or in the vast stretches of the desert and several fatal accidents occurred. The last messages¹ written (in May 1942) by a Polish pilot and discovered with his body alongside his forced-landed aircraft bear eloquent testimony to the dangers which were faced on every convoy flight.

Although the opening of a North African Reinforcement Route from Casablanca made the use of the West African Route superfluous for aircraft of the Royal Air Force, the United States Air Transport Corps (which had absorbed the African branch of Pan-American Airways) continued to use the route for ferrying their own aircraft to India and the East.

/Nevertheless,

¹ Quoted from "Atlantic Bridge". The final message - when the pilot lay dying of thirst and exposure - reads thus: "13.45 hours (10 May) I hear an aircraft flying to the south, to my right, my last hope; I cannot get up to have a look. My last minutes. God have mercy upon me".

Quoted from
D.G.O's LM/7329/
D.G.O. to
A.M.S.O., dated
30 March 1944
(No. 58A,
D.D.O.2's File
2137, Part II).

Nevertheless, the Royal Air Force still maintained Takoradi Station and the Staging-posts with the main intention of preventing the Americans from securing complete control of the route, and (in the opinion of the D.G.O., Air Ministry) "from building it up into a highly profitable Pan-American post-war concern".

The West African Reinforcement Route fully served its purpose: from small beginnings - augmented by ingenious improvisation on the part of the Officers, N.C.O's and Airmen of the Takoradi Station - it developed into an extensive and efficient organisation which proved to be a vital factor in the successful air campaigns of the Middle East. In July 1943 the 5,000th aircraft was erected and tested, and by the end of October of that year upwards of 5,300 aircraft had been erected at Takoradi, and nearly 5,200 had been flown to the Middle East in addition to a few aircraft which were despatched to Accra and other West African destinations.

ADMINISTRATIVE INSTRUCTIONS - WEST AFRICAN REINFORCEMENT ROUTEAIR STAGING POSTS ESTABLISHMENTS

	LAGOS	KANO	MAIDUGURI	GENEINI	EL FASHER	EL OBEID	REMARKS
Officers	1	1	-	1	1	-	H.Q. M.E. provide for El Fasher
F/Sgts Fitter 1	1	1	-	-	-	-	
Sgts. do.	-	1	1	1	-	-	
Cpls. do.	2	2	-	-	1	1	
Cpls. (D. Pot)	-	1	-	1	-	-	
A.C.s do.	2	2	1	1	2	1	
A.C.s (Fitt.lla)	4	4	1	1	-	-	
A.C.s (Fitt.lle)	4	4	1	1	-	-	
A.C.s (F/Mechs)	2	2	2	2	2	2	
Cpls. (W/T. Ops)	-	-	1	-	-	-	} Additional to A.M. Establishment
A.C.s do.	2	2	2	2	-	-	

Note The above is taken from Appendix 5 to Air/Cmdre. Thorold's Report "Takoradi and the West African Reinforcement Route
July 1940 - September, 1941."

APPENDIX "D"

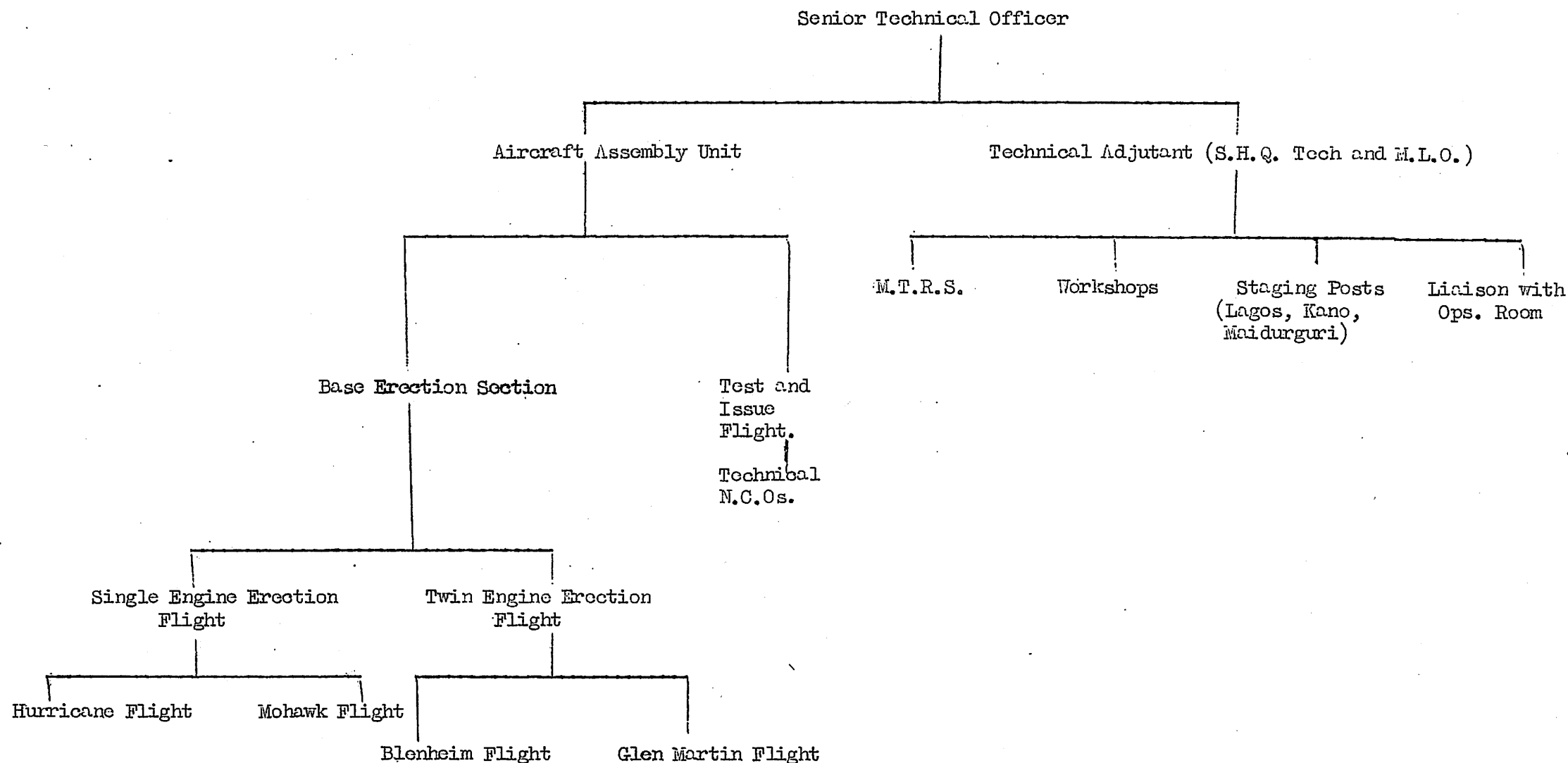
DETAIL	Group Captains	Wing Commanders	Squadron Leaders	Flight Lieutenants	Flying Officers	F/Os or P/Os.	TOTAL	Warrant Officers	Flight Sergeants	Sergeants	Corporals	Aircraftmen	Civilian Staff	TOTAL
<u>STATION HEADQUARTERS</u>	1		2	1		1	5	1	3	3	16	45		68
Equipment and supplies section (including Port Detachment).			1	5		2	8	1	3	7	10	41	50	112
Accounting Section		1		1			2		1	1	2	8		12
Signals Section			1				1		1	1	8	32		42
Aircraft Assembly Unit.			1				1	1	1	4	13	58	6	83
Ferry Personnel			1	3		10	14			12		12		24
Maintenance Section						1	1			1	1	9		11
GENEINA														
Two mobile Salvage and Maintenance Sections. (Kano and Khartoum)						2	2		2		4	30		36
	1	1	6	10		16	34	3	11	29	54	235	56	388

Note The above is transcribed from R.A.F. Station, Takoradi, Appendix VII to Form 540, Entry of 21 Aug. '40.

APPENDIX "E"

<u>Detail</u>	Group Captains	Wing Commanders	Squadron Leaders	Flight Lieutenants	Flying Officers	Flying Officer on P/Os	TOTAL	Warrant Officers	Flight Sergeants	Sergeants	Corporals	Aircraftmen	Civilian Staff	TOTAL	<u>Remarks</u>
Station Headquarters	1	-	2	1	1	8	13	1	3	4	18	75	88	189	
Equipment and Supplies Section	-	-	1	5	-	2	8	1	3	7	10	41	50	112	
Accounting Section	-	1	-	1	-	-	2	1	1	2	4	10	-	18	
Signal Section	-	-	1	1	-	-	2	1	1	1	10	39	-	52	
<u>Communication Unit</u>															
Headquarters	-	1	-	5	-	21	27	-	1	25	1	1	-	28	
Servicing party	-	-	-	-	-	1	1	-	1	4	5	25	-	35	
One flight	-	-	-	1	-	5	6	-	1	62	7	37	-	107	
<u>Aircraft Assembly Unit</u>	-	-	1	-	1	-	2	2	6	21	44	276	20	369	
<u>Maintenance Section</u>															
Geneina	-	-	-	-	-	1	1	-	-	1	2	17	15	35	
Mobile salvage and maintenance section Khartoum	-	-	-	-	-	1	1	-	1	1	3	27	-	32	
Mobile salvage and maintenance section Kano	-	-	-	-	-	1	1	-	1	1	3	28	12	45	
TOTAL	1	2	5	14	2	40	64	6	19	129	107	576	185	1022	

Note The above is transcribed from R.A.F. Station, Takoradi, Appendix XIX to Form 540, Entry of 21 Nov. '40.



NOTE: The above is transcribed from R.A.F. Station, Takoradi, Appendix XLIXa to Form 540 Entry of 30 Jan. '41.

TOPOGRAPHICAL AND CLIMATIC DETAILS
OF THE REINFORCEMENT ROUTE.

(a) Takoradi - Lagos (1st. day - 378 miles).

- (i) The route to Lagos consisted of two stages, Takoradi - Accra and Accra - Lagos. The first stage of 117 miles (on a course of 65° true) closely followed the coast-line and was mainly over semi-swamp land and native fishing villages. A number of 17th. and 18th. century Portuguese castles provided almost a confusion of landmarks. A good landing-ground at Accra could be used if required in emergency. The course was here altered to 78° true for the remaining 261 miles to Lagos. This part of the route lay some ten miles out to sea off the coast-line for the reason that the boundary of French Dahomey lies some 70 miles east of Accra. There were two Vichy controlled aerodromes in Dahomey, namely at Lome and Cotonou which could be used in grave emergency. About 40 miles before reaching Lagos the route gradually approached the coast until Badagri Creek (which runs parallel to the coast) was reached. This creek runs direct to Lagos harbour and could be followed to Apapa, the Lagos aerodrome.
- (ii) The weather on this Sector of the route is typical of West Africa. Except in the dry season (December to March) the weather is variable with considerable cumulus cloud and intermittent heavy rain storms varying from 2 to 30 miles in breadth. During the tornado season (April to November) frequent and fast moving squalls are encountered which extend up to 10,000/15,000 feet, with heavy rain and wind velocities of from 60 to 90 miles per hour. During both the rainy and dry seasons fog and ground mist generally prevented aircraft taking off in the early hours of the morning.

