London Airport

LONDON AIRPORT

By

L. A. A. HODBY

MARK 95% AWARDED

PLACED 1ST IN ENTRY

PREFACE

In compiling this thesis on London Airport great care was taken to ensure that a full and complete picture was obtained. As a result all the chapters, whilst complete in themselves, together form a fully interlocking account - working systematically through from the history and development of the Airport to describing some of the latest navigational aids which it employs.

The chapter on the definition of an airport has been included so that some of the fundamental problems encountered in the siting of an international airport could be laid down and to see how they were overcome or a compromise reached in the particular case of London Airport.

I should like to acknowledge the fine help and assistance given to me in the compilation of this thesis by the Marconi Wireless and Telegraph Company Limited and by the General Electric Company for the excellent photographs and helpful advice which they supplied and in particular to Mr. Essery who arranged a personal tour of the British European Airway's Maintenance and Servicing bays at London Airport.

L. A. H.

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CHAPTER

CHAPTER ONE

INTRODUCTION

A modern airport is, of necessity, a large and complex structure and a long time must elapse between the initial plan and its completion. Indeed, with the constant development of technical and mechanical inventions, it is doubtful whether an airport can ever be said to be complete. Nevertheless there comes a time when the final form is visible, permanent buildings rise from the levelled ground and the passenger and the visitor can at last feel that his needs, pleasure and interest are close to being satisfied.

This is what has happened at London Airport for day and night over the flat lands that lie between the Bath Road and the huge Staines reservoirs, fourteen to fifteen miles west of Central London, there is the almost continuous throb of aircraft. This, the site of London Airport, is already one of the greatest air stations in the world, the pivotal point for the main lines of flying traffic entering and leaving Britain and among the most up to date centres of air traffic control and equipments to be found today.

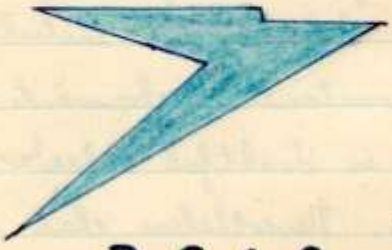
The running of London Airport sets the standard for the running of all other airports both large and small. Of course, not every airport needs such elaborate and expensive equipment, for

SOME OF THE OPERATING COMPANIES

THAT USE

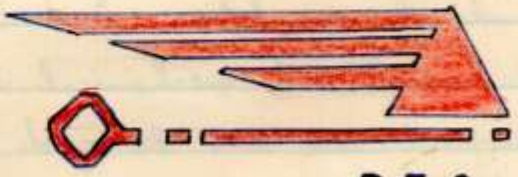
LONDON AIRPORT

ENGLAND



B·O·A·C

ENGLAND



BEA

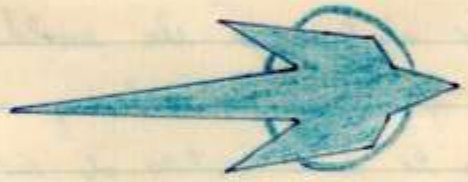
IRELAND

AER LINGUS

CANADA

TRANS-CANADA AIR LINES

ADEN



ADEN
AIRWAYS

many of them handle far lighter traffic. London Airport was designed to serve the largest kind of transport aircraft likely to be operated in the foreseable future.

The operating companies which use London Airport include, besides the British Corporations, which between them control the greatest air network in the world, a number of foreign and colonial services and charter companies. Each airline is responsible for its own working and administration duties, each employs its own staff; and the principal companies have their own operations rooms.

CHAPTER TWO

THE DEFINITION OF AN AIRPORT

Before proceeding further it will be as well to consider what is meant by an airport and also the factors which must be considered when choosing the site for one. Particular attention had to be paid to these in choosing the final site for the development of London Airport, which was destined to become the largest and most up to date international airport in the world.

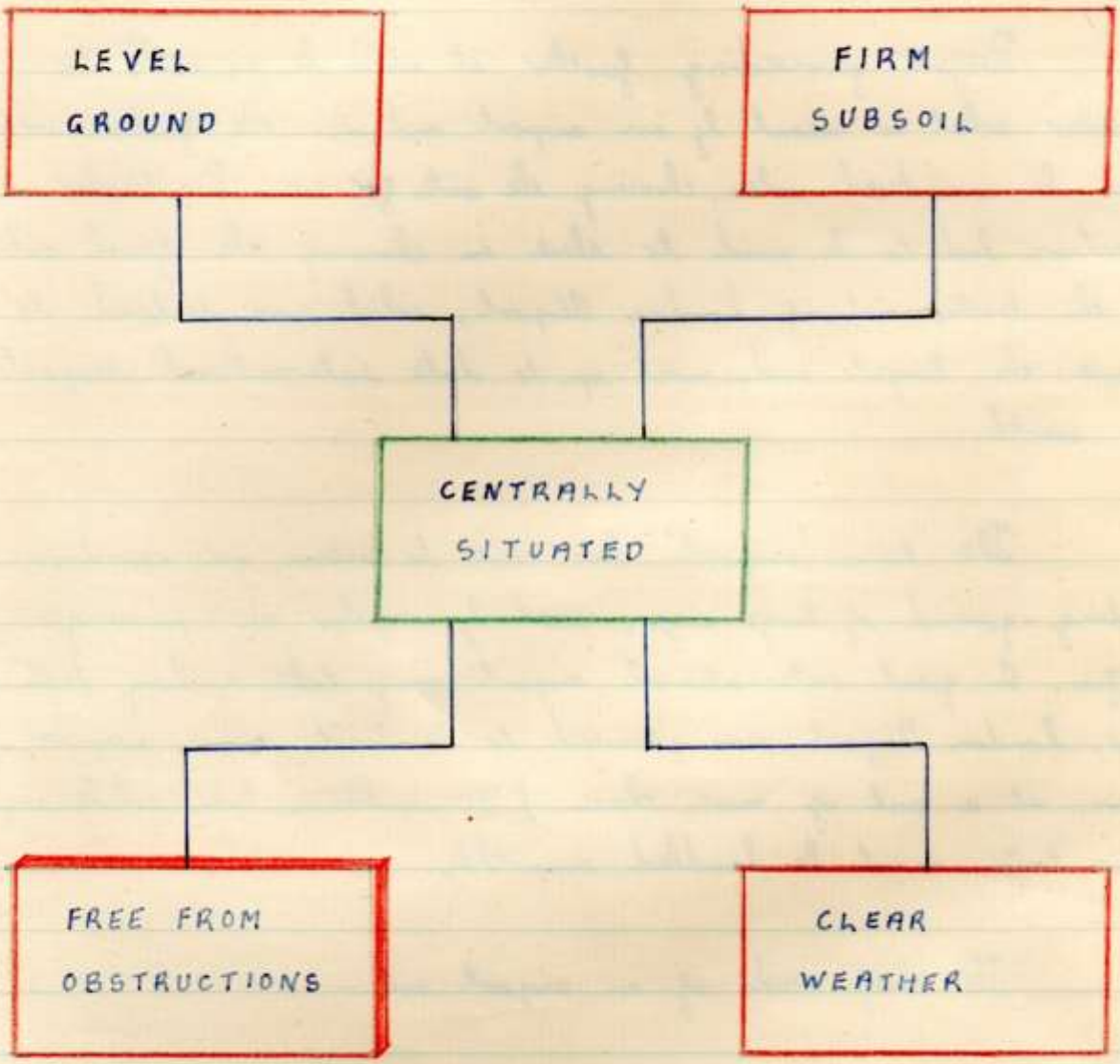
The term 'airport' has come to mean an aerodrome or landing-ground of large size, used by regular air-passenger traffic. A great international airport may take a long time to grow. London Airport was planned to be built over a number of years at a cost of more than £20 million. Even while airports grow traffic must be handled smoothly.

The chief needs of an airport are :-

(a) A large area of level ground.

Modern aircraft may need a run of nearly two miles along a take-off path or runway and an airport's runways must point in more than one direction to provide for changing winds. All aircraft take-off and land 'into' the wind facing the direction

THE MAIN REQUIREMENTS OF AN AIRPORT



from which the wind is coming. This is necessary so that the wings may develop enough 'lift'.

(b) Firm subsoil.

A firm subsoil is necessary in order that it may stand up to the thick concrete runways being laid on top of it. Aircraft weighing seventy tons or more may take off and alight at speeds around the 100 m.p.h. mark and the load on the ground is severe. On the aerfield, the land must be very carefully drained so that it is not allowed to become waterlogged.

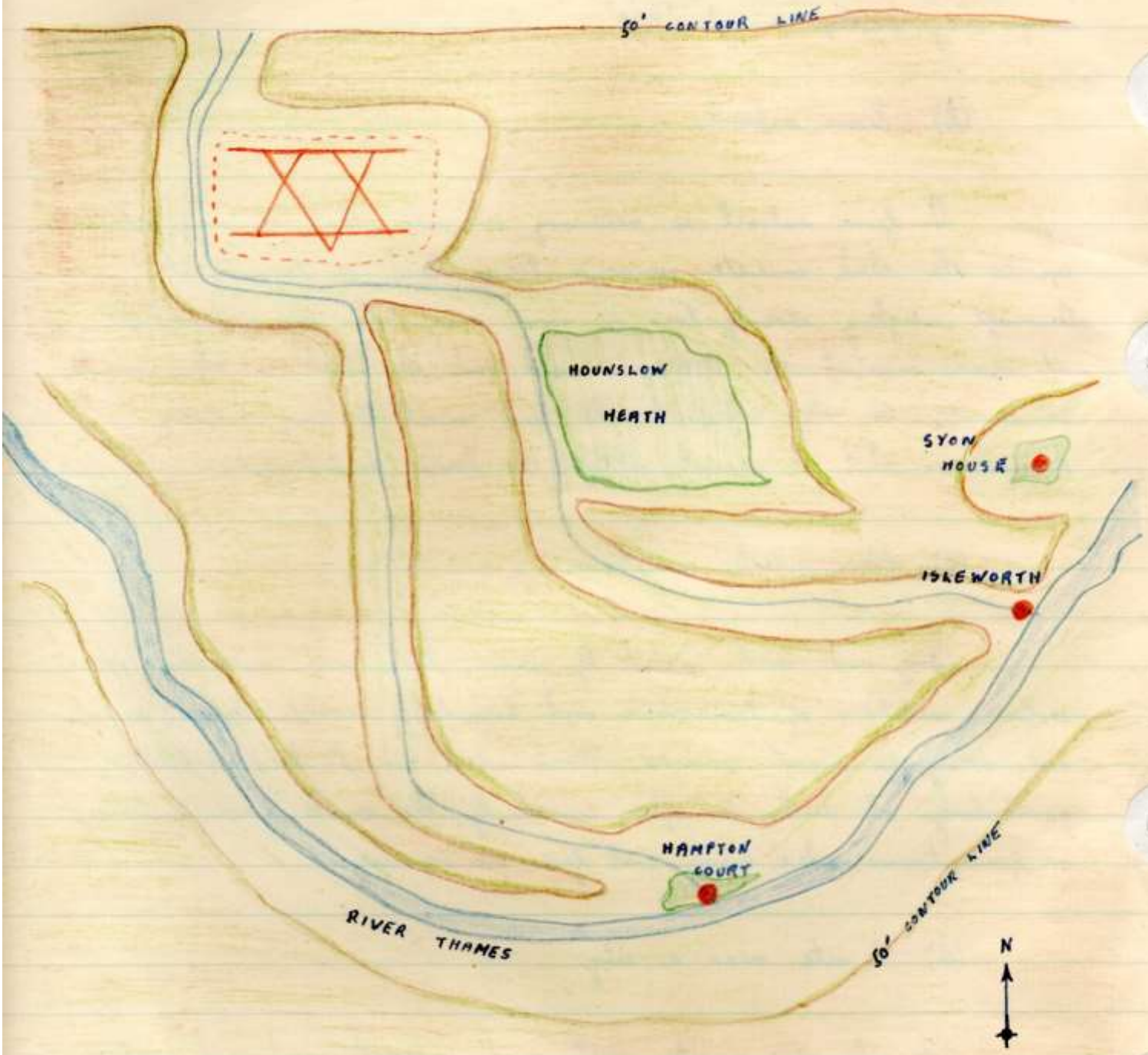
(c) Clear weather conditions.

Fog and mist caused by rivers, lakes and reservoirs in certain conditions of temperature and humidity involve danger, expense and delay for airport services. Mist which can hinder visibility, particularly at dusk, is often caused by the smoke from factories or from towns where many coal fires are in use.

(d) A site near a city.

A site near a city with good arterial road and railway services is essential, for time gained in air travel over long distances will be lost in slow ground travel unless the airport is near a capital or a group of large towns.

(e) Freedom from obstructions to flying.



SHOWING THE GENERAL LOCALITY AND OF PLACES IN CONNECTION WITH THE TEXT.