(b) Lagos - Kano (2nd. day - 525 miles).

- (i) Apapa aerodrome at Lagos had been constructed from reclaimed swamp. It had three runways: the largest of these was 900 yards long and the two shorter ones were of little use to modern aircraft.
- (ii) As the ferry service of aircraft from Takoradi developed the direct route to Kano was slightly modified to ensure that aircraft flew over three intermediate landing-grounds at Oshogbo, Minna and Kaduna.¹ From Lagos to Oshogbo - a distance of 119 miles - the course was 40° true. The first five miles of this Sector was the Lagos lagoon and thereafter the remainder of the route was over relatively dense forest and bush. At Oshogbo the course was altered to 48° true which was maintained for the 189 miles to Minna. Some 80 miles before reaching Minna the route crossed the junction of the Niger and Kaduna rivers which provided an excellent fix. From Minna the course was changed to 43° true for the next 94 miles to Kaduna. This part of the route was densely covered with bush over the low-lying ground which resolves later into a series of low hills with intervening valleys. At Kaduna the course was altered to 36° true for the remaining 123 miles to Kano. Over this Section the route approximated closely to the Kaduna-Kano Railway. Near Kano the scrub-covered terrain was highly cultivated, and the river Challawa was crossed some 15 miles from the city.

/(iii)

1. These landing-grounds had been constructed for and used by Imperial Airways. (see page 5 supra).

- (iii) The climate in this Sector varies considerably. At Lagos the humidity is greater than at Takoradi as the rainfall at Lagos is some 50% greater than that of Takoradi. Line squalls and frequent rain storms move up from the Niger delta and often produce a blanket of very low cloud with consequent poor visibility over the aerodrome. This climate maintains generally as far as Oshogbo where, in the rainy season, the landing-ground is under a curtain of low cloud for three days out of four. It was therefore frequently necessary to fly above the clouds in that neighbourhood. As Kano is approached the liability to low cloud diminishes, and at Kano itself violent rain storms are encountered after mid-day but they are of short duration. Between Kano and Kaduna the Harmattan storm area begins and from December to May visibility may be reduced to half a mile from this cause.

(c) Kano - Geneina (3rd. day - two stages of 325 and 689 miles).

- (i) The landing-ground at Kano was situated on a slight plateau; its surface was constructed of mixed laterite and sand. It had one main runway of 1,100 yards and two cross runways each of 1,000 yards.
- (ii) The flight from Kano to Geneina was made in two stages with a halt for refuelling at Maiduguri. From Kano to Maiduguri a course of 92° true was followed for a distance of 325 miles. Over the first part of the route the country was highly cultivated but was succeeded after some 20-30 miles by patches of cultivation interspersed with scrub-covered and arid country. The Kano-Maiduguri road could be seen on the starboard side which - during bad visibility - proved to be a convenient guide.

The landing-ground at Maiduguri was probably the best between Lagos and Khartoum. It was constructed with three runways of 1,100 yards and it possessed a firm surface which dried out quickly after heavy rain.

- (iii) From Maiduguri the course was altered to 78° true for Lake Fitri and intermediate landing-grounds at Fort Lamy and Ati in French Equatorial Africa.¹ For about 150 miles after leaving Maiduguri the country is arid with patches of scrub until the border of French Equatorial Africa is reached with Fort Lamy some 20 miles on the port side. After 360 miles the route passed the southern point of Lake Fitri - a mass of swamps - which shifts in outline up to 30 miles between the dry and rainy seasons.² On this Section a landing-ground at Bokoro³ could be used in emergency. At Lake Fitri the course was altered to 87° true for the remaining 335 miles to Geneina. A large Wadi runs from Lake Fitri which curves away on the port side and eventually turns and

/crosses

1. Fort Lamy (an important French airport) and Ati were able to be used by the R.A.F., if required, as the Government of French Equatorial Africa declared for General de Gaulle in August (1940).

2. Situated between Fort Lamy and Ati.

crosses the route. The landing-ground at Ati was situated at the extremity of this curvature.

The country continues swampy until the neighbourhood of Abecher is reached some 110 miles short of Geneina, and from Abecher to Geneina the country changes to desert with numerous outcrops of rock.

Geneina is situated on a Wadi which crosses the route: it is difficult to locate at a height of over 5,000 feet but it can be easily distinguished from 2,000 feet. The climate of this part of the country is subject to heavy rain storms during the summer and autumn months and occasional heavy line squalls are met. From December to May the Harmattan wind produces dust storms similar to those at Kano but of greater intensity.

(d) Geneina - Khartoum. (4th. day - two stages of 194 and 560 miles.)

- (i) The landing-ground at Geneina had a sandy surface: it was suitable for aircraft of up to 20,000/30,000 lbs., providing soft patches were avoided. It had one main runway of 1,000 yards and two shorter subsidiary runways. The flight to Khartoum was made in two stages, a halt for refuelling being made at El Fasher, and in the case of short-range aircraft a further halt was made at El Obeid. The course from Geneina was set at 88° true for the 194 miles to El Fasher. The country retains its desert-like characteristics with occasional patches of scrub and trees.

The landing-ground at El Fasher had a firmer surface than that of Geneina: it possessed one main runway of 1,100 yards and two subsidiary runways. From El Fasher a course of 93° true was set for the 330 miles to El Obeid. This latter place was not on the direct route from El Fasher to Khartoum but it was used because forced landings in the desert country on the direct route were difficult to locate, and would, in all probability, end in disaster for lack of water. On this (El Fasher - El Obeid) Section of the route the country is more barren with sporadic outcrops of rock rising from 3,000 to 4,000 feet, but on approaching El Obeid the desert gives way to cultivation which continues for some distance beyond.

At El Obeid a course of 42° true was set for the remaining 230 miles to Khartoum. Cultivation ceased after El Obeid and barren desert is encountered until reaching Khartoum. Owing to prevailing conditions of poor visibility from sandstorms the course was usually deflected to starboard so that the Nile could be located and followed up to Khartoum.

- (ii) The climatic conditions over this Section of the route were good for most of the year and visibility (except on the last stage) was generally good. The main part of the route was over a plateau which varies from 1,500 to 3,000 feet above sea level, and the landing-ground at Geneina was over 3,000 feet.

Note. The above is taken from Appendix "A.1" of Air Cmdre. Thorold's Report, Takoradi and the W.A.R.R., July, 1940 - September, 1941.

LEAP-FROG SCHEME FOR STAGING POSTS

It will be seen that aircraft operating on Schedule "A" might stop at different staging posts to aircraft on Schedule "B" until they reach Khartoum. Moreover, if necessary, by the insertion of Kaduna in Schedule "A" and Fort Lamy in Schedule "B" aircraft need not even land to refuel at the night stops in the other Schedule. Thus if Lagos, Kano and Gencina were all unserviceable aircraft could still proceed via Takoradi, Oshogbo, Kaduna, Maiduguri, Ati and El Fasher. Alternatively if Oshogbo, Maiduguri and El Fasher were all unserviceable aircraft could proceed by Lagos, Kano, Fort Lamy, El Gencina, and El Obaid.

In the case of convoys containing Tomahawks or Fulmars with their limited range it would be necessary to adopt schedule "C". Moreover to avoid duplication of convoy arrivals at staging posts where there is limited or no accommodation (and where therefore it would be uneconomic to require large accommodation) any two convoys leaving Takoradi on one day would proceed only on Schedules "A" and "B" or "A" and "C" but never on "B" and "C".

(Note. The Schedules are given on next page.)

NOTE: The above is excerpted from R.A.F. Station, Takoradi, Appendix LXXXII to Form 540, Entry of 25 March '41.

SUGGESTED ROUTING OF CONVOYS.

LANDING GROUND	Schedule "A"	Schedule "B"	Schedule "C"
TAKORADI	◻•	◻•	◻•
LAGOS	◯	◻•	◻•
OSHOGBO	◻•	-	◯(X)
MINNA (Emergency post, no stopping facilities)	-	-	-
KADUNA	◯	-	-
KANO	◯(X)	◻•	◻•
MAIDUGURI	◻•	◯(X)	◻•
FORT LAMY	-	◯	-
ATTI	-	-	◯(X)
EL GENEINA	◯(X)	◻•	◻•
EL FASHER	◻•	◯(X)	◯(X)
EL OBEID	-	-	◯(X)
KHARTOUM	◻•	◻•	◻•
ATBARA	-	-	◯(X)
WADI HALFA	◯(X)	◯(=)	◻•
ASSIUT	-	-	◯(X)
ABU SUEIR	◻•	◻•	◻•



= NIGHT STOP



= REFUELLING STOP



= OPTIONAL NON or REFUELLING STOP



= OPTIONAL NIGHT or REFUELLING STOP

Date 1. 4. 1941

Authority: S.62581/II

Secret

PERSONNEL

DETAIL	OFFICERS											AIRMEN AND CIVILIANS							REMARKS
	Air Marshals	Air Vice-M Marshals	Air Commodores	Group Captains	Wing Commanders	Squadrons Leaders	Flight Lieutenants	F/Officers	Flying Officers or Pilot Officers	Other Officers	TOTAL	Warrant Officers	Flight Sergeants	Sergeants	Corporals	Aircraftmen	Civilian Staff	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Station Headquarters	-	-	-	1	-	1	1	-	7	-	10	2	4	11	20	78	145	310	(a) In addition POLISH personnel are shown at Note 1.
Equipment and Supplies Section	-	-	-	-	1	1	2	-	2	-	8	1	3	9	18	63	74	168	
Accounting Section	-	-	-	-	-	-	8	-	-	-	8	1	2	2	-	27	-	30	
R.A.F. Hospital	-	-	-	-	1	1	3	-	-	-	5	1	-	4	6	16	5	35	
Embarkation Office	-	-	-	-	-	1	3	-	-	-	4	-	-	4	4	13	5	34	
Signals Section	-	-	-	-	-	1	2	-	-	-	3	1	1	1	7	24	2	36	
Communication Unit	-	-	-	-	1	-	6	1	21	-	29	-	1	111	1	7	-	121	
<u>Aircraft Assembly Unit</u>																			
Headquarters	-	-	-	-	1	-	1	-	1	-	3	1	-	1	-	6	2	10	
Workshops	-	-	-	-	-	-	-	-	1	-	1	1	3	2	27	162	5	213	
Assembly Unit	-	-	-	-	-	1	-	1	-	-	2	4	12	26	87	426	50	595	
Test and Despatch Flight	-	-	-	-	-	-	1	-	1	-	2	1	1	3	-	38	1	48	
<u>STAGING POSTS</u>																			
LAGOS	-	-	-	-	-	-	-	1	2	-	3	-	1	2	10	54	30	97	
MINNA	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	12	8	25	
KANO	-	-	-	-	-	-	1	-	2	-	3	1	3	5	25	153	39	226	
MAIDUGURI	-	-	-	-	-	-	-	-	2	-	2	-	1	2	5	33	17	58	
ATI	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	14	8	25	
GENEINA	-	-	-	-	-	-	1	-	2	-	3	1	3	6	24	108	35	177	
EL FASHER	-	-	-	-	-	-	-	-	1	-	1	-	1	2	5	28	17	53	
EL OREID	-	-	-	-	-	-	-	-	1	-	1	-	1	1	5	22	17	46	
WADI HARA	-	-	-	-	-	-	-	1	-	-	1	-	2	3	9	59	-	73	
(a) FORM STATION	-	-	-	-	5	2	23	8	45	-	83	-	1	2	5	28	17	53	
TOTAL: The above is transcribed from R.A.F. Station, Takoradi, Appendix LXXXIX to Form 540, Entry of 30 March '41.																			
												15	42	204	270	1367	535	2433	

ROYAL AIR FORCE

WAR ESTABLISHMENT OF ROYAL AIR FORCE STATION, TANKORADI.

Note 1. Communication Unit. In addition to the R.A.F. personnel shown in the above establishment the following Polish personnel will be allowed.

DETAIL	OFFICERS											AIRMEN AND CIVILIANS							REMARKS
	Air Marshal	Air Vice-Marshal	Air Commodore	Group Captain	Wing Commander	Squadron Leader	Flight Lieutenant	F/Officer	Flying Officer or Pilot Officer	Other Officer	TOTAL	Warrant Officer	Flight Sergeant	Sergeant	Corporal	Aircraftmen	Civilian Staff	TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Adjutant (G)	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	(z) Includes
Assistant Adjutant (G)	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	
Chaplains	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	
Flying	-	-	-	-	1	6	9	-	11	-	27	-	-	-	-	-	-	-	Commanding Officer 1 V/Cdr.
Interpreters	-	-	-	-	-	-	1	1	2	-	4	-	-	-	-	-	-	-	Deputy C.O. 1 S/L.
Medical	-	-	-	-	-	1	1	-	-	-	2	-	-	-	-	-	-	-	
Airman Pilots	-	-	-	-	-	-	-	-	-	-	-	8	16	17	-	-	-	-	
Clerks (General Duties)	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	41	
	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	3	
TOTAL	-	-	-	-	1	8	12	2	13	-	36	8	16	18	1	1	-	44	

APPENDIX "K"

R.A.F. Station, Takoradi - Technical Section - Organisation

COMPOSITION. The composition of the Technical Section will be as follows:-

- (A) Headquarters, (Senior Technical Officer and Adjutant).
- (B) Aircraft Assembly Unit (O.C., A.A.U.) consisting of:-
 - (i) Base Erection Section, divided into:-
 - (a) Single Engine Flight.
 - (b) Blenheim Flight
 - (c) Maryland Flight
 - (ii) Check, Test and Issue Flight
- (C) General Engineering Section (O.C., G.E.S.) consisting of:-
 - (a) No.1 Airframe and Engine Repair Section.
(O.C., No.1 A. & E.R.S.)
 - (b) No.2 Airframe and Engine Repair Section
(O.C., No.2 A. & E.R.S.)
 - (c) Station Workshops (O.C. Workshops) comprising:-
 - (i) Welding Shop.
 - (ii) Machine Shop
 - (iii) Instrument Shop
 - (iv) Airscrew Shop
 - (v) Metal Workers Shop
 - (vi) Carpenters Shop
 - (vii) Fabric Workers Shop
- (D) Mechanical Transport Repair Section
- (E) Route Technical Officer and Maintenance Liaison Officer

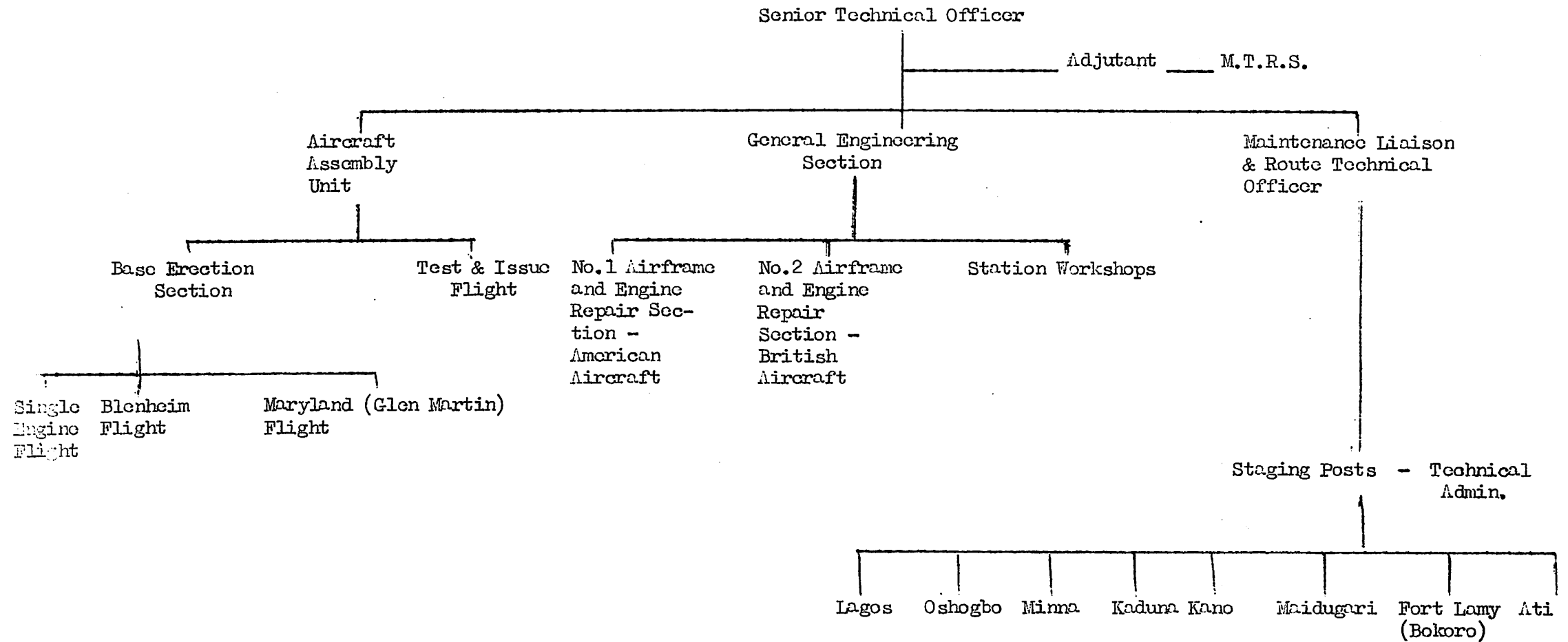
RESPONSIBILITY. The chain of responsibility will be as follows:-

- (1) The Senior Technical Officer is responsible to the Officer Commanding for the technical direction, control and co-ordination of all technical sections on the station.
- (2) O.C., Aircraft Assembly Unit and O.C., General Engineering Section are responsible to the Senior Technical Officer for the administration, control and efficiency of their respective sections.
- (3) The Route Technical Officer is responsible to the Senior Technical Officer for the technical control of the Nigerian Staging Posts and Ati and Bokoro.
- (4) Adjutant (Technical) is responsible to the Senior Technical Officer for the administration of M.T.R.S.
- (5) O.C., Base Erection Section and O.C. Check, Test and Issue Flight are responsible to O.C., A.A.U., for the administration, control and efficiency of their section or flight.
- (6) O.C., No.1 A. & E.R.S., O.C., No.2 A. & E.R.S. and O.C., Workshops are responsible to O.C., General Engineering Section for the administration, control and efficiency of their respective sections.

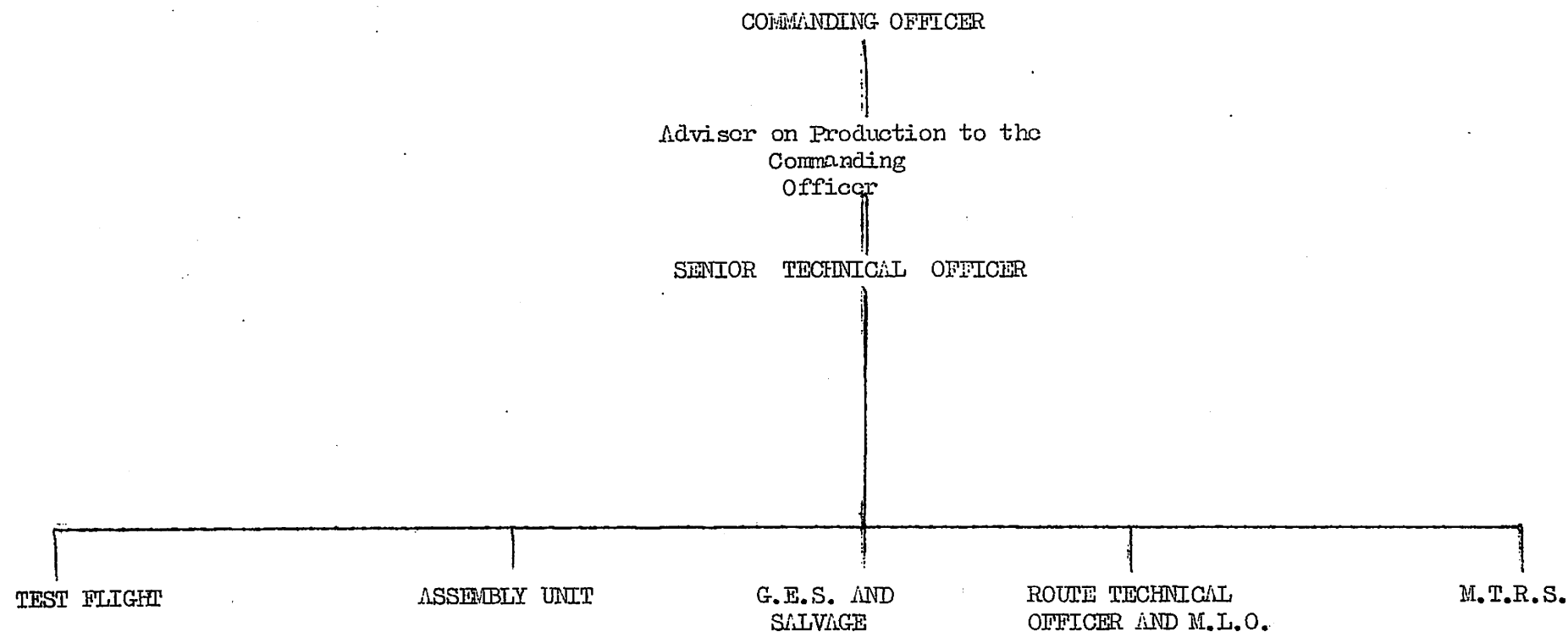
(OVER)

NOTE: The above is excerpted from R.A.F. Station, Takoradi, Appendix CXV to Form 540, Entry of 31 May '41.