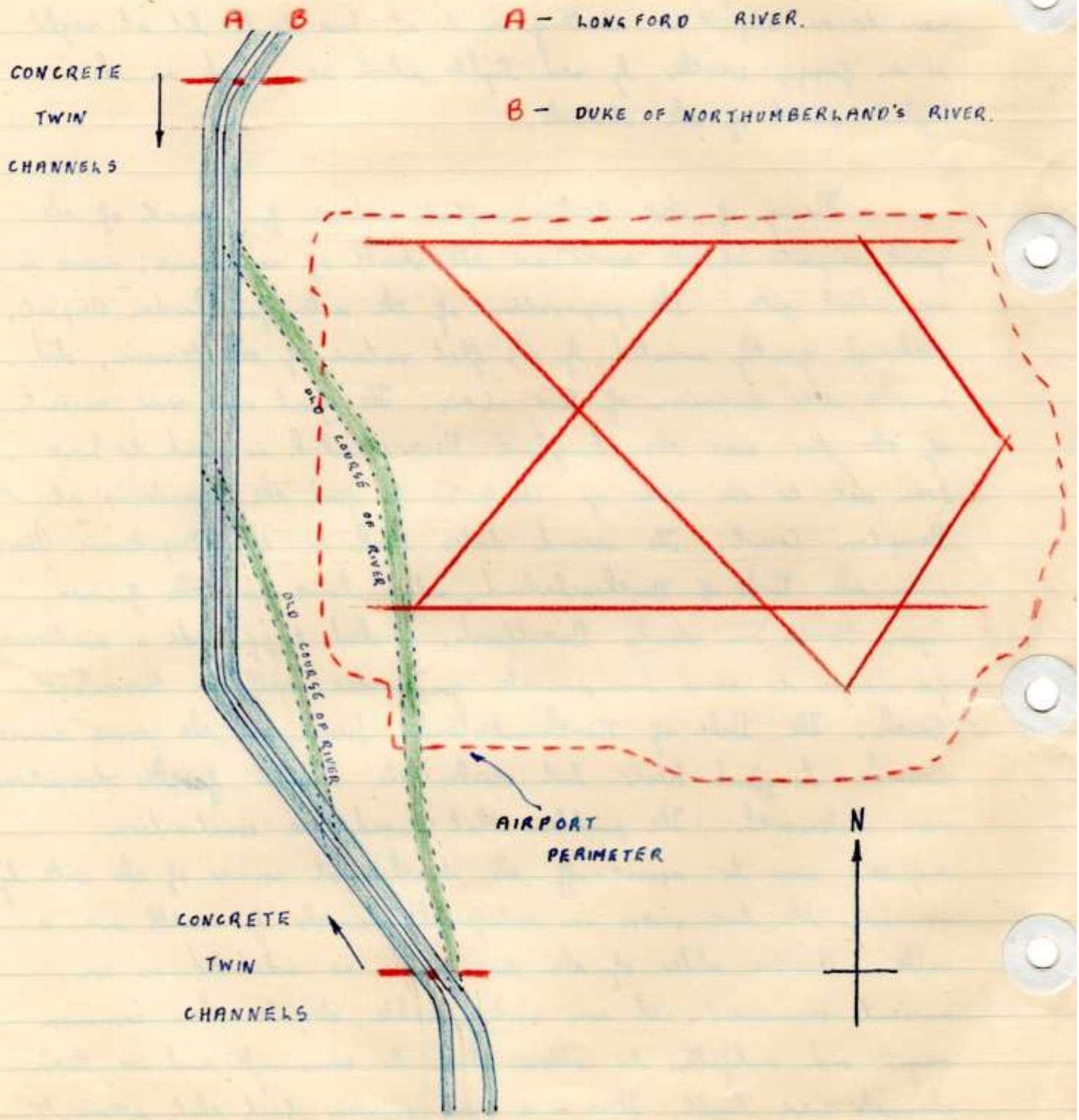
1500 yrs BC

TAPLOW TERRACE 17' to 30' of gravel

Neighbouring hills, blocks of flats and offices, factories and tall chimneys, power stations and electricity power lines, pylons and high railway viaducts are among obstacles to be avoided. Those near to an airport or abutting on to it have to be lit at night or in foggy weather by red lights which are placed on the highest point of the obstacle.

Many of these factors conflict and in fact most of the great airports of the world are the result of compromise; none is an ideal site. The preparation of the site for London Airport, although greatly assisted by the flat nature of the terrain, did involve the diversion of two rivers. The first and more ancient of the two was the Longford River, which is said to have been cut to the order of Charles II to feed the fountains at Hampton Court. The second dates back to the Napoleonic Wars when the Duke of Northumberland, whose home was the famous Syon House in nearby Brentford, wished to provide a waterway for barges to reach his private gunpowder mill on Hounslow Heath. The Duke of Northumberland's River has the same source as the Longford River but reaches the Thames further downstream near Isleworth. The problem that faced the construction engineers was to square-off the south-west corner of the site by running the two rivers in artificial channels for well over a mile. As the older of the two rivers is scheduled as an ancient monument, it was not possible, despite their common origin and outfall, to allow them to commingle and so twin channels were built. There is a most peculiar fact that seems to lend justification to the course that had to be adopted. Despite

SQUARING OFF THE SOUTH-WEST CORNER.



their common origin the rate of flow of the two rivers is slightly different and only one of the two has fish in it.

Most airports have been shaped by the constant changes that have taken place in the design of aircraft. Every few years runways have to be made larger to accomodate faster and heavier craft. Airports which cannot expand, owing to the presence of a neighbouring town or river, cease to be used by the most important airlines which turn to new airports. These new airports come into use before there is time to plan and build all the administrative, passenger and storage buildings required. For this reason groups of temporary buildings are seen on many of the worlds most modern airports.

Thus the patterns of airports differ a great deal. The pattern of each port is determined by its runways and these in turn are influenced by the prevailing winds, the quantity, speed and weight of the regular aircraft in use and the area of land and financial resources available.

CHAPTER THREE

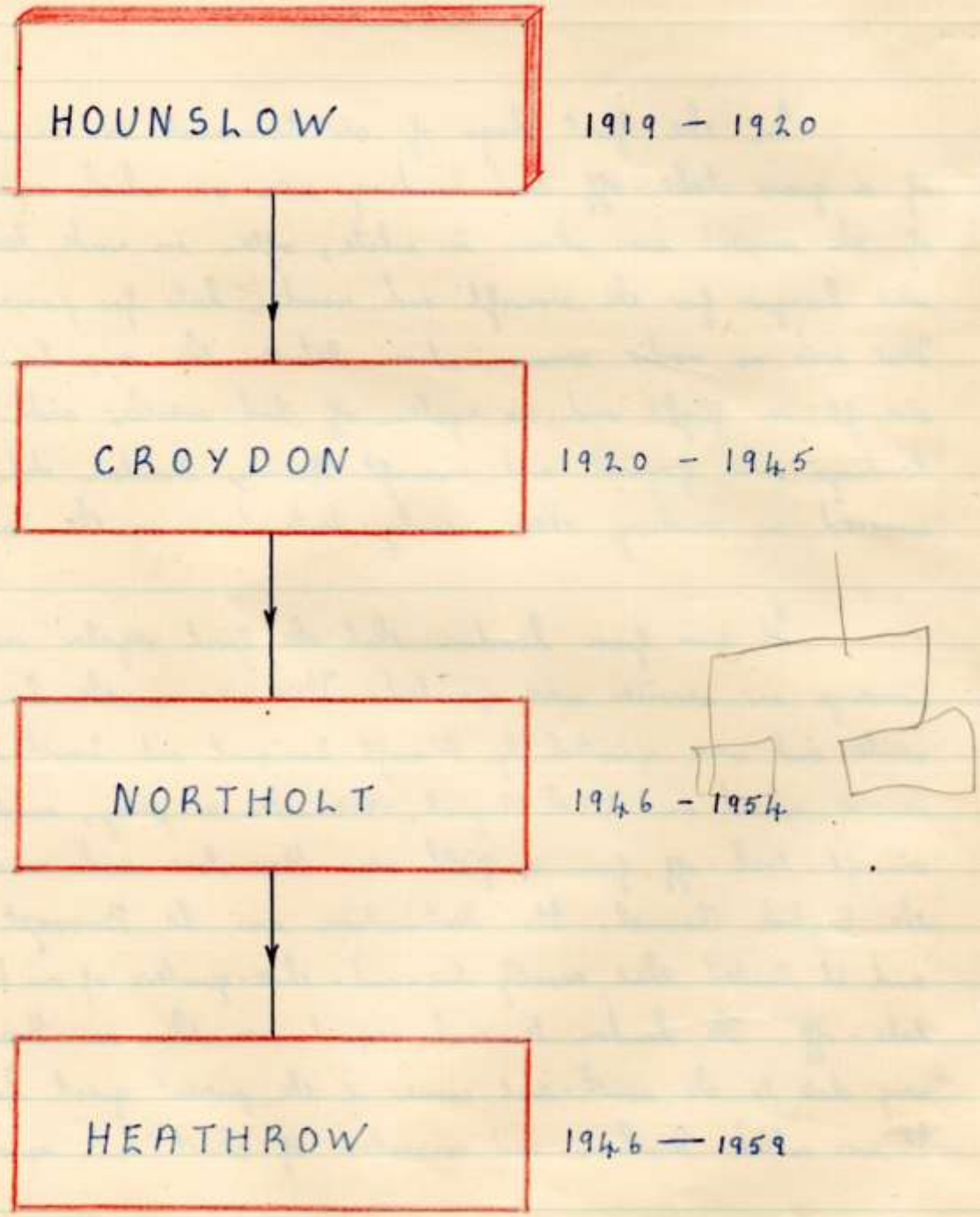
THE HISTORY AND DEVELOPMENT OF LONDON'S AIRPORT

In the first days of air transport an airport consisted of a grass take-off and landing area on which usually the name of the airport was shown in white, often in crude lettering. There were hangars for the aircraft and wooden huts for passenger handling. There was no radio communication between the airports and the aircraft in flight and no system of bad-weather aids. Emergency landings were frequent and aircraft leaving London did not always succeed in reaching their nearby destinations on the same day.

It was from London that the first regular international passenger air services were operated. These were on the London - Paris route and were operated by Aircraft Transport and Travel Limited. The service opened on 25th August, 1919 when a puny, inadequate looking aircraft took-off from a field near Hounslow and made direct for the English Channel. Its destination was le Bourget near Paris and it landed there exactly two-and-three-quarters of an hour after take-off. The London terminal airport was then on Hounslow Heath very close to the south-east corner of the present great London Airport. It was called Heathrow and consisted of about 4½ square miles.

This old Hounslow aerodrome was a small and rather rough

THE MAIN SITES IN THE DEVELOPMENT OF LONDON'S AIRPORT

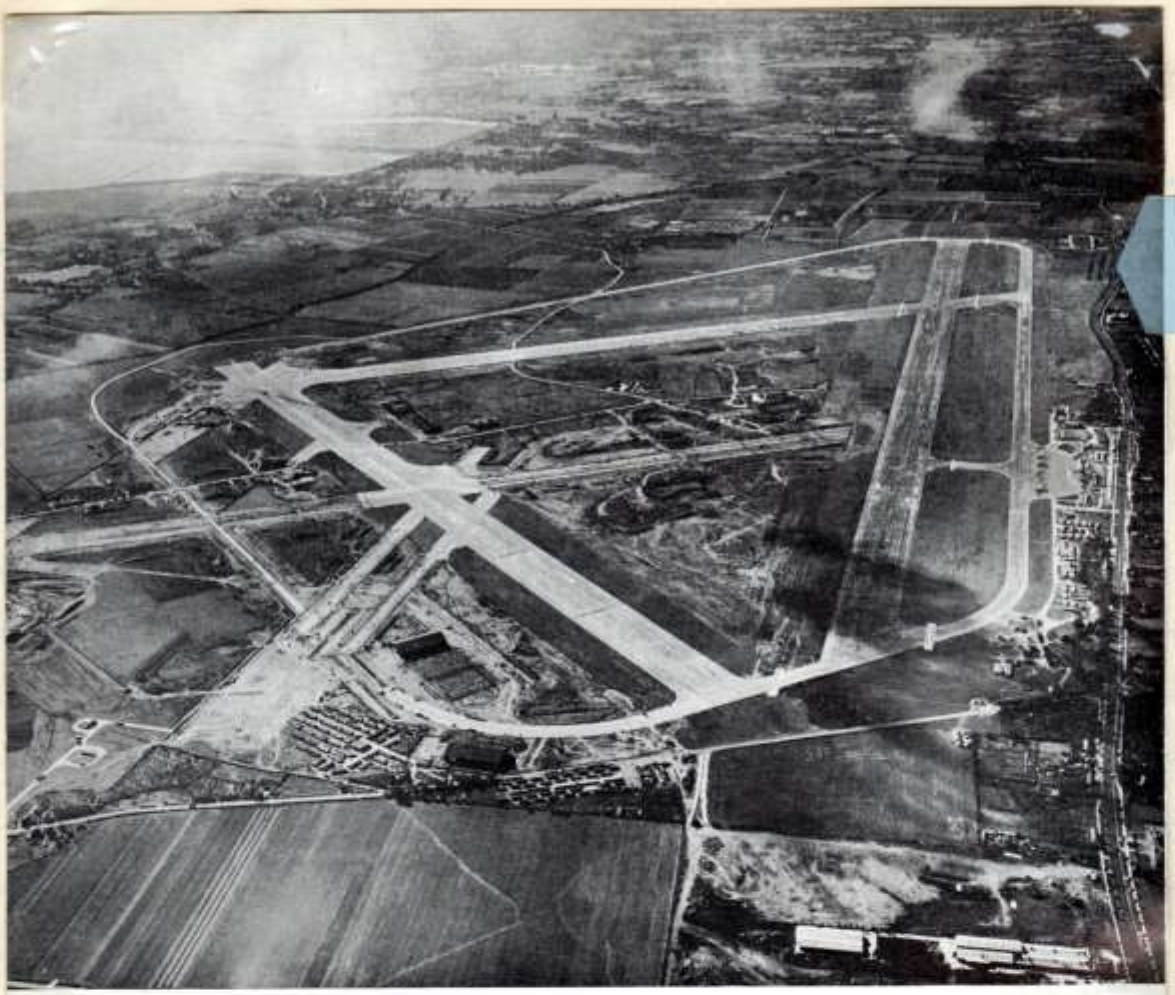


grass area with a few hangars, built during the first world war, a customs office and eventually a light beacon. The cross-channel flights of Handley Page Transport from Cricklewood to Paris called at Hounslow for customs clearance, until this service was available at Cricklewood, and the first French services also used Hounslow.