ROYAL AIR FORCE STATION, TAKORADI. TECHNICAL SECTION - ORGANISATION



MODIFIED TECHNICAL ORGANISATION



NOTE: The above is transcribed from R.A.F. Station, Takoradi, Appendix CXVI to Form 540, Entry of 31 May '41..

SUMMARIES OF AIRCRAFT DELIVERED, ERECTED AND DESPATCHED, SEPTEMBER 1940 - 31 AUGUST 1941

APPENDIX "L"

(A) AIRCRAFT DELIVERED AT TAKORADI, SEPTEMBER 1940 - 31 AUGUST 1941

Blenheim	397
Hurricane	532
Glen Martin	64
Tomahawk	222
Mohawk	17
Fulmar	36
Miscellaneous	<u>5</u>
Total	<u><u>1,273¹</u></u>

1. R.A.F. Station, Takoradi, Form 540, Entry of 30 Aug: 1941.

(B) SUMMARY OF AIRCRAFT ERECTED, SEPTEMBER 1940 - 31 AUGUST 1941

<u>Month</u>	<u>Blenheim</u>	<u>Hurricane</u>	<u>Glen Martin</u>	<u>Tomahawk</u>	<u>Fulmar</u>	<u>Mohawk</u>	<u>Total</u>
Sept. 1940	4	29	-	-	-	-	33
Oct. 1940	2	3	-	-	-	-	5
Nov. 1940	11	37	1	-	6	-	55
Dec. 1940	21	8	2	-	6	1	37
Jan. 1941	31	65	1	-	2	(crashed)	99
Feb. 1941	34	-	3	8	10	-	55
March 1941	52	60	6	6	9	-	133
Apl. 1941	32	41	9	40	1	-	123
May 1941	39	56	13	51	2	-	161
June 1941	52	65	15	71	-	-	203
July 1941	71	39	10	30	-	-	150
Aug. 1941	41	76	2	4	-	-	123
	<u>390</u>	<u>479</u>	<u>62</u>	<u>210</u>	<u>36</u>	<u>(1)</u>	<u>1,177</u>

(c). SUMMARY OF AIRCRAFT DESPATCHED TO AIR H.Q., MIDDLE EAST. SEPTEMBER 1940 - 31 AUGUST 1941

<u>Month</u>	<u>Blenheim</u>	<u>Hurricane</u>	<u>Glen Martin</u>	<u>Tomahawk</u>	<u>Fulmar</u>	<u>Total</u>
Sept. 1940	3	18	-	-	-	21
Oct. 1940	3	16	-	-	-	19
Nov. 1940	2	12	-	-	5	19
Dec. 1940	20	22	-	-	7	49
Jan. 1941	31	62	1	-	11	105
Feb. 1941	40	18	3	-	-	61
March 1941	30	53	5	7	9	104
Apl. 1941	33	39	9	31	-	112
May 1941	31	44	6	43	-	124
June 1941	29	55	13	53	2	152
July 1941	92	52	11	27	-	182
Aug. 1941	39	59	10	42	1	151
	<u>353</u>	<u>450</u>	<u>58</u>	<u>203</u>	<u>35</u>	<u>1,099</u>

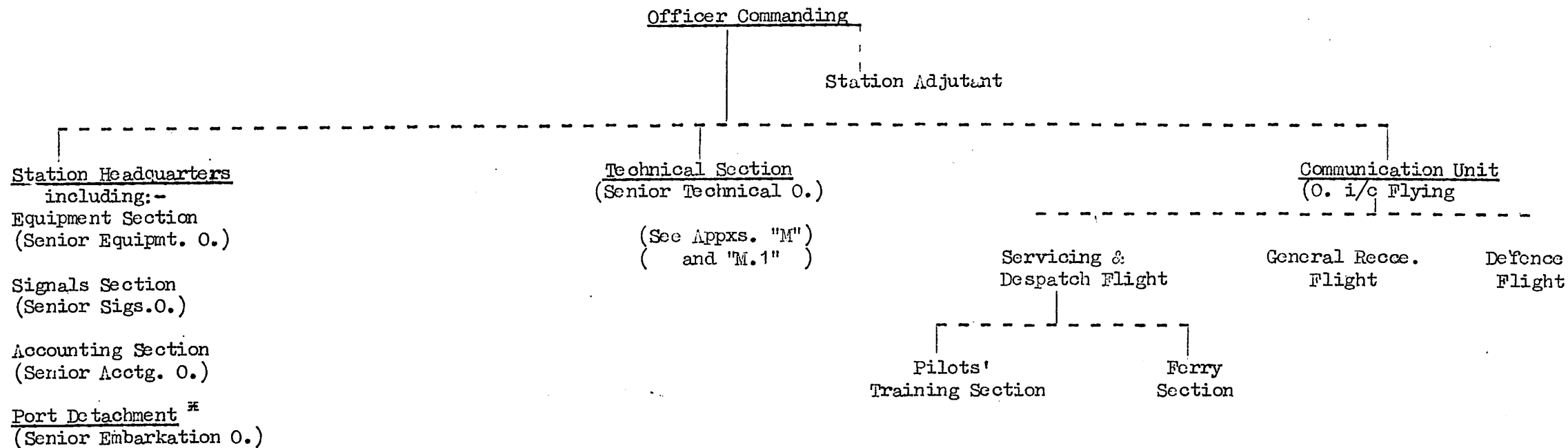
Note: Tables "B" and "C" are taken from Air/Cdre Thorold's Report, Takoradi and the W.A.R.R., July 1940 to Sept. 1941, pages 43 and 13.

WASTAGE OF AIRCRAFT DESPATCHED TO AIR H.Q. MIDDLE EAST (TAKORADI - ATI SECTION W.A.R.R.)SEPTEMBER 1940 - 31 AUGUST 1941

	<u>Blenheim</u>	<u>Hurricane</u>	<u>Glen Martin</u>	<u>Tomahawk</u>	<u>Fulmar</u>	<u>Total</u>
<u>Number of Aircraft despatched</u>	353	450	58	203	35	1,099
<u>Number of Aircraft written off</u>	8	12	3	7	1	31
<u>Percentage written off</u>	2.26%	2.66%	5.17%	3.45%	3.14%	2.82%

Note: The above table is taken from Air/Cdre Thorold's Report, Takoradi and the W.A.R.R., July 1940 to September 1941, page 49.

ORGANISATION OF ROYAL AIR FORCE STATION, TAKORADI. (AS AT AUGUST 1941)



* For administration and discipline:
independent for executive matters.

Note The above is compiled from Appendices 9, 15 and 16 of Air/Comdre. Thorold's Report, R.A.F. Station, Takoradi and the West African Reinforcement Route, July 1940 to September 1941.

PORT DETACHMENT.Receipt of Aircraft.

One of the factors which influenced the choice of Takoradi as a R.A.F. base was the excellent port facilities. The harbour could take ships of a goodly tonnage and draft and wharfside facilities existed on a scale unusual in West Africa. The port of Takoradi had been operating for some seven years during which time it had dealt with many thousands of tons of manganese ore and general cargo. It had one limitation, however, from the R.A.F. point of view in the capacity of the wharfside cranes. On the only wharf where ships carrying crated aircraft could berth the maximum lift obtainable was two tons. A 10 ton mobile crane was available, but could not be moved from its position near the shallow water jetty owing to the weakness of the jetty which would not have borne its weight except on the reinforced portion on which it stood. Early consignments of crated aircraft arrived in ships whose derricks were adequate to off-load the aircraft. In the case of the "Argus" the problem was solved with lighters.

As the flow of aircraft increased, however, it apparently was not possible for sufficient ships with adequate handling gear to be provided. For this reason the situation arose when neither the wharfside cranes nor the ships' derricks could off-load them. In some cases this complication was overcome by inserting between the ship which could not deal with its own aircraft and the wharfside, a second ship whose derricks were powerful enough to lift the aircraft from the outer ship on to the wharf. Early in 1941 several cases occurred when there was no suitable second ship available and cargoes of crated aircraft had to lay outside the harbour until such time as a suitable second ship arrived. Alternatively these ships were sent on to Lagos where a 10 ton crane was available to off-load them and where the aircraft could be loaded on to a suitable ship returning to Takoradi.

To overcome this difficulty urgent demands were sent to the Air Ministry for a suitable heavy crane. This was eventually found and despatched to Takoradi but owing to delays in shipping and other reasons it was still only partially erected in September, 1941. This type of complication naturally increased the work of the Port Detachment.

Handling of Freight.

At the same time although much of the local equipment required for Takoradi had arrived by the end of 1940, the gradual realisation of the proposition to form a small stores depot on the station resulted in an increased quantity of freight to be dealt with in the port. It was soon evident that the work to be done required the establishment of more than one Port Officer.

The matter was taken up with the Air Ministry and it was finally agreed to increase the establishment both in Officers and Airmen.

During the period under review, the following traffic was handled by the Embarkation Staff:-

Aircraft received:-	1390 (in 3,324 cases)
(This represents 163,892 shipping tons)	
Stores received	6032 packages
Stores shipped	5472 packages
Personnel disembarked	2225
Personnel embarked	281

/Transport

Transport of Aircraft to aerodrome.

The transport of aircraft from the port to the aerodrome also presented difficulties. Initially Takoradi was supplied with four large and four small Comer high loading articulated vehicles. These vehicles are designed for a 3 ton load. The weight of a crated Blenheim is over 5½ tons. As no other alternative transport was available the 3 ton vehicles had to be used. A local modification was produced whereby the rear springs of these trailers was strengthened with an extra leaf. It was then found that, although when carrying a crated Blenheim the vehicles were clearly loaded beyond the normal factor of safety, they would stand up to the job. A careful watch was kept on them and a rigid speed limit of 5 m.p.h. was enforced. By these means it was possible for some six months to move the necessary loads without breakdown or accident.

Marine Transport.

As the number of incoming ships increased it became evident that marine transport would soon be a problem. The number of launches available at Takoradi was very limited and they were already then in extensive use. When ships arrived with aircraft or other freight it was necessary for the Port Officer to visit them immediately, often when they were still outside the harbour, in order to inspect the cargo and confer with the master of the ship about off-loading. On all these visits it was necessary to borrow one of the Government or private launches. Demands were made on the Air Ministry to supply launches, but presumably because they were not available even in the United Kingdom no launches were sent. During the whole 12 months the Port Officer was dependent on borrowed launches. This and other difficulties of harbour congestion contributed to the state early in 1941 where it appeared that the port might be the bottle-neck in expansion.

The situation, however, was eased by the close and useful co-operation which was built up between the R.A.F. Port Detachment Officer and the harbour authorities. It was possible by the loan of Coles cranes and certain other equipment and material belonging to the R.A.F. to make a fair exchange for services which the local authorities could not render without inconvenience to themselves. Difficulties of off-loading were overcome by intelligent anticipation of the arrival of ships and by close and unofficial communication with Freetown. It was thus possible to arrange that those ships with good handling gear were used to clear those without. Arrangements were made however, to accelerate the clearing of crated aircraft from the wharftside. Whenever there was a rush of arrivals, lack of space and transport tended to congestion. To ease this situation it was agreed with the Gold Coast Railways that railway bogies might be used for the portable storing of crated aircraft until they could be cleared from the port. This enabled the hoisting gear of one ship to be used for the rapid off-loading of several small ships. This liaison also produced beneficial results in the borrowing of launches. During the whole of the year the situation was never satisfactory but without this co-operation on the part of the local authorities it might have been very much worse.

Air Transportation Office.

As the bulk of incoming freight grew, the proportion of freight intended for onward transport to the Middle East increased. The available air transportation, which in the early days consisted almost exclusively of a small British Overseas Airways service, rapidly became inadequate for the quantity of freight to be carried. Storage problems thus arose. By arrangement with the harbour authorities one of the main cocoa sheds was allotted to the R.A.F. until the next cocoa season. Early in 1941 by arrangement with the Customs authorities, a portion of the Customs Shed was set aside for the same purpose. The early provision of this storage space proved its value later, as it was not

/until

until April and May 1941, that the air transportation to Middle East began to catch up with the freight which had accumulated.

This increase of freight to Middle East was rapidly followed by an increase in personnel arriving at Takoradi for onward transport to Middle East. In fact the transport of both freight and personnel soon grew into a secondary function of the station. Initially the R.A.F. was responsible merely for the reception of both freight and personnel and their accommodation until such time as British Overseas Airways provided aircraft for their onward movement. It was soon realised, however, that the question was more than could be dealt with by a reception organisation. Varying priorities made it essential that the R.A.F. had a direct hand in loading and despatch. With the arrival therefore of additional Port Officers early in 1941 a sub-section of the Embarkation Office was opened to deal with the onward despatch of both freight and personnel to the Middle East. This section consisted of one officer and two clerks with authority to call on Port Detachment transport for the movement of material. From this date onwards it was arranged with British Overseas Airways Corporation that exact details of the space available on all outgoing aircraft should be passed in advance to the Embarkation Officer who would then arrange for the distribution of his load within these limits. This ensured that R.A.F. requirements in priority for both personnel and freight were strictly adhered to. It also ensured that urgent requests for particular items from the Middle East were dealt with immediately.

Schedule of Personnel and Freight carried during the period
4 November 1940 - 30 September 1941.

PASSENGERS - LAGOS AND BEYOND

<u>1940</u>	<u>B.O.A.C.</u>	<u>R.A.F.</u>	<u>TOTAL</u>
4 Nov. to 31 Dec.	74	2	76
<u>1941</u>			
1 Jan. to 31 March	89	60	149
1 Apl. to 30 June	127	80	207
1 July to 30 Sept.	216	108	324
	<u>506</u>	<u>250</u>	<u>756</u>

FREIGHT (in lbs.) LAGOS AND BEYOND

<u>1940</u>	<u>B.A.O.C.</u>	<u>R.A.F.</u>	<u>TOTAL</u>
4 Nov. to 31 Dec.	3,469	-	3,469
<u>1941</u>			
1 Jan. to 31 March	7,603	11,145	18,748
1 Apl. to 30 June.	26,336	33,688	60,024
1 July to 30 Sept.	53,947	80,547	134,494
	<u>91,355</u>	<u>125,380</u>	<u>216,735</u>

AIRCRAFT ASSEMBLY UNIT

General.

The Aircraft Assembly Unit was established to accept crated aircraft conveyed from the port by mechanical transport. The unit was responsible for the aircraft until they were handed over to Despatch Flight in a serviceable and airworthy condition. The assembly of aircraft therefore fell into three divisions:

- (a) The handling of crated aircraft on arrival.
- (b) The erection of the airframe, and installation of the engine where applicable.
- (c) Ground and air test of the aircraft and adjustments as necessary to render it airworthy and serviceable.

/The

The Aircraft Assembly Unit was initially organised into flights, each of which dealt with the erection of a particular type of aircraft. In addition to these flights there was an aircraft test section and a small workshops section for which at the start it was impossible to spare more than a very few personnel.

Technical Organisation.

As the volume of aircraft arriving increased, it was found necessary to make certain detailed alterations in the technical organisation. In April 1941, these changes were consolidated and set out in a letter to all departments and all sections of the Aircraft Assembly Unit. It laid down as a fundamental principle that the purpose of the Aircraft Assembly Unit was to effect the maximum rate of erection. For this purpose it designated the erection flights and air test organisation as the production line and emphasised that the workshops and ancillary sections were subsidiary to this production line and that their prime purpose was to assist it.

Ancillary Equipment.

In order to augment the lifting and transport facilities at the aerodrome it was necessary to manufacture locally certain ancillary equipment details of which are as follows:-

- (a) Gantry. Due to the shortage of cranes and also to the fact that some cased aircraft were beyond the lifting capacity of the Coles 5 ton Crane three goal-post type steel post gantries approximately 23 feet high and 23 feet wide fitted with 2-5 ton tackles were made and erected at convenient points for off-loading cased aircraft in the vicinity of the erecting sites.
- (b) Trolleys. Low wooden top trolleys were constructed from axles and wheels obtained from local resources. These trolleys were fitted with a pivoting beam across the top; two such trolleys are required to accommodate each aeroplane case. These trolleys ran on 2 foot gauge tracks laid between the gantry and points convenient to the hangar.
- (c) Lifting Jacks. Service step jacks of about 5 ton capacity were manufactured locally to enable the aeroplane case to be raised from the trolleys and lowered to the ground.

All the above mentioned equipment was manufactured in Gold Coast Government Railway Workshops, Sekondi.

Hangar Accommodation.

The accommodation for Aircraft Assembly Unit started in 1940 with one hangar for Blenheim erection and a tarmac apron on which Hurricanes were erected. During the year five Bellman hangars were erected until eventually all erection was carried out in hangars.

It was not considered practicable to erect hangars for the accommodation of Test Flights. Considerations of space and economy affected this together with the realisation that it would require at least two hangars to accommodate the aircraft likely to be under test at any one time during the rush period. Similarly it was not considered economical to provide hangar space for those aircraft which had been handed over to the despatch organisation to await despatch from Takoradi. When the system was working smoothly aircraft should not have to wait for more than two to three days before despatch. Any hangar accommodation therefore, would only be used to any degree during the period when the despatch of convoys was delayed owing to bad weather or for other reasons.

Inspection and Testing.

Up to December 1940, whenever aircraft were ready for testing, it was the practice for pilots to be loaned from the Communication Unit to carry out one individual test. These pilots were not under the control

of the Aircraft Assembly Unit and the individual chosen depended on the existing state of the ferry pilots pool. After a short time it was clear that this system was quite unsatisfactory. A test pilot's job is essentially specialised. He must know the type of aircraft well and be able to compare it with other aircraft of the same type flown under similar conditions after a similar history.

In January, 1941, therefore, two pilots were posted permanently from Communication Unit to the Assembly Unit for duty as test pilots. At the same time a further independent section of the Aircraft Assembly Unit was formed as Test Flight. This flight was placed under the command of the Senior Test Pilot. It was later established by Air Ministry with a Flight Lieutenant (Engineer) in command, three test pilots and a small maintenance staff.

Test Flight was made responsible for an independent final inspection of all aircraft delivered from the production line. Personnel from this flight supervised the ground running of engines before test and the adjustment of the aircraft after test. This system of test which, although within the Aircraft Assembly Unit, was independent from the erection flights (i.e. assembly unit) proved its value immediately. The quality of the aircraft passed to the ferrying organisation improved and the time taken to remedy defects was greatly reduced owing to the specialised experience and recommendations of the test pilots.

In June, 1941, in conformity with normal home procedure for Service Repair Depots, a Depot inspection Department was formed and later in the year a qualified officer was posted to control it. D.I.D. took over the inspectional supervision and control of all technical work relating to aircraft on the station. The staff was selected from N.C.Os previously employed on inspection duties in the assembly unit and test flight. Inspections on the completion of each stage in the aircraft erection were carried out by D.I.D. as a check on the normal shop inspection. In this way D.I.D. took over from test flight the inspection, checking and certification of all aircraft work. The system proved very satisfactory and had the virtue of being entirely independent of the production line. The D.I.D. were also responsible that a satisfactory record of all aircraft work and inspections was maintained on the unit; Work Record Sheets were adopted for this purpose.

The arrival of carrier borne aircraft caused an immediate acceleration in the erection and despatch rate of Hurricane aircraft owing to the fact that except for items to be fitted and a comprehensive inspection there was little erection work to do. At the same time this immediate acceleration was partially off-set by the consequent interruption to the erection programme. Personnel normally engaged in erecting aircraft had to be removed from the production line for the reception, inspection and passing out of the carrier borne aircraft.

The peak month for production occurred in June 1941 when 204 aircraft were erected. This showed that the commitment to erect 200 aircraft per month could be carried out. The decline in production figures after June 1941 was due solely to the lack of crated aircraft delivered to Takoradi. In July, August and September 1941 the supply of aircraft was intermittent and below schedule. For this reason unproductive periods occurred.

Opportunity was taken during the temporary slack period to accelerate outstanding work on aircraft that for technical reasons had failed to pass air test, or in the case of certain American types of aircraft on account of shortage of spares were crated and dispatched by sea to Egypt.

Comparison of Man Hours.

The four main types of aircraft erected to Takoradi varied greatly in the man hours required in their production. In particular the Glen Martin owing to the separating of its fuselage into three portions and

the consequent necessity for the laying of control cables was a very much less economical job than other types. The man hours required for these four types are shown below for comparison:

Blenheim	352 man hours
Hurricane	109 man hours
Maryland	180 man hours
Tomahawk	381 man hours

SERVICING AND DESPATCH FLIGHT

Ferry organisation.