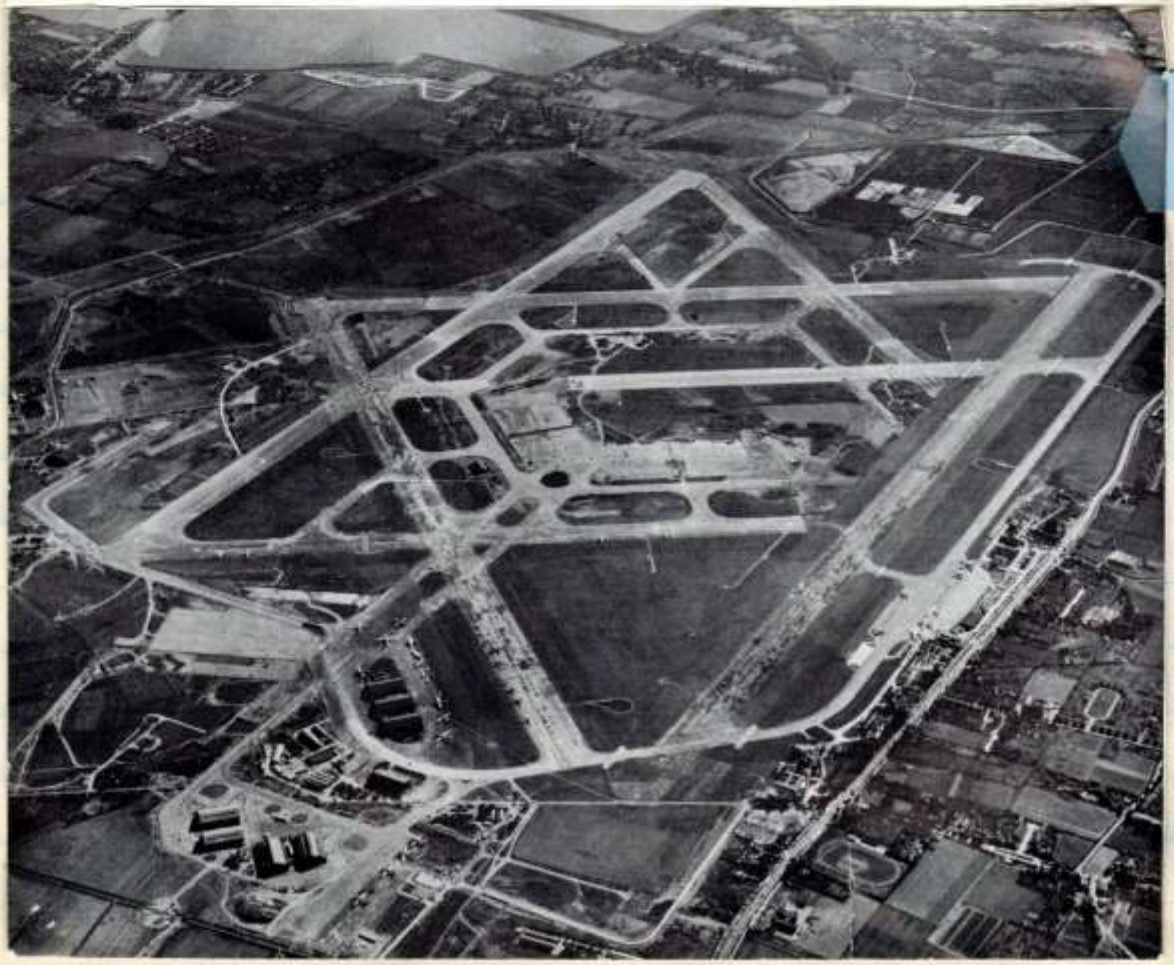
Hounslow was not particularly good nor suitable for airline operations and so on 29th March, 1920 the services were transfered from Hounslow to Croydon, which was destined to become famous as the London terminal airport until the beginning of the war in 1939.

During the war there were no purely civil air services in or from Britain and the essential services operated for the government were flown by flying-boats from Poole, or by land aircraft from a number of airports away from the London area.

When the first civil air service was once more flown to and from London in November 1944, it used Croydon Airport, war-damaged and camouflaged, but much as it was when war had started. Gradually the European and British Isles services were re-established with their United Kingdom base at Croydon. Long distance services continued to use bases away from London, the flying boats at Poole and later at Southampton and the land planes at Hurn near Bournmouth. Military transport operations were being carried out from Northolt, which had gradually been developed since the first war, and it was to and from Northolt that the civil European services began to be flown in 1946. The bulk of domestic and European services used Northolt for several years before the airport was closed for civil operations in October 1954.



1946



1950

Towards the end of the war in Europe it was realised that Royal Air Force Transport Command would need an aerodrome close to London for the operation of trooping flights to the Far East, and during 1943 about fifty sites were examined for this purpose. The site considered to be most suitable was that at Feltham in Middlesex, situated between the Bath Road and the Great South-West Road, at a distance of about fourteen miles from Charing Cross. There was already at that time a small grass aerodrome on the site. It was owned and used by the Fairey Aviation Company and was in fact Heathrow.

Among the factors which influenced the choice of Heathrow were the flatness of both the aerodrome and the surrounding areas which reduced the earthworks in construction and gave an unobstructed approach for aircraft, the good bearing strength of the subsoil and the fact that it had the most satisfactory meteorological conditions in the London Area.

However, because of the unexpected early end of the Japanese war, the Heathrow Station of the Royal Air Force was never brought into service use and at the end of 1945 it was taken over by the civil aviation authorities.

So, having chosen the site for the new aerodrome, work was commenced on a vast project of providing a fully equipped and international airport.

The first civil flight was operated from this new airport on

These two pictures show how passengers (ABOVE) *and airport administration* (BELOW) *were accommodated in* 1946.

the photographs are reversed

1st January, 1946 when an Avro Lancastrian belonging to British South American Airways, now absorbed by British Overseas Airways Corporation, took off for South America on a proving flight to Buenos Aires. On 25th March, 1946 the airport was officially named London Airport and at the end of May it was opened to international air traffic. By mid-1946 most long distance services were concentrated at London Airport and on its northern boundary a group of single-storey buildings following a very temporary array of tents were erected to cope with traffic handling, Customs, Immigration and other services, together with a control tower of a more solid construction. This group of buildings and the traffic has grown considerably during the intervening years.

At the end of 1954 the other London terminal airport, Northolt, was handed back to the Royal Air Force and all civil operations, which included quite a number of British European Airways' flights were then based at London Airport.

All services were operated from the north side of the airport until 16th April, 1955 when London Airport Central was officially opened. Now, many of the short-distance services use London Airport Central but for some time to come the long-distance services will continue to use London Airport North.

In conclusion it can be said that this great project undertaken to provide and develop a fully equipped international airport is still far from being complete for, although work has been going on for the past ten years, it will not be before many more that the entire plan can be completed.

CHAPTER FOUR

THE CENTRAL TERMINAL AREA

In the early stages of planning London Airport it was at first decided to replace the present temporary passenger buildings on the northern edge of the airfield with another set of temporary buildings on a more elaborate scale in the Central Terminal Area. Experience of the existing buildings, however, soon made it clear that a further intermediate stage in the production of the permanent airport would be a very expensive proposition with few advantages. The planners wisely, therefore, made up their minds to go straight ahead with three of the permanent buildings and so in 1950 Mr Frederick Gibberd was appointed by the Minister of Civil Aviation to design the buildings, his work being approved by the Royal Fine Art Commission before construction was started.

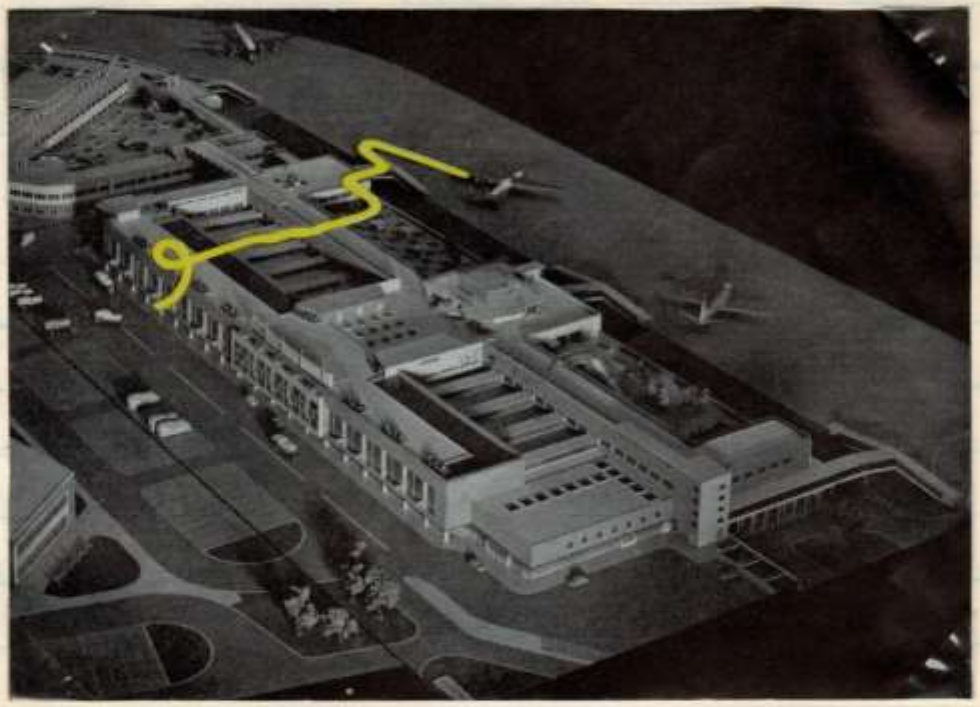
I. THE PASSENGER BLOCK

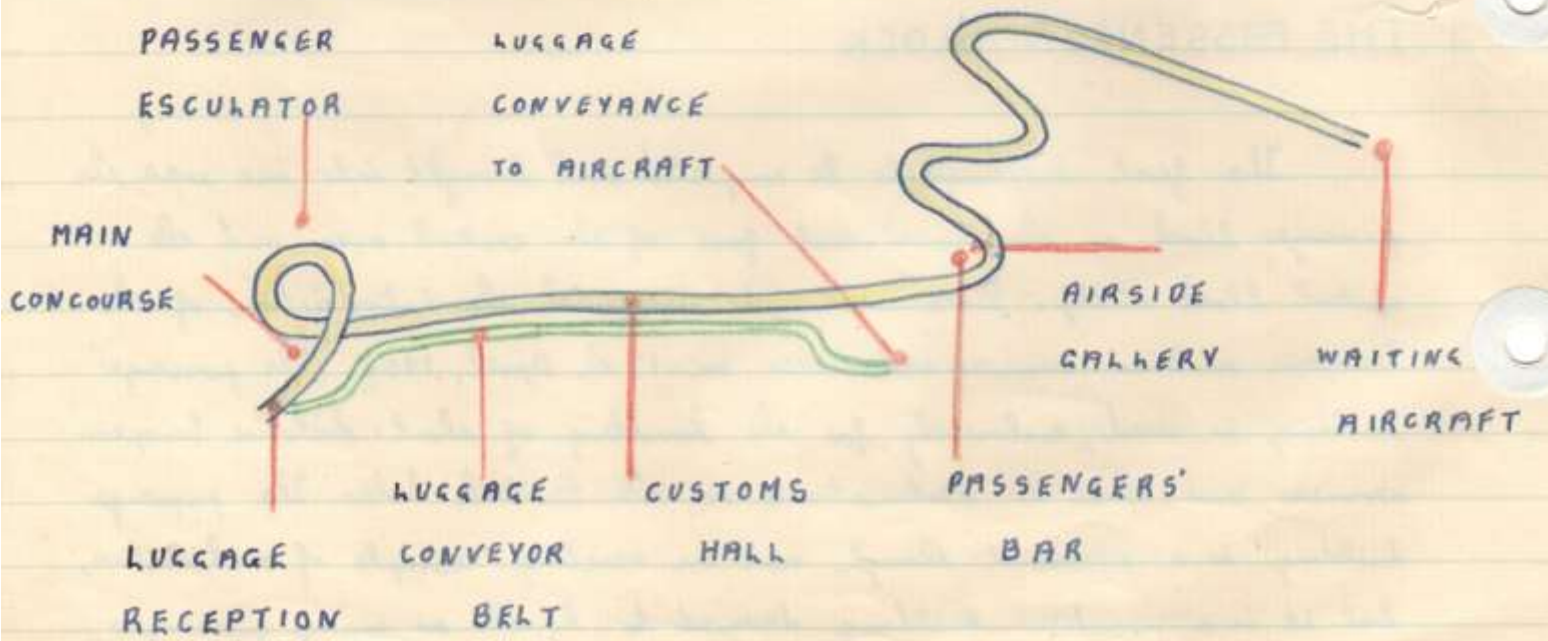
The first buildings to be completed and brought into use were the passenger block on the south-east face of the central area and the control block itself. Both came into use with the introduction of the European airlines summer schedules on 17th April, 1955. The passenger building is used almost exclusively for the handling of short-distance European services and those to destinations in the British Isles. The passenger building is a pleasant though not an exciting example of architecture, but it is a practical building designed to handle as many passengers

THE PASSENGER BLOCK

SHOWING ONE OF THE TWELVE IDENTICAL ROUTES TAKEN BY OUTGOING (OR INCOMING) PASSENGERS

(KEY BELOW).





as possible in the shortest possible time. The actual block is 620 feet long and 254 feet deep from road side to airport side and it has a total floor area of 445,437 square feet.

The main part of the building is on the first floor, which consists of a main hall running the length of the building, behind which are the Customs and Immigration halls, Port Health offices and finally, looking out onto the airport, the passenger lounges. The passenger channels cut right through the building making a series of cross-sections through the offices.

On the second floor there is a lounge and a restaurant; and on the top of the block are roof gardens and promenade areas. Scattered throughout the building are shops selling flowers, books, newspapers and clothes and there are even nurseries, showers and beauty parlours.

The ground floor is devoted to technical services and kitchens, in one of which British European Airways prepare the meals that are served to their passengers during flight.

The third unit to come into operation was the eastern apex building which provides accomodation for operational activities such as flight planning and crew briefing. It also has a post office, news cinema, a grill room and a buffet.

A covered way at first floor level connects this block with the south-east passenger building and later will connect with the

THE CENTRAL TERMINAL AREA

THE CONTROL BLOCK CAN BE SEEN IN THE FOREGROUND

(VIEW TAKEN FROM THE SOUTH-WEST)

passenger building to be erected on the north-east face of the terminal area. Roof-level bridges will also connect these buildings.

2. THE CONTROL BLOCK

The second of the three buildings to be constructed in the Central Terminal Area was the Control Block which is situated in the centre of the diamond. The tower of this building is the nerve centre of the whole airport, the focal point of an almost fantastically complex system of radio and line communication, radio and radar navigational aids, airfield lighting and ground movement control. It has been sited practically in the centre of the airfield so that the upper floors of the tower, containing the Air Traffic Control organisation, command an all-round view of the whole dual parallel runway system and of all the taxiways right up to the outer edge of the central aprons. In addition it is the administrative headquarters with other portions housing the tele-communications section, the medical centre, welfare facilities and a comprehensive staff catering branch.