The ferrying organisation was originally established under the name of 'Communication Unit' and was divided into Servicing and Despatch Flight (including Ferry Pilots Pool and maintenance personnel) and Training Flight in which conversions from one type of aircraft to another were carried out.

Later still in the Spring and Summer of 1941 a General Reconnaissance Flight of 3-4 Blenheim aircraft and a Defence Flight of 8 Hurricanes was formed and put under the operational control of Wing Commander 'Flying'.

From the inception of the station it had been decided that the ferrying of aircraft could best be done by pilots who knew the difficult route over which they had to fly. It was, therefore, decided as a matter of policy that the ferry pilots should be based at Takoradi and should return from Egypt after each delivery flight. This policy was kept throughout the year and proved its worth as ferry pilots gained knowledge of the flying and navigational problems involved.

Later in the year for short periods when for a variety of reasons aircraft had accumulated at Takoradi it was necessary to supplement the ferry pilot pool by the addition of casual pilots supplied from the Middle East. On the whole this did not prove successful. Pilots who came down from Egypt to Takoradi for one trip only tended to regard it as a holiday and did not betray that sense of responsibility necessary for the successful operation of the ferry route. Even when pilots were sent down to collect aircraft for their own squadron various difficulties arose owing to their lack of knowledge of the country. For this reason as far as possible only those pilots who were permanently attached to the ferry pool at Takoradi were used in ferrying aircraft.

The first members of the Ferry Pilots Pool arrived in No.17 draft in August 1940. They consisted of 12 officers and 13 sergeant pilots from No.4 Ferry Pool, Kemble. These pilots were sufficient for the initial ferrying as the despatch rate at that time approximated to one convoy a week. As the programme worked up to schedule, however, it became necessary to add to the strength of this ferry pool. On the 24 October 1940 a signal was received from the Air Ministry stating that it was proposed to release the additional British pilots who had been destined for Takoradi by employing Polish pilots on ferrying duty. It was proposed to send out some 18 Polish officers and 30 Polish N.C.O. pilots. 20 of these pilots arrived towards the end of November and were followed by a further 25 in 1941.

As ferrying commitments increased during 1941 additional British and Polish pilots and wireless operators were posted to Takoradi. At the same time the navigation of these convoys which had originally been undertaken by Civil air line pilots loaned by British Overseas Airways Corporation was taken over by the R.A.F. A number of officer and N.C.O. navigators were posted for this purpose. By the summer of 1941 the ferrying organisation had at its disposal some 120 pilots, 40 navigators and 40 Wireless observer/air gunners, of whom approximately 50% were Polish.

Delivery of Aircraft.

The number of aircraft ferried over the route increased rapidly during the first six months of 1941. During the early months of the year a

/considerable

considerable proportion of this increase was due to the arrival of carrier borne aircraft in the operations 'Pageant' and 'Monsoon'.

Of the Blenheim aircraft erected eight were handed over to a free French Detachment who ferried them to Maiduguri on the formation there of the Free French Topic Force in December 1940. Four Glen Martins were later ferried to Middle East by Free French pilots, possibly because of the pilots' lack of knowledge of the route, four of these aircraft had become complete casualties within a short time of their despatch from Takoradi.

Return of Ferry Pilots.

As the production rate rose between March and June 1941 it rapidly became apparent that sufficient pilots were not available at Takoradi to despatch the aircraft as they were erected. This problem became very pressing during these months and at one time there was an accumulation of some 75 serviceable aircraft awaiting despatch from Takoradi for whom there were no suitable pilots. It was apparent that there were two solutions:

- (i) To increase the number of pilots at Takoradi.
- (ii) To accelerate the return of air crews from Egypt after they had completed their delivery flight.

An examination of the problem showed that the number of pilots was almost, if not quite, adequate and that the real bottleneck was the limited capacity of the B.O.A.C. aircraft to return them from Cairo. Additional pilots would have helped temporarily, but once used the same problem of an adequate return rate would arise. The need, therefore, was to expand the capacity of the air transportation services returning the air crews.

In March 1941 the available aircraft on the Cairo - Takoradi route consisted of three Bombays (which had recently been added in an attempt to improve the situation) and some 30 seats per week on British Overseas Airways Lockheed and D.H. 86 aircraft and on S.A.B.E.N.A. 'Junkers'. This was totally insufficient to cope with the number of air crew who had to be returned. Urgent representations were made both to Air Ministry and to Headquarters, R.A.F., Middle East emphasizing that it would not be possible to despatch aircraft at the rate of 200 per month unless a very appreciable increase in the return air transportation from Cairo was available. Various half-hearted methods were then tried to improve this position, but it was not until August 1941 that the situation improved. At that time owing to the deletion of American aircraft from the programme and the lack of British replacements the production rate had fallen. At the same time further Bombays were added and six R.A.F. Lodestar aircraft, which had recently been flown from America, were lent to British Overseas Airways to augment their capacity. These two factors enabled the accumulation of serviceable aircraft to be cleared during August and although sufficient aircraft were not arriving to reach the figure of 200 per month, it appeared that the transportation services would be adequate to return the number of aircrew required for that figure.

This question of the return of ferry pilots was vitally important to the successful operation of the West African Reinforcement Route. Moreover, it was intimately connected with the increasing commitments of freight and personnel arriving at Takoradi from the United Kingdom for onward transmission to Middle East. As it happened, the increasing services arranged for the return of ferry pilots could be fully used for the movement of freight and personnel from Takoradi to the Middle East. Even if this latter commitment had not existed, however, the large transportation service which grew up during the year would still have been essential to effect the return of air crews from Cairo. If freight and personnel had not accumulated at Takoradi for onward movement to the Middle East it is a doubtful point whether the lack of an adequate return transportation service from Cairo for air crew would have been dealt with even as energetically as it was.

/Control

Control of Aircraft and Movement.

The control of convoy movement over the route from Takoradi presented many difficulties. In the early days when only one convoy per week was being despatched signal facilities could be concentrated on the passing of movement orders. As aircraft movement signals grew in quantity and as the number of signals on administrative matters further crowded communications the situation over the route at times became confused. Various systems were tried both to increase the priority value of aircraft movement signals and to decrease the priority value of administrative signals. As the signals organisation itself increased conditions became easier but at all times it was evident that movement control over 2,500 miles of ferry route in Africa was a different matter requiring the close attention of a suitable small staff.

Proposals were made for the appointment of a R.A.F. Regional Movement Controller in Nigeria who would in some degree remove the responsibility of convoy control in Nigeria from Takoradi. This policy was finally approved in August 1941 and it was hoped to implement it early in October 1941 in line with other changes in the organisation of the R.A.F. Detachment at Lagos.

The relationship of Ferry Pilots and aircrews to the delivery of aircraft over the W.A.A.R.

The safe despatch of aircraft across the W.A.A.R. depended primarily upon the following factors:-

- (a) The suitability of pilots taking part.
- (b) The arrangement of convoys.
- (c) The provision of a 'rule of thumb' procedure as a means of enforcing discipline.
- (d) Suitability administered Staging-posts across the route.

With a journey of approximately 4,000 miles confronting them, it was essential that all crews should be experienced on the type of aircraft they were required to fly. They had to be physically fit and well led.

To ensure their ability to fly the type of aircraft required, a Training Flight, comprising a dual and solo Blenheim, a Glen Martin, Hurricane and Tomahawk aircraft was formed. The qualifications of all new pilots were closely considered on their arrival and whenever there was doubt as to their ability, they were tested in this flight by an Instructor.

Difficulties arose regarding the suitability of pilots to fly Tomahawks in that no dual single engine aircraft was available in which to test them. In order to overcome this difficulty, they were required to fly the dual Blenheim for a short period in order to satisfy the instructor they had the required air sense to fly a single seater.

When Glen Martin and Tomahawk aircraft were first received, pilots of proved ability only were selected for these types, and in this way it was possible to keep flying accidents down to a minimum.

A large amount of conversion generally was carried out at Takoradi. It is considered that this was most undesirable and extravagant. The aerodrome was not suitable for instruction in that it was used to the full by visiting aircraft and convoy aircraft on test. Added to this, experience showed that the route demanded a high standard of flying ability and it was considered that conversion should be carried out at more suitable aerodromes and that pilots should normally have a minimum of 250 hours previous flying experience.

Each aircraft after a satisfactory test in the Test Flight was transferred to Despatch Flight and allotted a pilot. Prior to proceeding on convoy, each pilot was required to carry out a further test flight of at least one hour. This fulfilled two purposes, in that the aircraft was given a further test and at the same time it enabled the pilot to display his ability to convoy the aircraft across the route.

To overcome difficulties in navigation and as an aid to locating forced landed aircraft without delay it was considered essential to form the single engine aircraft into convoys led by a Blenheim aircraft carrying full crew. In consequence the normal convoys comprised one Blenheim and up to six Hurricanes, the size and composition being varied occasionally in accordance with the output.

As a safety precaution in the early stages, skilled navigators with experience on the route were loaned from B.O.A.C. Civil wireless and D/F facilities already existed and these were used by the leading aircraft. B.O.A.C. continued to assist in navigation for the first few convoys until the nucleus of R.A.F. Observers were considered to have sufficient knowledge of the route. It later became the policy of all new observers posted to the Unit to carry out two flights over the route in the deputy leader's aircraft in order to gain experience.

When a number of convoys were required to proceed at short intervals careful routing was required and consideration had to be given to the length of each leg to allow for the varying endurance of different types of aircraft with the appreciation of the necessity for having fuel reserves to reach the nearest emergency landing ground should weather conditions prohibit the use of regular staging-posts. The position of convoys at any one time over the route was shown daily on a Convoy Intelligence pro-forma.

Before departing from Takoradi, all convoy members were briefed. The briefing was comprehensive and covered all matters which concerned the safe delivery of aircraft to their destination. It was varied as occasions arose to cover the peculiarities of convoys composed of different types of aircraft. Each convoy leader was given a Convoy Movement Order.

In view of the numerous difficulties and hazards that arose during the flight great care was required in the selection of leaders both from the psychological and general flying experience point of view.

The first few convoys were led by the most experienced personnel available at the time. New leaders were later selected from pilots who had made several successful crossings and who displayed the necessary qualifications.

Every endeavour was made for leaders to retain the same navigator and wireless operator, as the efficient co-operation of this team greatly added to the chances of the successful delivery flight.

In view of the above the need for experienced pilots will be appreciated. A variety of pilots arrived at Takoradi, many loaned for one crossing only and others for short periods embracing perhaps three or four trips. The former included every type of pilot and the majority were inclined to regard the experience in the light of a holiday jaunt. For this reason very comprehensive briefing instructions were given prior to their departure and figures showed that a vast majority of accidents on the route were to the discredit of pilots temporarily attached. A pilot having an accident may not be made to appreciate the extreme seriousness of even a trifling mishap if he knows he is not returning to his station of departure. The formation of a Central Pilots Pool will, however, assist in overcoming this problem.

Besides the British and Dominion pilots, there was a Polish Detachment stationed at Takoradi. This Detachment was self contained having a Commanding Officer, and an ample administrative staff which included Adjutant, Padre, Medical Officer and Interpreters. The flying personnel were largely composed of older men of considerable experience. Despite obvious difficulties such as language and training on American aircraft, the detachment had a very fine record

of accomplishment on this route and a low accident incidence. Several reliable officers were selected as Convoy Leaders, their crews being provided from British sources, and the sight of an all Polish convoy was frequent.

As the Staging-posts had only limited personnel, accommodation and servicing facilities, it was necessary to ensure as far as possible that convoys were evenly spread out on their journey across the route. For this reason a leap-frog scheme was evolved. In the event of bad weather delaying the departure of convoys this scheme made it possible to despatch as many as seven convoys on one day.

Owing to the W.A.R.R. passing through Nigeria, Chad, E.A. Sudan and Egypt, special medical certificates were required, and to ensure fitness it became the practice for convoy personnel to have blood and temperature taken on the day prior to departure. Temperatures were again taken before departure in order to complete the requisite form and satisfy all concerned that each air crew was medically fit prior to leaving.

On arrival at their destination pilots reported to A.R.R.C. at Headquarters, R.A.F., Middle East to discuss any queries that might arise during their flights. Detailed reports were compiled by convoy leaders and submitted on their return to Takoradi. From these much useful data was obtained and an accurate log was thereby kept regarding the movement of all aircraft and convoys that crossed the route.

The results that have been achieved have been made possible by the setting up of an efficient ground organisation along the route and the introduction of the convoy system based on the enforcement of rigid flying discipline, the latter incorporating comprehensive briefing of crews and the issuing of a simple rule of thumb procedure to be carried out during their journey.

REPAIR AND SALVAGE ORGANISATION

In order that the Route Technical Officer might be acquainted with the progress of repair work along the route, each Staging-post submitted a weekly return to Takoradi with a copy to H.Q., M.E. This return showed the state of unserviceability of aircraft at the Staging-posts at 1200 hours on Fridays.

Owing to the humid climate in certain sections of the route, minor defects occurred in aircraft on delivery flights which were remedial at the Staging-posts without spares and usually without delaying the convoys. To keep a check on these defects and also to remedy them, each Staging-post submitted a return to Takoradi at the end of each month giving details of recurrent defects in aircraft. These reports were received at Takoradi by the Route Technical Officer and action taken at the discretion of the Senior Technical Officer, either by direct remedial action or by instituting a special inspection.

Repair Organisation.

When an aircraft becomes unserviceable at a Staging-post, the officer in charge of the Staging-post signalled without delay to Takoradi repeated H.Q., M.E. The signal was prefixed 'Unserviceable' and given priority 'Immediate'.

On receipt at Takoradi the signal was passed to the Route Technical Officer immediately. The R.T.O. thereupon obtained the items necessary for the repair, either from stores or by robbing an unserviceable aircraft at Takoradi or from an aircraft unserviceable elsewhere on the route.

Demands for such spares as were not available at Takoradi were signalled to Khartoum for delivery direct to the Staging-post. If Khartoum was unable to supply, they signalled H.Q., R.A.F., Middle East requesting issue to the Staging-post.

All spares when available were despatched to the Staging-post by air (except in the case of a component too bulky for air transport). The transport of replacement spares was given high priority.

When the aircraft was repaired and serviceable a request was made by signal by the officer in charge of the Staging-post to Takoradi requesting a pilot to air test the aircraft and subsequently to join the next available convoy passing through the Staging-post.

Salvage Organisation.

Each Staging-post included a small salvage party in its establishment to deal with crashed aircraft in its area. The equipment of these parties was made up as necessary from equipment held at the Staging-post and consisted of shear legs, pulleys, crow bars, tools and an articulated or other similar vehicle as was available.

After a forced landing, as soon as the aircraft was located, the Staging-post commander immediately notified Takoradi of the location of the aircraft. He then despatched the salvage party equipped with all necessary tools, food, bedding etc. to bring in the crash, without awaiting for any further instructions from Takoradi.

Takoradi was kept informed of the progress of the salvage work until such time as the aircraft was brought into the Staging-post. A full technical report was then submitted, on which disposal instructions were issued by Takoradi. If beyond repair, the aircraft was broken down and reduced to produce at the Staging-post. If repairable but beyond the Staging-post capacity, the aircraft was returned to Takoradi. Aircraft for return to Takoradi were despatched by road and rail to Lagos for shipping to Takoradi.

NOTE: The above is excerpted from Part III of Air/Cdr. Thorold's Report, Takoradi and the W.A.R.R., July 1940-September 1941.

APPENDIX "O"

WIRELESS FACILITIES TAKORADI - KHARTOUM, JULY, 1940.

Station	Frequencies	Aerial Power	Type of D/F	Transmitters	Receivers
Khartoum	333 6594		Adcock	M/W Local design S/W -do-	D.F.G. 10
El Obeid	333	.1	Nil	M/W Local design	R. 64
El Fasher	333 6675, 6594	.1 .15		M/W Local design S/W -do-	R. 64
Geneina	333 6675, 6594	.1 .15	Nil	M/W Local design S/W T. 58	R. 64
Maiduguri	333 6593	.25 .1	Nil	M/W T.19B (Obsolete R.A.F. pattern) S/W	
Kano	333, 322 6593	.25 .25	Adcock	M/W Local design S/W Marconi T.A. 8	D.F.G. 10 Local design
	333 6593	.25 .25	Nil	M/W Local design S/W Marconi T.A. 8	Local design
Oshogbo	333 6593	.25	Nil	M/W Local design S/W Marconi T.N.19A	Marconi
Lagos	333, 322 6693, 8840	.25 1.0	Adcock	M/W Local Design S/W Marconi T.W.10	D.F.G. 10 Marconi R.G. 34
Accra	333 6593	.25 .17	Adcock	Combined M/W & S/W Marconi T.W.5B	D.F.G. 10 R. 1084
Takoradi	333 6593	.25 .17	Nil	Combined M/W & S/W Marconi T.W.5B	R. 1084

Note: The above is transcribed from Appendix 18 (18B-18C) of Air Commodore Thorold's Report on Takoradi and the W.A.R.R. July 1940 to September 1941.

SIGNALS ORGANISATION FOR THE COMMENCEMENT OF FERRYING

(Summary of R.A.F. Middle East Signal Instruction No.20).

SIGNAL PLAN.

1. At the outset, communication is to be passed via the existing civil facilities both Airadio and Posts and Telegraphs.
2. When aircraft intend using the route, it is the responsibility of Khartoum and Takoradi to notify each other, giving 24 hours notice if possible, when the following organisation is to be brought into force. Such signals are to include:- (a) Number and type of aircraft; (b) number of formations; (c) number of officers and airmen, and (d) non-confidential call signs allotted.
3. The responsibility of notifying intermediate stations rests with Khartoum as far as Geneina and with Takoradi up to Maiduguri.

POINT-TO POINT ORGANISATION

4. This is to be organised into two groups, (a) Sudan and (b) West Africa, with provision for inter-communication, and will be continuous within the periods laid down except on those positions of the route over which aircraft are operating.

(a) Khartoum	STK)	Normally by land line.	
El Obeid	STO)	Alternative W/T:-	0330 - 1800
El Fasher	STF)	6590 kc/s. 333 kc/s	hrs. G.M.T.
		(in emergency).	daily.
(b) Takoradi	ZNV)		
Accra	ANT)	333 kc/s	0330 - 1800
Lagos	ZJK)	Alternative 6593 kc/s.	hrs. G.M.T.
Kano	ZIR)		daily.
Maiduguri	ZDS)		
(c) Maiduguri	ZDA)		0330 - 1800
Geneina	STE)		hrs. G.M.T.
			daily.

AIRCRAFT ORGANISATION.

5. The following airadio stations will open on the route and will maintain aircraft watch whilst aircraft are operating within their sections and will not return to point to point working until aircraft have landed at or passed the next W/T station. List of stations:-

Takoradi	}	33 kc/s. Alternative 6593 kc/s.
Accra		
Lagos		
Kano		
Maiduguri		
Geneina		
El Fasher		
El Obeid		
Kosti	}	For use in emergency. Reception 333, transmission 6590 kc/s.
Malakal		
Khartoum)	Receives 333 kc/s, transmits 6593 kc/s.

D/F FACILITIES.

6. The following Adcock D/F stations will be available on the route:-

/Accra

Accra
Lagos
Kano
El Gencina (if completed)
Kosti
Khartoum

7. Aircraft D/F rotating loops to work on 333 kc/s. and having a limited range of approximately 50 miles are installed at:-

Maiduguri
El Gencina
El Fashor

METEOROLOGICAL SIGNALS ORGANISATION

8. Only immediate meteorological information and weather reports before taking off are to be passed by Airadio stations. Regular observations for the preparation of synoptic charts will be passed over the Post and Telegraph network of the countries concerned to their collection centres. These centres are:-

- (a) For Nigeria - Lagos;
- (b) For Gold Coast - Accra;
- (c) For the Sudan - Khartoum

9. The information available will be broadcast on a special frequency in code by Lagos and Takoradi (for Accra) to a schedule under the arrangements of the meteorological services. Similar arrangements are made for broadcasting by Khartoum on a special frequency.

CALL SIGNS AND W/T PROCEDURE

10. R.A.F. non-confidential call signs are to be issued to all aircraft using W/T. Civil W/T procedure is to be used when working both Airadio and R.A.F. W/T stations. Call signs G-EZH. 51-150 are allotted to R.A.F. station, Takoradi; but abbreviated call signs, GHV followed by a number, are to be used between air and ground.

W/T TRANSMISSIONS BY AIRCRAFT

11. W/T and calibration tests are invariably to be carried out before flights but the times at which these tests are conducted are to be varied. Tests just before taking off at regular times are to be avoided as these may indicate E.T.D.'s to the enemy.

12. W/T silence is to be enforced except to pass urgent traffic or to obtain navigational assistance, or met. information.

CONTROL OF M/F WIRELESS TRANSMISSIONS

13. Except in cases of emergency, or where it is essential for a ground station to transmit on medium frequencies to enable an aircraft to obtain a bearing from its rotating loop in case of distress, medium frequency transmissions will be controlled in accordance with H.Q., R.A.F., M.E., Signal Instruction No.16. It is not at present intended to impose control on such transmissions west of the Sudan.

CODE CYPHER AND PLAIN LANGUAGE.

14. Itinerary reports and details of operational moves should be made in cypher wherever possible. Where plain language is essential the minimum of information is to be disclosed and should normally be limited to use by aircraft in emergency when working Airadio or Airgonic stations.