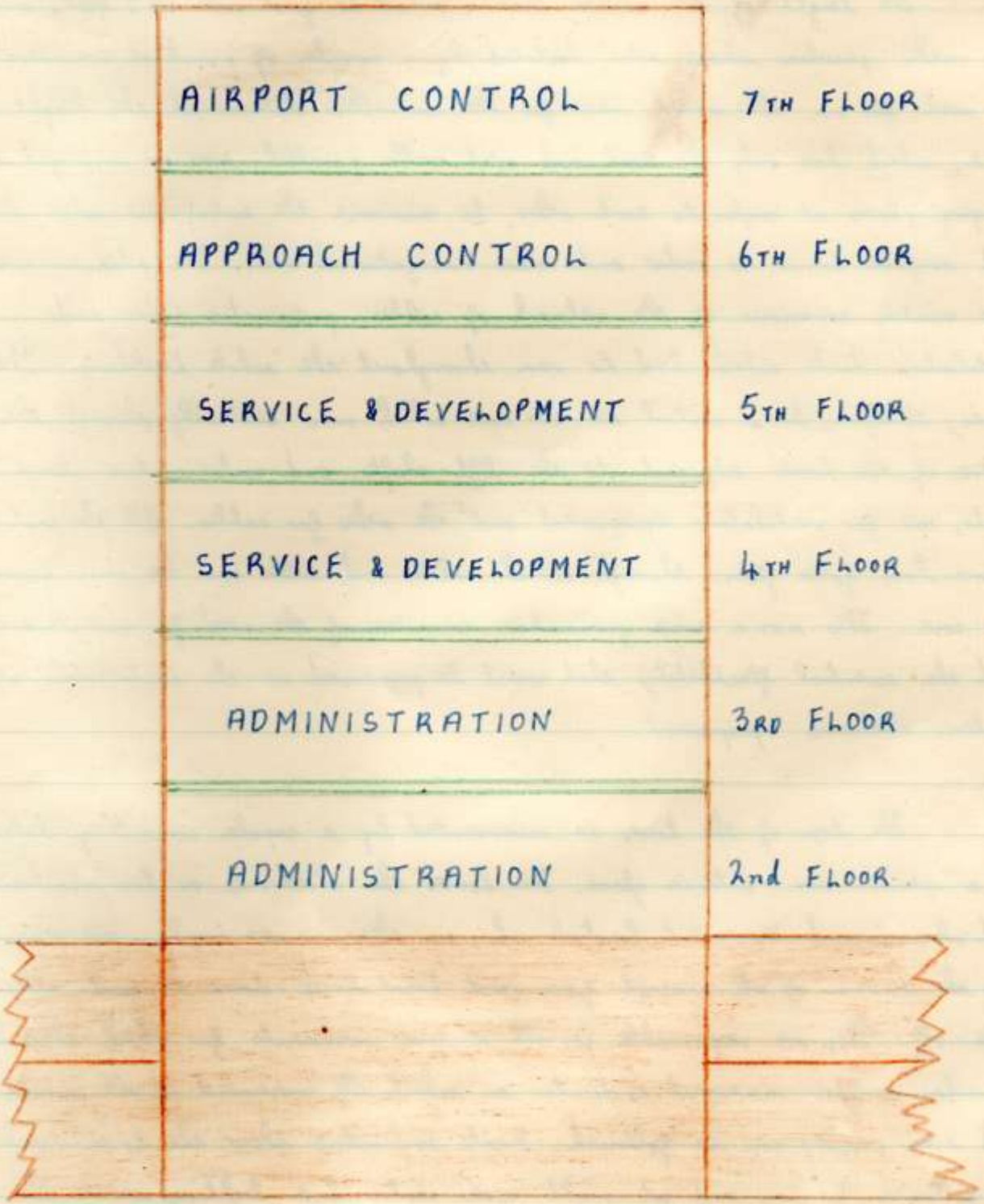
From directly overhead the building appears as a giant "T" with the nine-storey control tower rising from its intersection. In the base leg of the "T" to the south are grouped the staff cafeterias and restaurants, all served from a central kitchen. The left side of the cross-bar of the "T" houses the medical centre with administrative offices above it on the first floor and, in addition to the usual first-aid facilities of such a centre, this one also deals with some of the stringent bi-annual medical examinations which all the civil airline crews have to pass. The right side of the cross-bar, to the east, provides rooms on both floors for the tele-communications section of the Ministry Staff and the main electrical

switchboards for the whole area.

The height of the control tower, which is just over 127 feet, and its rather peculiar shape were dictated by a number of practical considerations. The need for an all-round view for the controllers determined the height. The slope, which has only the east and west walls parallel, was so arranged on varying planes at angles to each other to minimise the interference which large flat surfaces cause to radio and radar navigational aids. The planners were also acutely conscious of the network of cables, pneumatic tubes and ventilation ducts which had to run throughout the whole building. The tower, therefore, has a central services core which runs vertically through the centre of the tower adjacent to the lift-shafts, and contains two large ducts, one for ventilation equipment and the other for cables. All the control rooms have false floors through which cables and tubes can be run from the core. This was a wise precaution in view of the need for maintenance and the essential flexibility that must be preserved in the installation of modern electronic equipment.

The top of the tower is surmounted by a cupola consisting largely of a special non-actinic glass. This houses the aerodrome or local controllers and also Ground Movement Control who, as their names imply, are responsible for the control of all aircraft from just before touch-down to just after take-off. They are responsible for all surface movements for which they have a radar surface movement indicator on which the movement of all aircraft, and even people, can be followed. Route indicators show the taxi-tracks to be followed by day and at night green centre-line lighting serves the same purpose. The floor beneath houses the ventilating plant and lift motors.

DIAGRAM OF THE CONTROL TOWER



On the sixth and seventh floors is situated the nerve centre of the whole building, the Approach-Control room. It embodies one of the most important aspects of control, particularly in bad weather, for the finest airport in the world is of little use if the traffic cannot be brought in with high frequency in poor visibility. This sixth floor is claimed to be large enough to cope with any expansion of traffic, and with improved techniques in air-traffic control. Great care has been taken to achieve the clearest radar representation of aircraft to enable the controllers to land them in rapid sequence. The west wall of the room has an enormous control information panel on which are set out all the maps and charts needed for quick reference.

The three other walls are fully glazed and, in common with the other control rooms and many offices, the glazing is double in order to help suppress outside noise and to maintain the air conditioning so vital to delicate electronic equipment. These walls slope outwards to avoid any reflection of light and balconies run both inside and outside them to permit students of air-traffic control and other visitors with a technical interest to watch operations without interfering with the very essential concentration of the controllers.

On the fifth and fourth floors is a similar but somewhat smaller control room, once more occupying two floors in height. This is reserved for Ground Movement Control equipment which is likely to be developed in the future and here again the windows are sloped to avoid reflection.

Current use of Television

The third and second floors, which are the lowest two of the

Her Majesty the Queen arrives to open the new buildings at the centre of London Airport, 16*th December* 1955.

Probably except 4m passengers in 1957

tower itself before it joins the main block, contains a conference room, administrative offices and the offices of the aerodrome commandant and his deputies.

3. THE QUEEN'S BUILDING.

Since the end of the war the spectacular appeal of arriving and departing aircraft has developed so rapidly that a visit to London Airport has become a popular days outing for the family. In the six months during 1956 London Airport received over 800,000 casual visitors who come to the temporary Public Enclosure situated on the north boundary of the airport. It has been necessary for the airport authorities, not only to cope with these large scale friendly visits, but to make provision for the arrival of even larger numbers in the future.

1957 well over 1m visitors

This problem, which is one of the largest that the planners and staff of London Airport have had to face, has been solved by the construction of Queen's Building which adjoins the Passenger Building and is linked to it by a bridge. Queen's Building, or the Eastern Apex Building as it is sometimes called due to its position on the eastern point of the central diamond, was built for two major purposes, namely that of handling by operating companies of aircraft operation and crews and to provide amenities for the general public who visit the airport.

Like the Control Building, Queen's Building is most unusual in shape. It can best be described as a broad wedge, with

THE MEMORIAL STATUE

TO

SIR JOHN ALCOCK

AND

SIR ARTHUR WHITTEN-BROWN

the point cut off and the upper edge curved. Each edge of the wedge is about 230 feet long and the flat base just under 200 feet. The central spine of the building consists of three floors and the outer segments of two, and the flat roofs of the Passenger Building are repeated on an even large scale. Careful study of the requirements has produced a design which caters equally well for each major requirement and at the same time keeps each one completely separated for the other.

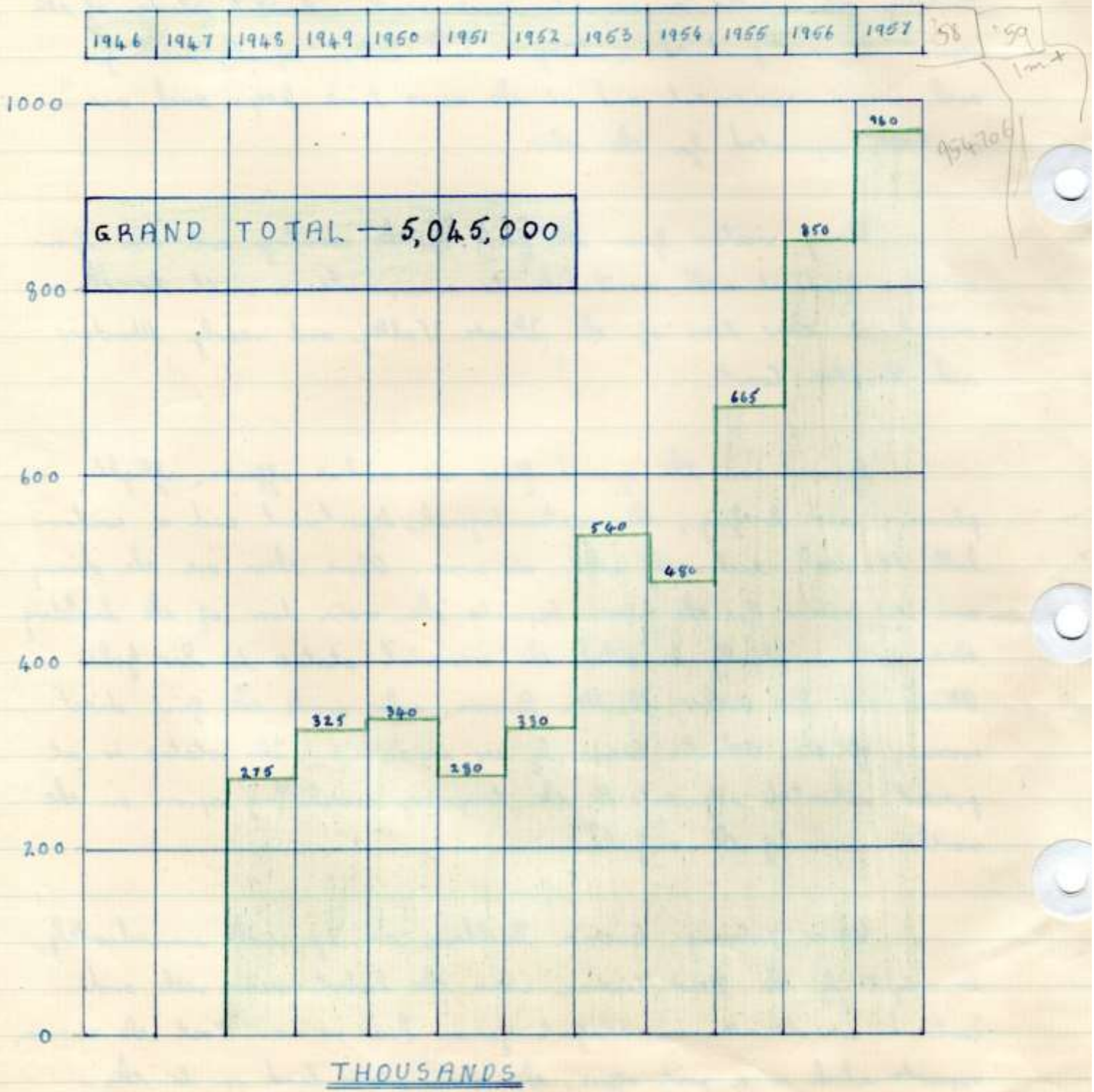
Many visitors from all parts of the country and also from overseas find it well worthwhile to incorporate a visit to the airport in their tour of the Thames Valley and nearby Windsor and Hampton Court.

Grouped on the ground floor are airline offices, flight planning and briefing, the meteorological department and a customs hall to deal exclusively with air crews. Above them are the dining and rest rooms for the crews. Opposite the main door of the building there will eventually be sited the memorial statue to Sir John Alcock and Sir Arthur Whitten Brown, who made the first direct crossing of the Atlantic Ocean by air in 1919. This statue is at present situated adjacent to the temporary marshalling apron on the northern side of the airfield.

Upon entering Queen's Building the eye will immediately be caught by the News Cinema where the latest news-reels and cartoons can be seen in comfort for an hour or so. Past the cinema, opposite which is a post office, the main stairs lead up to the

VISITORS TO PUBLIC ENCLOSURES.

FROM 1946 - 1958 (12 YRS)



Exhibition Hall which, as the name implies, is available for the display of exhibits of various kinds. At the further end of this hall is a popularly-priced restaurant and bar and some luxurious dining suites that can be reserved for private parties. The restaurant is arranged in tiers so as to give all its patrons an uninterrupted view of the Airport through the curving length of projecting cantilevered windows and, in common with the other buildings, Queen's Building has artificial ventilation in all the public rooms.

There is an even wider view, however, from the roof terraces which can accommodate some ~~ten~~ several thousand people at once. From them you can see the Airport spread out like a map and all the many activities connected with the arrival and departure of aircraft.