VERIFICATION SIGNALS

VERIFICATION SIGNALS

15. Verification signals are not to be used at present west of the Sudan. East bound aircraft are to be in possession of Verification Signals for working any D/T station in the Sudan. They are to be used by Takoradi before aircraft leave.

TIME.

16. All signal time is to be G.M.T. and watches are to be synchronised daily with the B.B.C. Time Signals.

SUMMARY OF H.Q. R.A.F., M.E., MODIFIED SIGNAL
PLAN (APRIL, 1941) - WEST AFRICAN REINFORCEMENT ROUTE.

AIR.

1. To provide full R.A.F. point to point services, D/F and Radio Beacon facilities along the West African Reinforcement Route.

PLAN.

Command.

2. Since deliveries are from west to east, losing daylight hours, the C.S.O. Takoradi to be responsible for the signals organisation Takoradi to Khartoum.

3. C.S.O. Takoradi to be upgraded to W/Cdr. (W/Cdr. Keens temporarily attached to be posted as C.S.O.).

4. Two visiting signal officers to be established on the staff of C.S.O. Takoradi, one to be based at Takoradi and the other at Khartoum.

5. Visiting signal officer Takoradi to be responsible for W/T stations Takoradi to Maiduguri.

6. Visiting signal officer at Khartoum to be responsible for W/T stations to Wadi Halfa.

Signals Organisation.

7. Main Staging Posts are being established at:-

Accra
Lagos
Oshogbo
Kano
Maiduguri
El Gensina
El Fasher
Khartoum
Wadi Halfa

8. Subsidiary staging posts are being established at:-

Ati
El Obeid
Luxor (not yet decided)

9. R.A.F. point to point, R.A.F. communication with aircraft on high frequency, H.F. D/F and Radio Beacons to be installed at all main staging posts.

10. R.A.F. point to point and communication with aircraft on low power with H.F. D/F, Type P.3, (D/F range 30 miles) to be established at all sub-sidiary staging posts.

[11. Communications to be provided and main items of equipment required are given at Appendix "A".]

Equipment.

[12. Equipments are given at Appendix "B", listing total equipments to be sent to H.Q. 203 Group and R.A.F. Station, Takoradi.]

LAND LINE.

13. 800 yds. of Don 3 wire and 6 field telephones to be provided for each staging post for local communications.

/W/T FITTING

W/T FITTING.

14. 4 W/T fitting parties have been established for Middle East, but only personnel for one party has been provided.

Personnel for the second W/T fitting party to be provided forthwith by Air Ministry and solely employed on fitting W/T stations on W.A.R. Route.

PERSONNEL.

15. Following personnel are to be established:-

Takoradi	1 W/Cdr. 1 F/Lt. and 1 Sgt. W.E.M.	C.S.O. W.A.R. Route, visiting duties, Takoradi to Maiduguri.
Khartoum	1 F/Lt. and 1 Sgt. W.E.M.	Visiting duties, Ati to Wadi Halfa.
All main staging posts	1 F/O. and 1 P/O.	Code and Cypher duties.
All subsidiary staging posts.	1 F/O. and 1 P/O.	Code and Cypher duties.
All main staging posts.	W.E.M. 1 Sgt. 1 Cpl. 2 ACS. W/Ops. 1 Cpl. 7 ACS.	N.C.O. in charge. Transmitting Stn. Point to point, H.F. D/F and Beacon watches.
	Elect. II 1 AC. W.O.M. 1 Cpl. 2 ACS. W/Ops. 2 ACS. Elect. III 3 ACS.	Charging. Servicing Aircraft -do- -do-
All subsidiary staging posts.	W.E.M. 1 Cpl. W/Ops. 1 Cpl. 4 ACS. W.O.M. 1 AC. Elect. II 1 AC.	N.C.O. in charge. Point to point and air- craft watches. Servicing aircraft -do-
Kano	W/Ops. 2 ACS.	Attached to 2 salvage parties.
Geneina	W/Ops. 2 ACS.	-do-

WORKS SERVICES.

16. R.A.F. accommodation to be provided for all R.A.F. Signal Stations.

17. Following to be provided at all main staging posts:-

- (i) Receiving station consisting of W/T Cabin, Signal Office and Store.
- (ii) Transmitting station consisting of transmitting room, workshop charging room and small office.
- (iii) 400 yards of 6 pair remote control cable.
- (iv) Hut for H.F. D/F equipment.
- (v) Electric power to the Transmitting station and lighting for all other Signal buildings.

/TRANSPORT

TRANSPORT

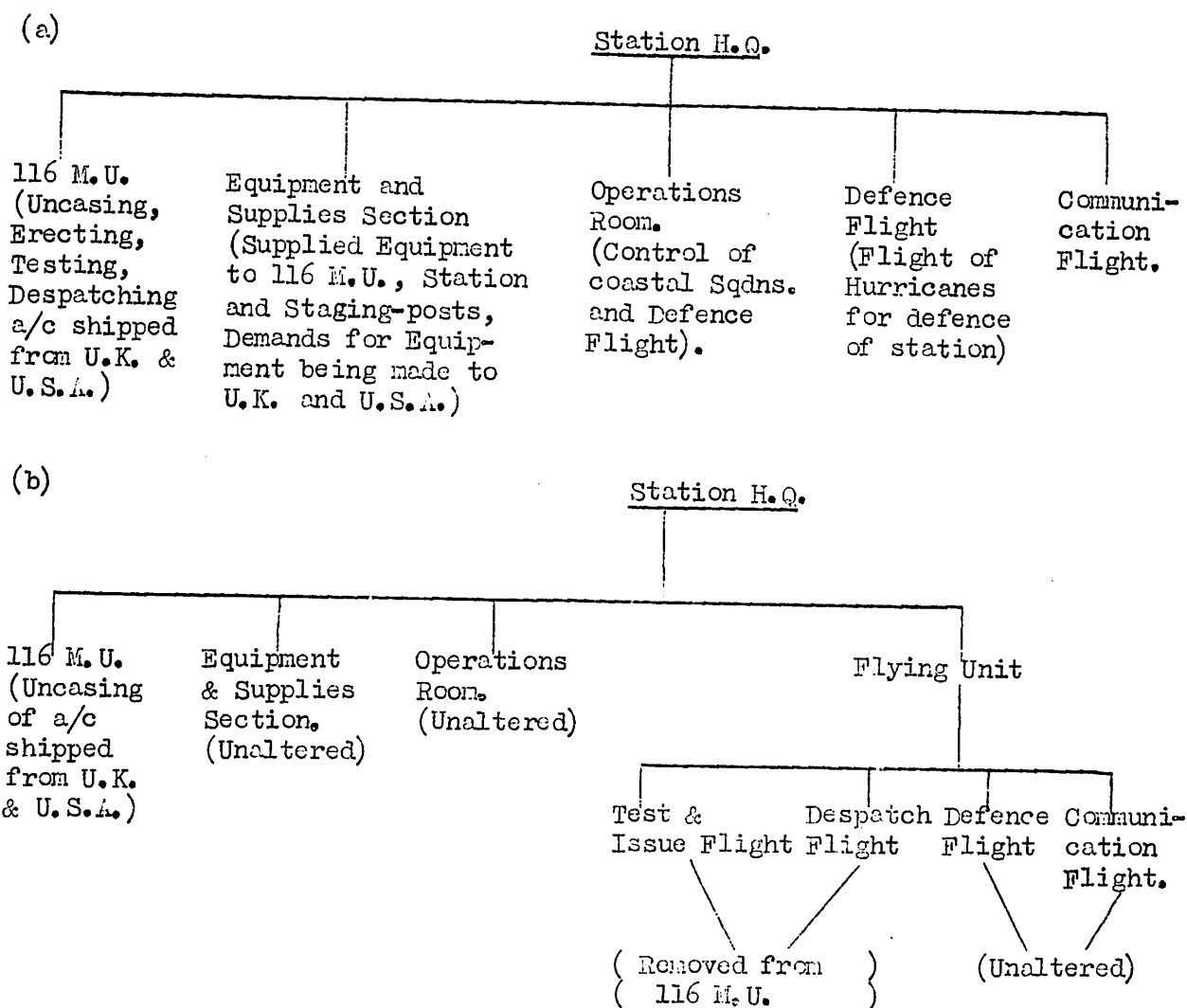
18. One truck and 1 AC driver to be provided at all Staging Posts and 1 Motorcycle and 1 AC Motorcyclist to be provided at all main Staging Posts.

SALVAGE PARTIES

19. 4 Salvage Parties are to be established, 2 at Kano and 2 at 1 W/T Pack set and 1 AC W/Operator to be established for each Salvage Party.

APPENDIX "P"

ORGANISATION OF R.A.F. STATION HEADQUARTERS, TAKORADI AS
AT (a) SEPTEMBER 1942 and (b) AS REVISED BY THE ESTABLISHMENTS
SUB-COMMITTEE.



Note: The above is taken from Report by M.E. Sub-Committee
September 1942 (D.D.O.2's File 2137, Part 1).

APPENDIX "Q"

(A) SUMMARY OF AIRCRAFT ERECTED, SEPTEMBER 1940 - 31 OCTOBER 1943

Blenheim	1,149
Hurricane	2,306
Glen Martin	66
Tomahawk	232
Fulmar	36
Mohawk	18
Kittyhawk	262
Boston	38
Beaufighter	341
Spitfire	740
Beaufort	42
Anson	14
Gladiator	6
Defiant	6
Miscellaneous (viz: Tiger	6
Moth, Master, Electra)	
	<hr/>
	5,262
	<hr/>

In addition to the above 156 Hurricanes were erected at No. 177 M.U., Apapa (Lagos) during October 1942 - January 1943.

(OVER)

NOTE: The above table is compiled from R.A.F. Station, Takoradi, Form 540, Entries of 31 July (giving totals to that date) and of 31 August, 30 September and 31 October 1943.

(B) SUMMARY OF AIRCRAFT DESPATCHED TO AIR H.Q. MIDDLE EAST,
SEPTEMBER 1940 - 31 OCTOBER 1943

Blenheim	1,114
Hurricane	2,272
Glen Martin	65
Tomahawk	232
Fulmar	35
Mohawk	16
Kittyhawk	259
Boston	37
Beaufighter	337
Spitfire	736
Beaufort	40
Anson	14
Gladiator	6
Ventura	37
Miscellaneous	3
	<hr/>
	5,203
	<hr/>

In addition to the above 156 Hurricanes were despatched from No. 177 M.U., Apapa (Lagos) during October 1942 - January 1943.

13 Venturas were also despatched to Accra for South Africa and 3 small aircraft to Freetown.

NOTE: The above table is taken from R.A.F. Station, Takoradi, Form 540, Entry of 31 October 1943.