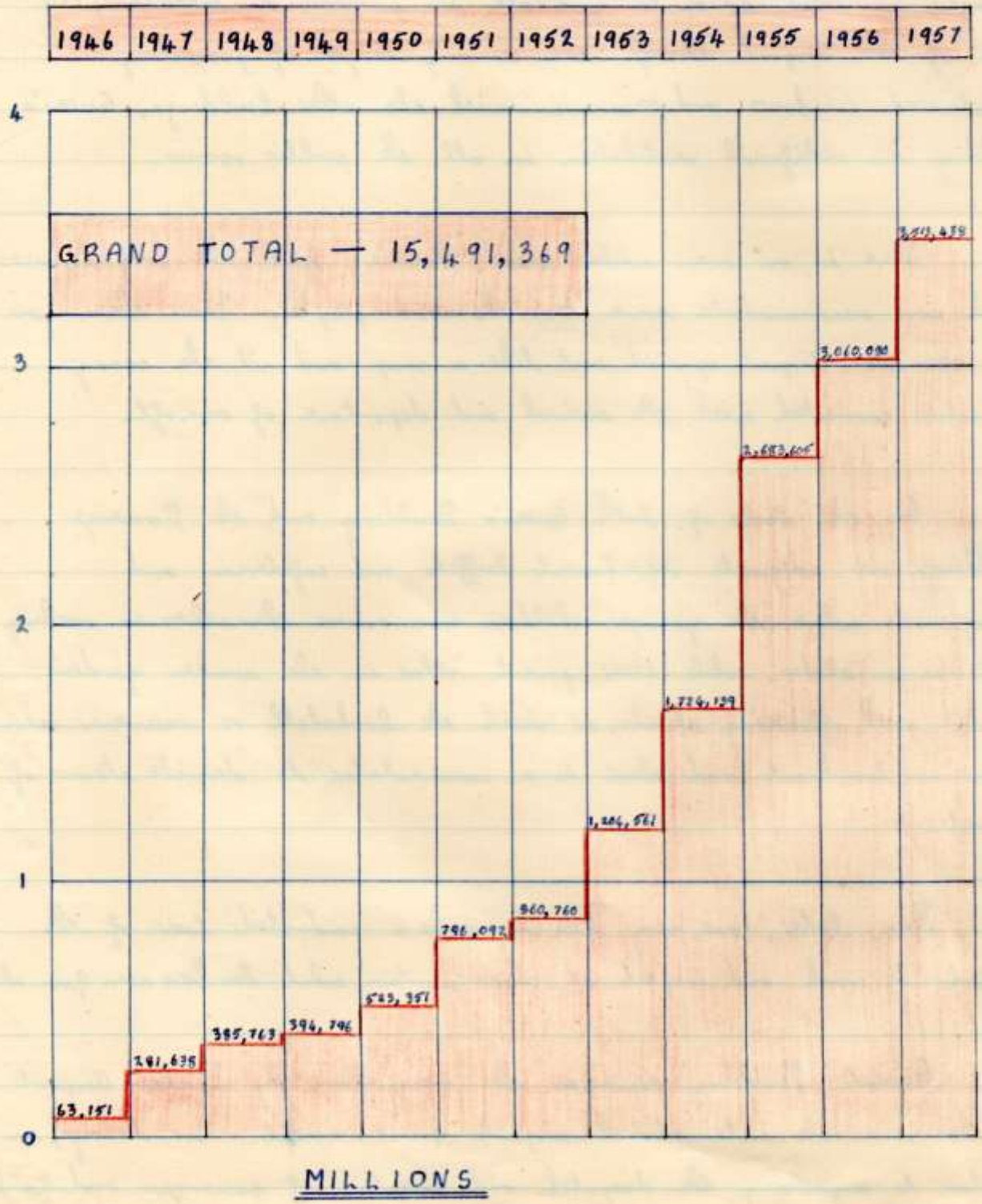
On the roofs of both Queen's Building and the Passenger Building are adequate refreshment buffets and cafeterias and playgrounds where the younger children can amuse themselves in rocking boats or on slides, while their parents relax in the sunken gardens scented with flowering shrubs, or visit the bookstall or souvenir shop. Music is broadcast and there is a commentator to describe items of interest.

Then, later, one may like to make a conducted tour of the Airport by coach and inspect at close quarters what has been seen from above.

Queen's Building expresses the recognition by London Airport of the new role international airports must accept. For today, in addition to organising the dispatch and reception of passengers and freight

THE GROWTH OF PASSENGER TRAFFIC

FROM 1946 — 1958 (12 YRS)



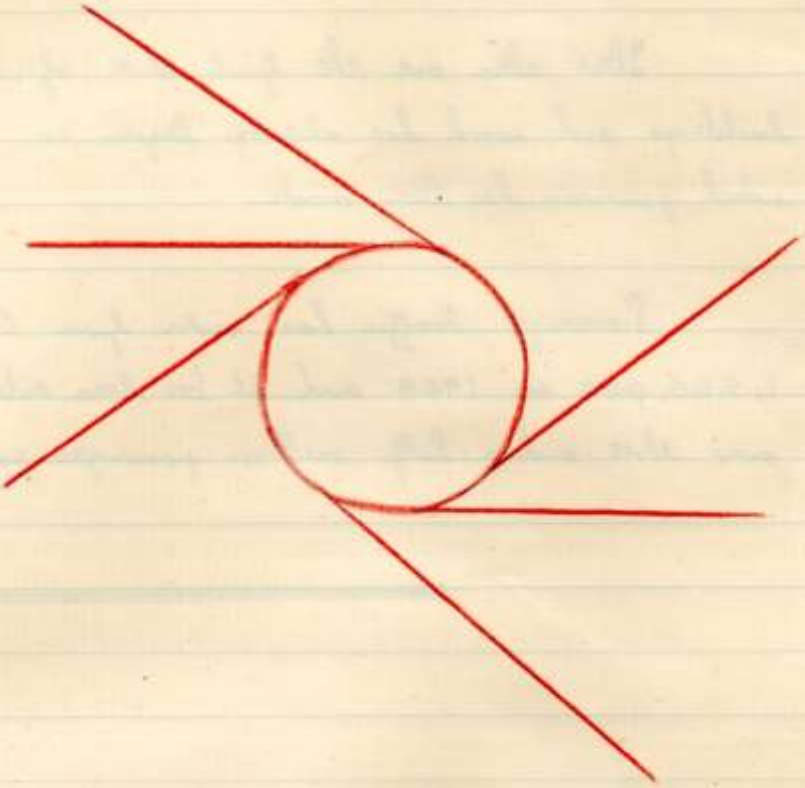
by air to and from the most distant parts of the earth, a great airport must be prepared to be treated as, in itself, a place of interest.

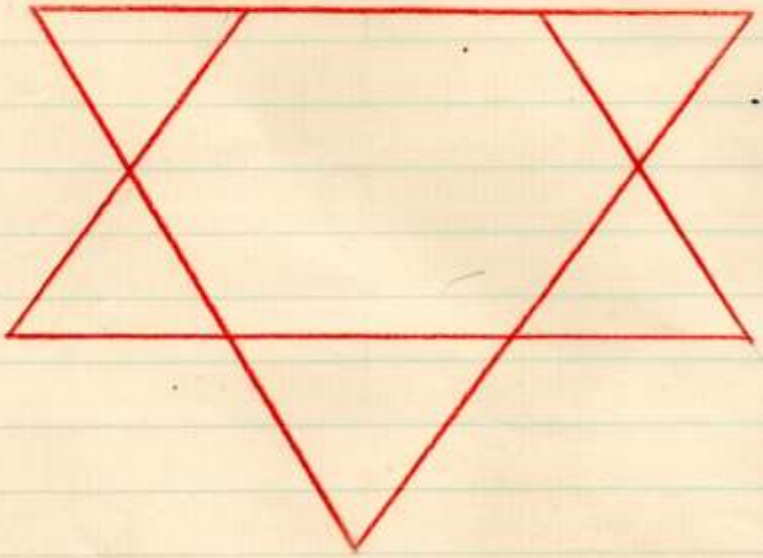
These then are the first three of London Airport's permanent buildings and work has already begun on the ~~remaining~~ four for which provision has been made.

Passenger traffic has risen from 523,000 in 1950 to 1,205,000 in 1953 and it has been estimated that 1960 will see over three-and-a-half million passengers pass through London Airport.

PLANNING THE RUNWAYS.

IN 1946 THE TANGENTIAL SYSTEM ON THE RIGHT WAS CONSIDERED BY THE LONDON AIRPORT LAYOUT PANEL.....





..... BUT THE PARALLEL RUNWAY SYSTEM ON THE LEFT WAS CHOSEN DUE TO THE TOPOGRAPHY OF THE SITE.

CHAPTER FIVE

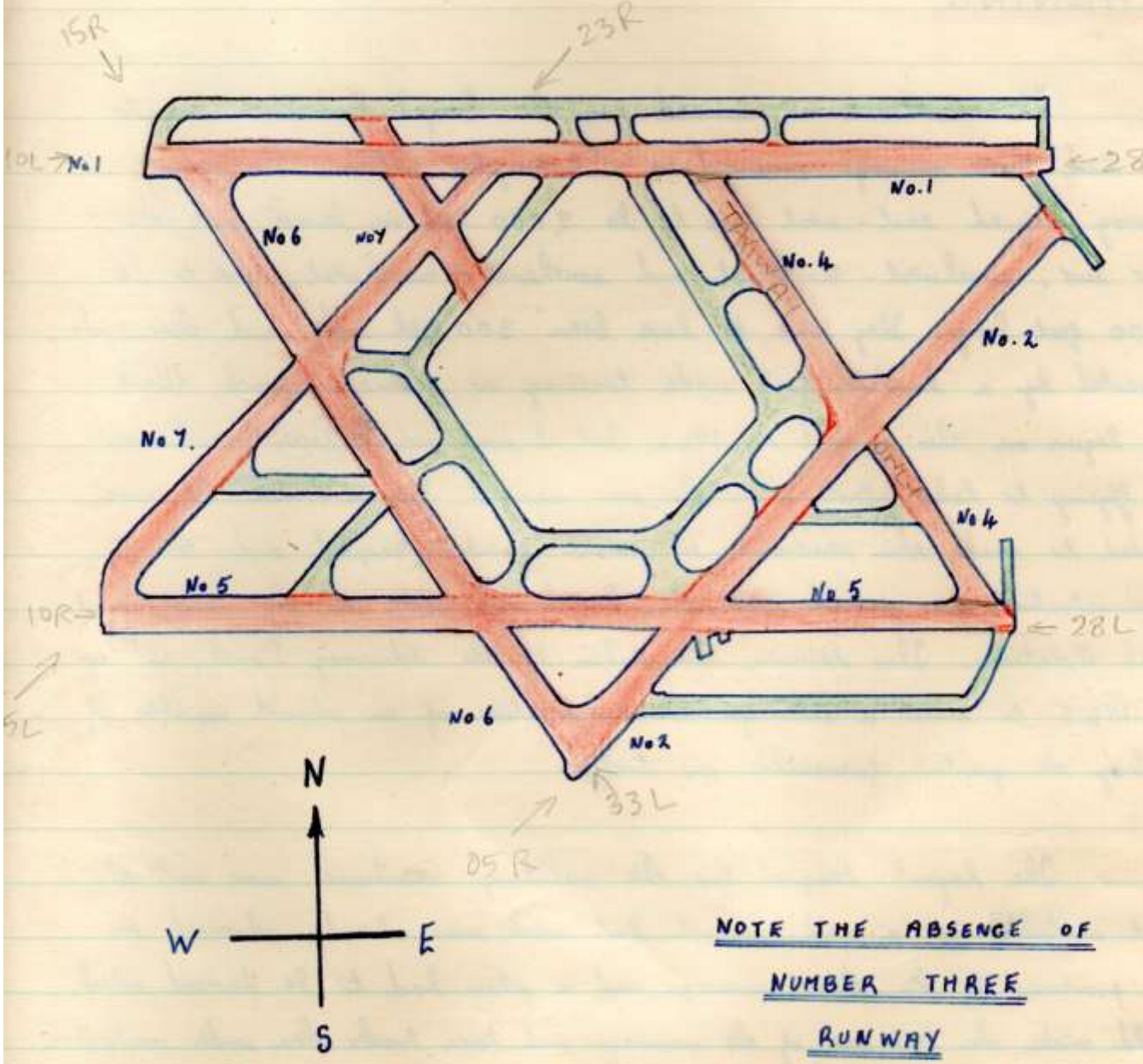
THE RUNWAY SYSTEM

A. PLANNING.

The aerodrome as planned for the Royal Air Force was to have had three runways arranged in a triangular pattern. The main runway aligned east-west was to be 9,000 feet in length and the other two, southwest-northeast and southeast-northwest, were to be 6,000 feet long. They were to have been 300 feet wide and their ends connected by a hundred foot wide taxiway or perimeter track. Work was begun on this project in 1944 but it was not sufficiently advanced for flying to take place when the war against Japan ended. It was decided to make this aerodrome the main London airport and the administration was passed from the Royal Air Force to the Ministry of Civil Aviation. This decision was taken by the Advisory Panel, set up in 1945 to select a site for the construction of an airport capable of meeting the greatest foreseeable air traffic.

The layout designed for the military aerodrome was not the most suitable for a civil airport but work was already advanced on the provision of the three runways and a plan had to be devised which would make the best use of the runways and taxi tracks then under construction. In fact two of the original R.A.F. runways are now part of the six-runway pattern which has been adopted.

THE RUNWAY NUMBERS OF LONDON AIRPORT



NOTE THE ABSENCE OF NUMBER THREE RUNWAY

Pilots know runways by abbreviated magnetic bearings i.e. 28L is left hand runway of a pair at 280°

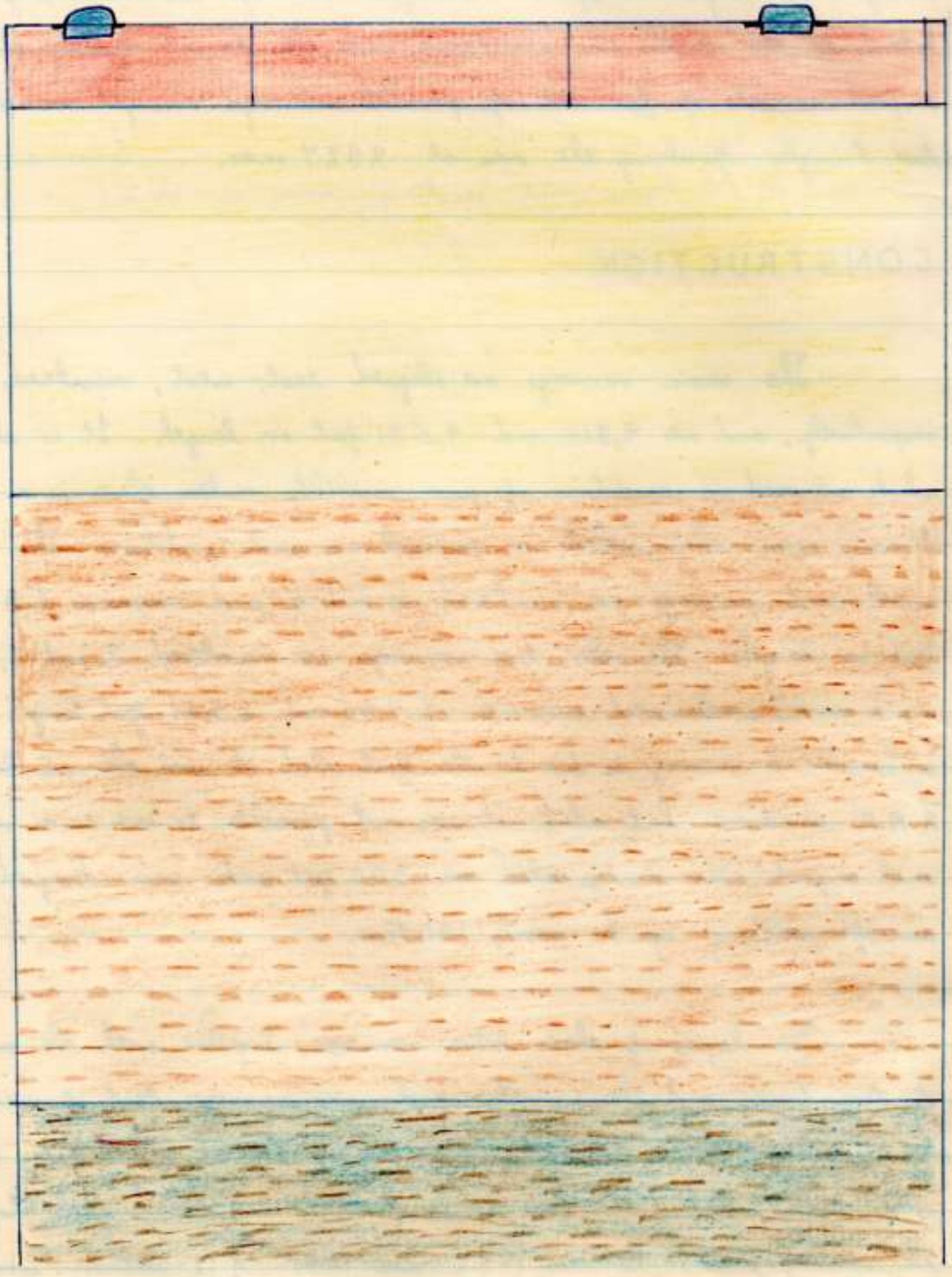
The advisory panel recommended the adoption of a triple parallel runway system, which was to be achieved by the superimposition of a second triangle of runways on the existing R.A.F. triangle and the laying down of a third to the north of the Bath Road. This third triangle was later modified to a pattern of two divergent runways but eventually the plan to extend to the north was abandoned and the layout finally chosen for the airport consists of two sets of parallel runways arranged in the form of two triangles finalising the area at 2827 acres.

B CONSTRUCTION.

The main runways are aligned east-west, numbered One and Five respectively, and are 9,316 and 9,581 feet in length. It is these runways which are used in conditions of poor visibility unless there is a strong wind blowing across them, which is unusual in such conditions. The north-west/south-east runways are numbered 4 and 6 and measure 5,823 and 7,570 feet in length. The other two runways are numbered 2 and 7, are aligned north-east/south-west and are 7,735 and 6,261 feet long. The lack of a number 3 runway is due to the fact that it was the one built for the R.A.F. aerodrome but which it was not possible to use as a runway at the civil airport. The runways which are 300 feet wide were designed to take aircraft weighing up to nearly 180 tons.

The laying of these extra runways, together with the complex system of taxi-tracks and the perimeter road, was a major feat of civil engineering. Some eighty acres of the area consisted of disused gravel pits, flooded and often badly silted. These had to be drained and filled with top-soil from the runway areas. Between 1944 and 1951 £12 million worth of work

THE CONSTRUCTION OF THE RUNWAYS.



was carried out on London Airport's runway system involving a total of 16,000,000 cubic yards of excavation and another 3,200,000 cubic yards of compacted gravel fill which was taken from the more remote pits on the site to provide the foundations for the concrete which was laid twenty inches thick. This high grade concrete forming the top surface was laid in slab paving in order to obtain a bearing strength of 4,000 pounds per square inch. The need for such strength is made quite clear when one considers that a modern airliner, weighing between sixty and seventy tons, touches down on a runway at about a hundred miles per hour. When the total runway length of over 40,000 feet and width of 300 feet is considered no one is prepared to doubt the statement that there is enough concrete in the runways of London Airport to make a first class road stretching the four hundred miles from London to Edinburgh.

C. EXCAVATIONS.

The Central Terminal of London Airport is, as can be seen from the plan, completely surrounded by runways and a means of access to it was therefore needed. A tunnel was then planned from the northern boundary of the airport emerging at the northern end of the Central Terminal Area. As soon as the Number Five, the new east-west runway, was completed and ready for use, its parallel the Number One original runway was taken out of use together with its three flanking taxi-tracks.

Only part of the new runway - East-West runway

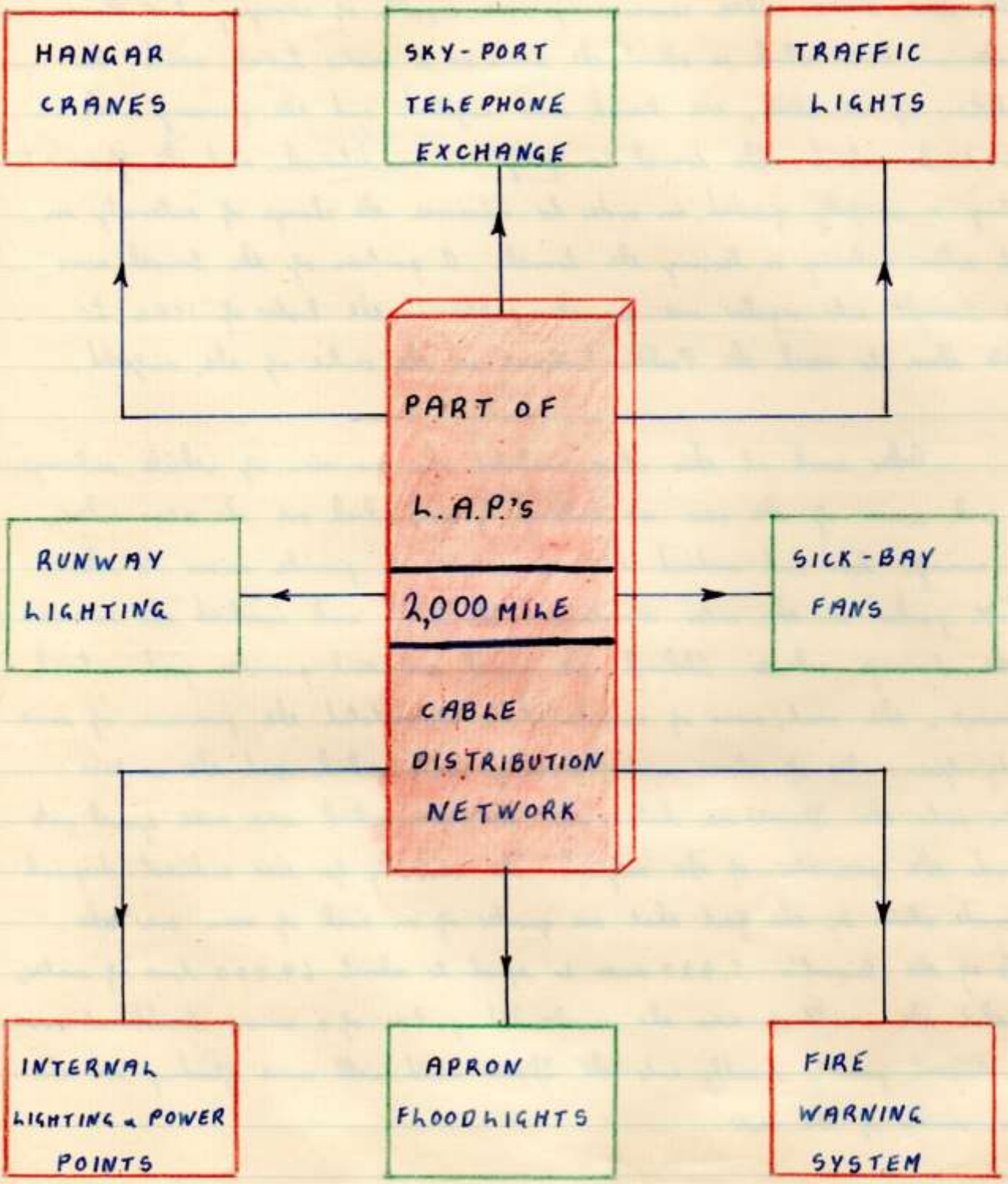
Due to the nature of the sub-soil any possibility of boring in the conventional manner was out and so a deep trench over 2,000 feet long was dug. Into this trench a reinforced concrete shell 2,060 feet long, 86 feet wide and 23 feet high was placed. It was sub-divided internally

THE TUNNEL

to provide inbound and outbound pedestrain paths and cycle tracks, flanking inbound and outbound dual carriageways for motor traffic which includes double-deck buses. These carriageways are capable of carrying two thousand vehicles an hour which is about the same as a main trunk road. On completion of the shell, the trench was refilled and the runway with its taxi-tracks relaid. The tunnel is fully air-conditioned and the fluorescent lighting is carefully graded in order to minimise the change of intensity in light when entering or leaving the tunnel. A portion of the tunnel was first brought into regular use for the public in the Easter of 1954 to enable them to reach the Public Enclosure in the centre of the airfield.

Other work at this stage included the provision of vehicle subways at each corner of the new marshalling aprons, which are the areas where the aircraft load and unload their passengers, to provide access to the aircraft parked on the outer stardings. The final work involved the extension of the drainage scheme. Although the gravel sub-soil provides good natural drainage, the vast areas of concrete have necessitated the provision of some eighty-five miles of storm water drainage ducts which feed the surface water into the Thames via balancing reservoirs which were once gravel pits around the perimeter of the airfield. The necessity for this indirect disposal is made plain by the fact that one quarter of an inch of rain over the whole of the Airport's 2,827 acres is equal to about 69,000 tons of water, so that the result of even the unabsorbed portion of a minor cloudburst over the Airport pouring directly into the Thames could well cause flooding in the lower reaches of the river.

Another task that had to be undertaken was the provision of ducts for the network of cables of various types which cross and recross the


HANGAR CRANES
SKY-PORT TELEPHONE EXCHANGE
TRAFFIC LIGHTS
PART OF L.A.P.'S
2,000 MILE
CABLE DISTRIBUTION NETWORK
RUNWAY LIGHTING
SICK-BAY FANS
INTERNAL LIGHTING & POWER POINTS
APRON FLOODLIGHTS
FIRE WARNING SYSTEM

airfield. The electricity cables, over two thousand miles of them, carry the current from the forty-five sub-stations to the widest variety of electrical apparatus imaginable from giant cranes in the hangars and powerful floodlights on the marshalling apron to traffic lights in the tunnel and electric fans in the sick bay.

CHAPTER SIX

THE AIRPORT'S UNIQUE LIGHTING SYSTEM

A. INTRODUCTION

When Claude Grahame-White made his gallant, though unsuccessful, bid to win the £10,000 prize for the London to Manchester flight in 1910, he opened a new era in aviation. Taking off and landing by the light of motor car acetylene headlamps in Northamptonshire, he heralded the start of night flying and the birth of airfield lighting. Today this has become an exact science and one of the major factors behind the regularity and safety of modern air transport. The development of airport lighting underlies both its purpose and its importance.

In those early days when airfields were literally grass areas flying aids were non-existant and navigation was by compass, ground recognition and by the stars. The first forms of airfield lighting followed closely the Grahame-White experiment and consisted of floodlighting the whole field with special multi-bank floodlight projectors. Weather, of course, imposed severe limitations on the usefulness of these methods. The next step came with the marking of the airfield boundary by lights and, at the end of the 1920's, boundary lights, floodlights and an identification beacon had been installed at Croydon Airport, then the air terminal for London.

Gradually the use of the airfields changed from that of landing in any

AIRPORT IDENTIFICATION

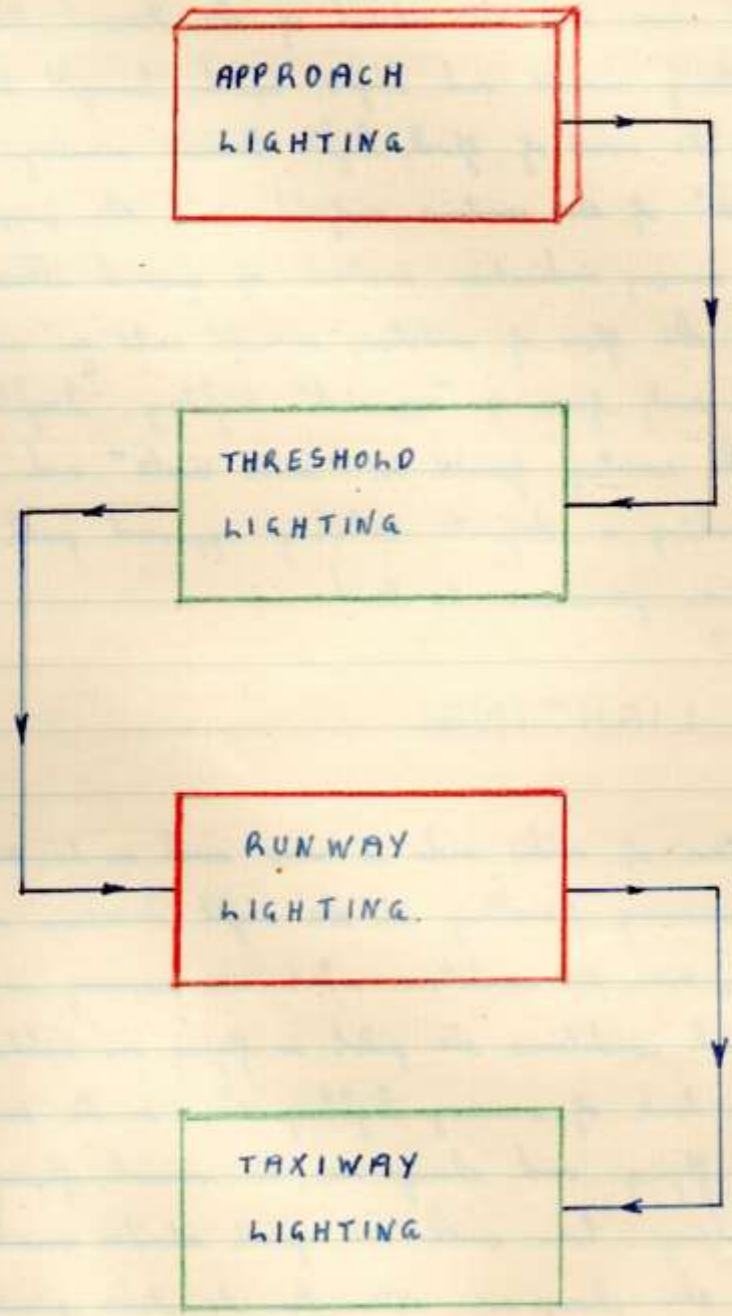
THE PUNDIT OF LONDON AIRPORT FLASHING
ITS MORSE IDENTIFICATION LETTERS — V. A. —

direction according to the wind to that of landing in a specific direction only approximately into wind, a development made necessary by air traffic growth and having some relation to the runway system of present day airports. Following this "directional landing" came the marking of the direction by flush lights placed in parallel rows but the advent of the Second World War forced rapid changes. Heavy aircraft and higher speeds brought the development of the runway. The rows of flush lights become runway lighting, the familiar "flarepath" of the wartime airfields and the purpose of that lighting become runway indication instead of ground illumination. The need to regulate the flow of military aircraft onto an airfield also brought about an early form of "approach" lighting. Lights mounted on poles out in the country formed an "inner circle" and "outer circle to the airfield, marking a definite orbiting approach path for the aircraft before it was given permission to land.

B. APPROACH LIGHTING

The nature of radio aids is now such as to enable an aircraft to approach the runway travelling in the right direction and at the right height for safety, even in conditions when the runway is completely invisible. In such conditions the pilot is flying on instruments and radio and the primary task of runway lighting then is to enable him to cease instrument flying and change over to visual flying for the final approach and landing. Even with the great strides made in runway lighting, however, this change-over often has to take place before the runway lighting is visible. Approach lighting is designed to bridge this gap and lead the pilot to the threshold of the runway. Thus runway and approach lighting together form by far the most important elements of

THE TYPES OF LIGHTING TO AID THE PILOT.



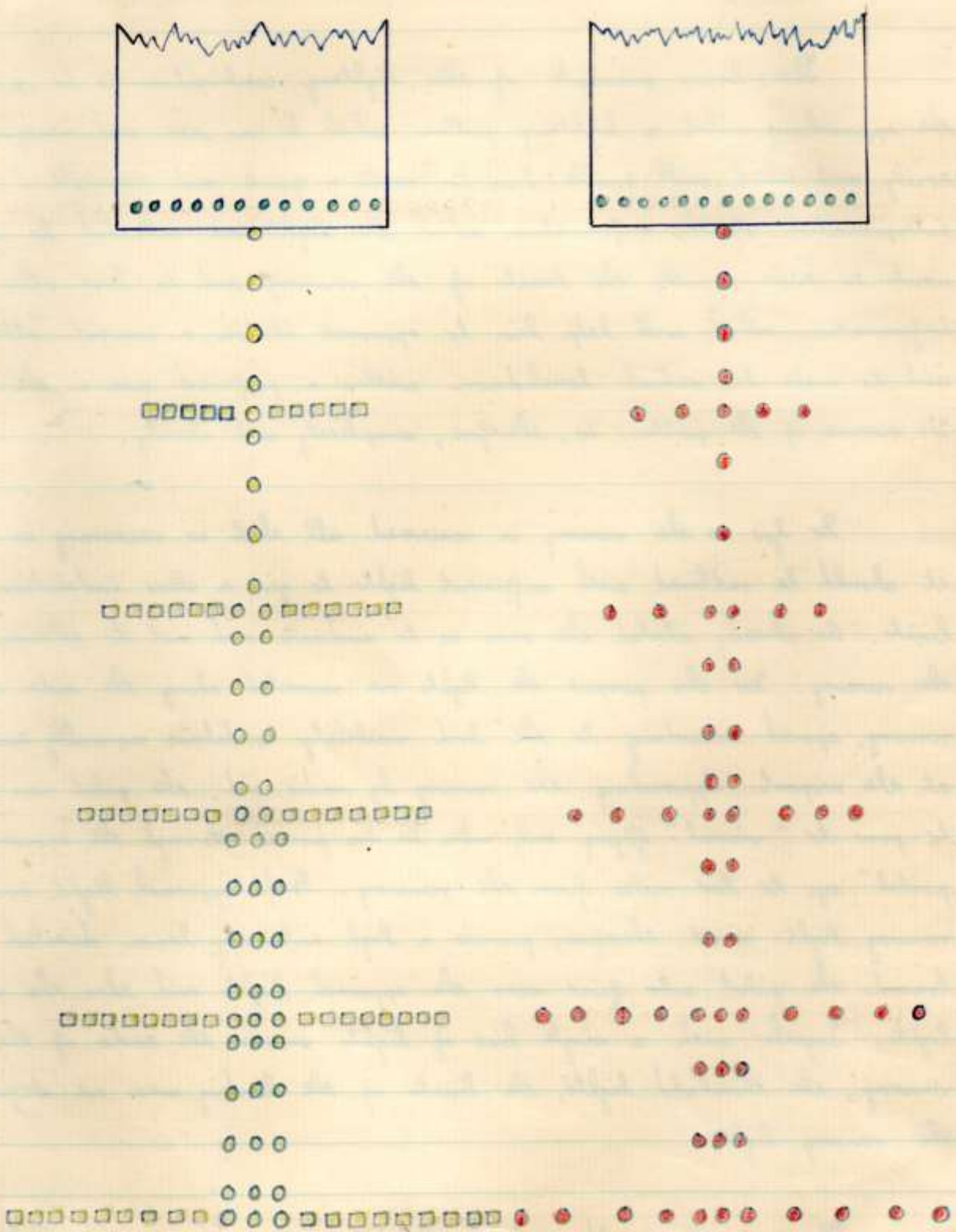
airport lighting today.

The basic principle of this lighting combination is to present to the approaching pilot a lighting pattern which he can see and recognise easily and which will enable him to make a quick and accurate interpretation of the information which the lights are intended to give. He wants to know exactly the limits of the runway and to have other information which will help him to approach it in a correct "attitude" and to make his actual touchdown within a prepared area on the runway. The essence of the pattern is, therefore, simplicity and clarity.

So far as the runway is concerned all that is necessary is that it should be outlined with sufficient light to give a clear indication of its limits. As already stated the aim is to indicate and not to illuminate the runway. For this purpose the lights are mounted along the sides of the runway, spaced according to the bad visibility conditions normally encountered at the airport. Approaching the runway by radio aid, the pilot can expect to pass to "visual" flying only when he has passed through the "approach portal" up to two miles from the runway. Each approach light and runway light must, therefore, provide a high intensity beam directed towards the pilot who first sees the approach lights and then the runway lights. Together with a single line of light across the ends of the runway, the threshold lights, the limits of the landing area are defined by the runway lights.

Many of the worlds airports have some form of approach lighting although, unfortunately, in many cases it is composed of only a single line of lights leading to the runway which, although helpful, is not ideal.

THE CALVERT SYSTEM



IN FOG OR MIST

ON A CLEAR NIGHT

High intensity beacon from below to increase in 1959 autumn

The system in use at London Airport is without question the first in the world and it has since been adopted by some other airports. The London approach lighting was designed by Mr. E.S. Calvert of the Royal Aircraft Establishment at Farnborough and has become known as the Calvert System, although its more accurate designation is Line and Bar Approach Lighting. It has been adopted as a standard by the International Civil Aviation Organisation but local modifications to it have reduced its value at some airports.

The Calvert system consists of a line of lights leading to the centre line of the runway. The line of lights is 3,000 feet long and it slopes so that those farthest from the runway are the highest. The whole length is divided into three sections so that the 1,000 feet farthest from the runway consists of triple lights, the middle 1,000 feet of double lights and the last 1,000 feet leading to the threshold of the runway of single lights. At right-angles to this line and spaced at 500 feet intervals are the cross-bar lights which are of differing widths, with the bar nearest to the runway the shortest. These cross-bars provide an artificial horizon for the pilot to steer by, while their diminishing widths give an indication of the descending path that the aircraft must fly. All these approach lights are mounted on poles or at ground level according to the contour of the terrain but are only just above ground level within 1,000 feet of the runway to minimize obstruction. The lights have a maximum brilliance of 80,000 candle power and possess good fog penetrating qualities. As the weather improves the intensity of the lights is decreased. Low-intensity red lights are used for night approaches in good visibility and these can be seen from a considerable distance. It is worthy of note that the figures for "approach successes", that is a first time landing without overshoot,

ONE OF THE MAIN RUNWAYS

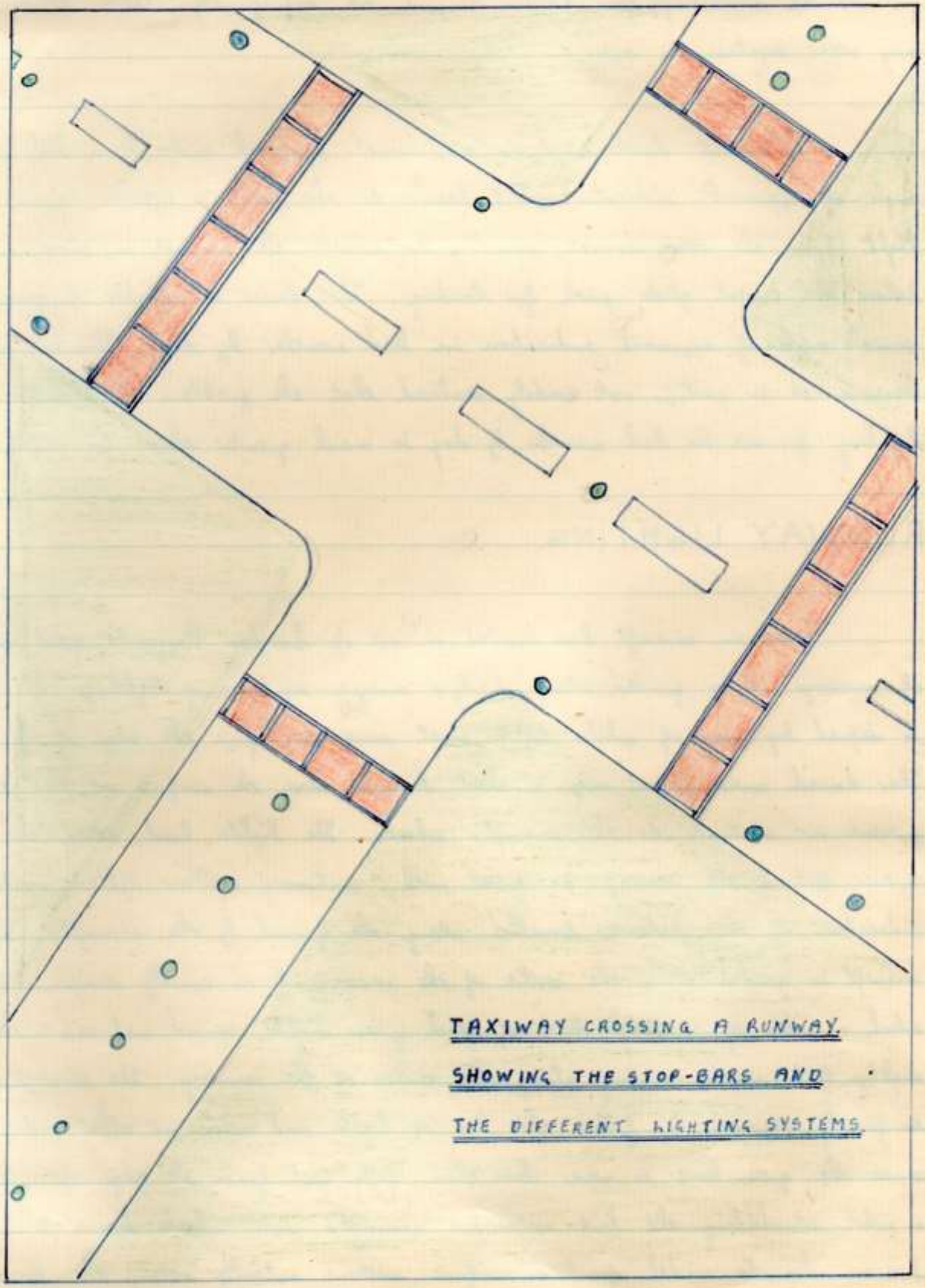
THE CENTRE-LINE LIGHTS HAVE BEEN EXTINGUISHED

in reduced visibility, for London Airport are significantly better than for any other system in use.

A recent development in additional approach aids is a high-intensity angle-of-approach indicator which beams to the pilot a yellow, green or red light from the same source, according to whether the aircraft is above, on or below the correct glide-path for landing. This device is capable of giving a visual angle-of-approach indication in bad weather by day. This is important because it is perhaps not widely realised that the problem of effective airport lighting for use in bad weather by day is much greater than for night use.

C. RUNWAY LIGHTING.

Once an aircraft has landed on one of London Airport's great network of runways it is guided along it by a unique system of lighting. The runway is defined by rows of white lights inset some way from the edge of the concrete. Their domed covers project only a short distance above the surface so that they present no obstacle to the aircraft's wheels. The lights laid along the last 2,000 feet of the runway are fitted with "cautionary" yellow filters as an indication of the distance travelled along the ground by the aircraft. The aircraft is guided along the centre of the runway by an equally unique system which consists of a single line of flush green lights, spaced not more than eighty feet apart, running along the centre of the runway. The aircraft captain is simply required to follow this line of lights and needs no other aids. Also, since the green line is never less than fifty feet from the edge of the runway, a pilot straddling the line with his aircraft's main wheels knows that he has an adequate width of hard surface without actually seeing the boundary of the runway. London Airport is, so far, the only civil airport in the world



TAXIWAY CROSSING A RUNWAY.
SHOWING THE STOP-BARS AND
THE DIFFERENT LIGHTING SYSTEMS.

to adopt this green centre-line system.

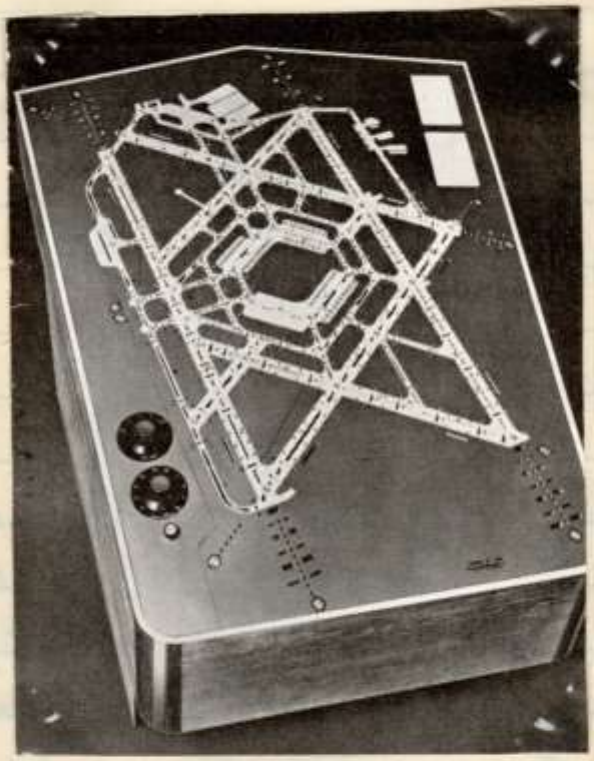
The runway lighting normally operates at thirty per cent of its maximum value but the intensity can be varied in changing weather conditions or to suit individual pilots. A sodium flare-path is also available should the normal lighting become obscured by snow.

D. TAXIWAY LIGHTING.

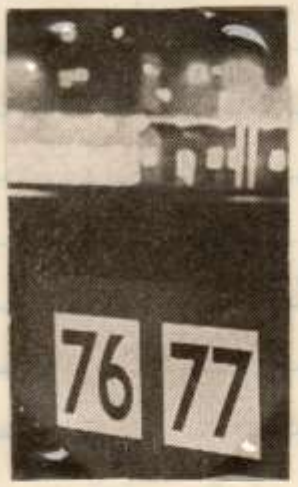
Having helped to bring the aircraft down the next lighting problem at night is to direct it from the runway to the terminal or maintenance area by means of taxiways. These taxiways are normally marked at London Airport by two lines of lights along their edges. These lights are either sunk into the ground or else are of lightweight construction so as to minimise damage to an aircraft in the event of a collision. Recent research at London Airport, however, has been based on the theory that better guidance may be given by marking the centre line and for this, new types of taxi-lights have been developed which can be recessed practically flush with the surface and which are strong enough to stand up to being run over by aircraft.

The runways and taxiways are themselves divided into sections or blocks so that separation is assured at points where an aircraft's route crosses other taxiways routes or duty runways. There are about one hundred of these blocks which vary in length but which are so designed that an aircraft standing at the boundary of one is clear of traffic in adjacent blocks. Approximately half the blocks consist of junctions with other taxi-tracks while the remainder are straight sections between junctions. The entrances to each block are marked by lines of flush red lights called "stop-bars" and an

THE LIGHTING MODEL OF THE COMPLETE RUNWAY SYSTEM



BY DAY



BY NIGHT

THE POSITION INDICATOR BOARDS

aircraft must not cross them when they are illuminated. When the green taxiway lights are lit on a through route all the stop-bars across that route are automatically extinguished. As all the stop-bars at other entrances to the blocks on the selected route remain at red, the aircraft is safe-guarded against other traffic. The whole system is operated from the top of the control tower, the routes set up being shown on a lighting model of the complete runway network.

Even by day an indication of the route to be followed is needed and, as the green taxiway and red stop-bar lights are not visible on bright days, a series of position indicator boards have been set up at London Airport. These boards, of which 228 have been installed on runways and taxiways, assist pilots in reporting their position both by day and after dark. The hunded blocks into which the airfield is divided each has an individual number allocated to it. On receiving a message from an aircraft reporting the number of the nearest board the air traffic control officer is immediately able to pinpoint the aircraft's position and give any necessary guidance. The value of the reflective material with which these signboards are made is threefold. It has a wide angle of reflection so that the pilot need not necessarily be at right-angles to the marker board; in fact the incidence of reflection is almost eighty degrees. Further, the material lasts for years and needs practically no maintenance. Finally the reflective sign can be picked up in fog or other adverse weather conditions hundreds of yards away the reason being that the material is composed of millions of microscopic glass spheres. These are permanently bonded onto a tough, plastic, reflective film and "bounce" back the light with a dazzle free glow up to 185 times that of a white painted surface.

AIRPORT LIGHTING

NOTICE THE SHARP CUT-OFF POINT OF THE LIGHT ON THE EXTREME LEFT

E. AIRPORT LIGHTING.

In addition to those main lighting aids of London Airport already mentioned the important consideration of the space lighting of the central terminal area, roadways and carparks had to be taken into account. This was no ordinary lighting problem because of the possibility of confusion between runway and street lighting. Upward light from the latter had to be eliminated or severely reduced and therefore street lighting of the "cut-off" or zero-screened type was used on the main roads running past the airport and around the private roads inside the airport's boundary. Similarly the aircraft loading aprons in the central terminal area had to lit by special floodlights designed to eliminate light, not only above the horizontal, but also from other parts of the airport where it could dazzle or confuse pilots of taxi-ing aircraft.

F. CONCLUSION.

Considering all the important aspects of London Airport's lighting system mentioned above it can be concluded that mastering this subject was a complex business; one that needed to be planned from the start as a completely interlocking scheme so that the work of the lighting engineer could run smoothly and his work reduced to a minimum.

CHAPTER SEVEN

THE PASSENGER'S PROGRESS

Passengers intending to travel by air from London Airport begin their journey by travelling to the Airways Terminal which is in London. It is a fine building with a tall tower and is situated just past Victoria Station. It is one of the most cosmopolitan meeting places in the world for over 1,200 passengers of all races and colours pass through it every day. These passengers are of seventeen airline companies from eleven different countries and they all use its reception rooms and traffic bays. The Air Terminal is indeed Britain's air gateway to the world.

The traffic bays of the terminal give one a thrill with their signposts - Montreal, Sydney, Hongkong, Lima, Paris, Cairo. On comfortable settees in the various bays the passengers rest, waiting until they are told that their coach is waiting to take them along to the Airport. The coaches do not depart until information has been received from London Airport that the plane will be ready to fly.

Passengers are assured of every comfort. There are restaurants, rest rooms and a sick bay with a nurse in attendance. There are also interpreters and guides always at hand if needed.

The terminal is the London headquarters of B.O.A.C. and although it was only planned eight years ago it is handling four times as many passengers as it was designed to take. During 1947 alone, the year in which

West London Air Terminal adjoining Cromwell Road.

Ground floor reception area, West London Air Terminal.

it was built, over 4.50,000 inward and outward passengers passed through its doors. With the growing popularity of the British airlines, especially among other nations the number has not only become greater but has exceeded all proportion so much so that in October 1957 the West London Air Terminal was opened by British European Airlines. It is a temporary structure which took four and a half months to build and it is intended to use it only until a permanent building is built in five - ten years time. This new terminal has the advantage of being situated closer to London Airport than the terminal at Victoria. Journeys can therefore be made much quicker, in fact well under half an hour making the most use of the new road schemes such as the Cromwell Road Extension.

On the arrival of the coach at London Airport the passengers are met by the traffic staff dealing with arrivals and are escorted through the main doors of the passenger building to a waiting room where they can obtain foreign exchange or send off cables.

The reception staff is made up mainly of girls who have been specially chosen to assist users of the Airport in every possible way. They weigh passengers luggage and issue tickets. The passenger's luggage will already have been weighed and labelled at the Air Terminal if they have arrived by coach but if they have arrived independently they hand over their luggage on arrival to be weighed by the waiting officials. It then ascends separately by way of its own conveyor belt to await them at a later stage. The passengers, meanwhile, ascend by escalator to the principal assembly hall of the building known as the Main Concourse.

Terminus North Terminal visited July 1961.

The first general impression of the Main Concourse is of the surprising

C. Terminal only

CENTRAL PASS BLDG

THE CHANNELS AND THEIR USES.

1	UNITED KINGDOM
2	UNITED KINGDOM
3	DEPARTURES
4	DEPARTURES
5	DEPARTURES
6	DEPARTURES
7	ARRIVALS
8	ARRIVALS
9	ARRIVALS
10	ARRIVALS
11	ARRIVALS/DEPARTURES
12	ARRIVALS/DEPARTURES

quietness and the remarkable air of leisure in so large and usually busy a hall. The quietness, in effect a suppression of echo, has been architecturally achieved by the use of Ashburton marble underfoot which offers very little response to the tread and by the sound-deadening ramps that form part of the design of all but the central area of the ceiling. Great windows stretching from the ceiling almost to floor level form the front wall of the Main Concourse, maintaining by day the maximum natural light. When daylight fails a forest of silver trumpets, growing down from the ceiling in apparently spontaneous variations of shape, burst into light.

In the middle of the Main Concourse is a General Information Centre and a Quick Service Refreshment Buffet. Along the inner wall, opposite the windows, are the assembly points for the routes, known as "channels", through which all passengers have to pass to reach the aircraft on the apron beyond. There are twelve channels in all, two for travel within the United Kingdom and therefore not involving Customs and Immigration and ten serving passengers bound for destinations beyond the United Kingdom. The latter channels can all be used for incoming or outgoing traffic. In practice channels 9, 10, 11 and 12 are usually kept for arrivals, channels 2, 4, 5 and 6 for departures while channels 7 and 8 are used as the traffic dictates.

The departing passenger will find his appropriate assembly point by an illuminated number above the door leading to the channel. He is informed of the channel he is to use both when he reports to the desk on arrival and by an announcement broadcast over the loudspeaker system when departure is imminent.

Each assembly point has an area in front of the channel door,

THE CUSTOMS BENCH

CONVEYOR BELT →

THE EVER-OPEN BAR →

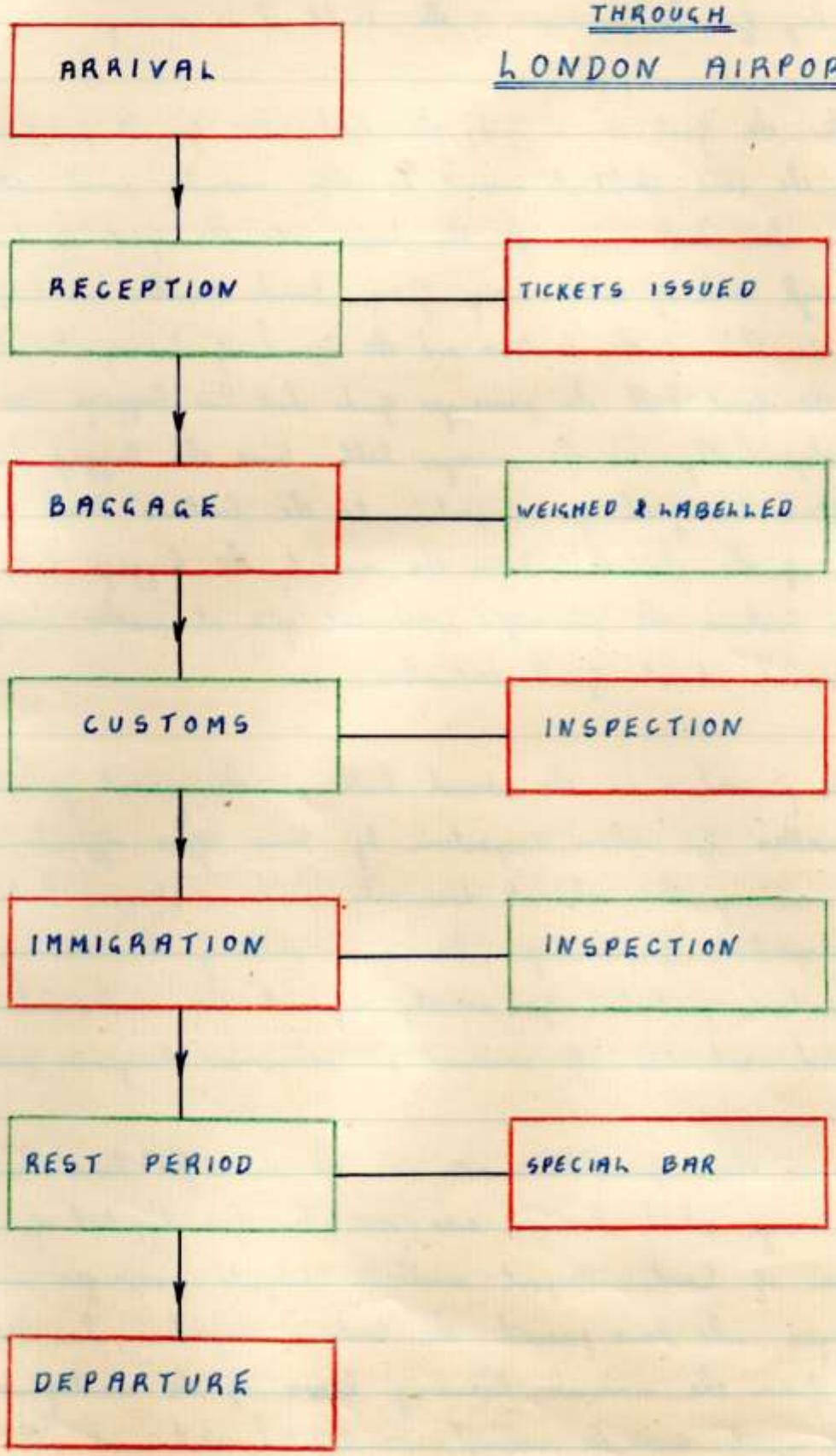
marked off by a rail and furnished with green leather armchairs which forms a waiting bay for the passengers of the flight it is serving.

After the final summons by the loudspeaker for all passengers holding tickets for the next flight to report to their assembly point, they are escorted by their hostess through the doors into the first of two adjoining halls, through each of which every foreign bound traveller must pass. The first hall is that of the Customs and the second of Immigration. On entering the first hall the passenger finds that his luggage has already arrived independantly on the conveyor belt. Once the luggage has been claimed, it is transfered for inspection to the Customs bench on the other side of the channel. From the moment the luggage has been cleared by Customs the passenger need not give it another thought until it has arrived at its final destination.

The procedure in the second hall is the merest formality for most travellers for whom inspection by Home Office officials of their passports or any other relevant documents hold no terrors but this stage in the inspection of passengers leaving or entering the country is a most important protection for society against the unobserved and uncontrolled activities of criminal or otherwise dangerous elements.

Once these formalities are over the passengers leave the halls and enter a lounge which has an ever-open bar for by Act of Parliament this section of London Airport available only to passengers in transit or passengers who have passed the Customs inspection, has been released from the normal licensing laws of the country so that wines and spirits may be supplied in limited section at all times.

THE PASSENGERS PROGRESS THROUGH LONDON AIRPORT



The opportunity of outgoing passengers for taking advantage of this privilege are in practice restricted by the normal rapidity of operations in London Airport. The passengers are likely to be in the final waiting room for only a few minutes before being conducted to a waiting aircraft across the low six-hundred-and-sixty-foot long airside gallery. They will probably have just enough time to be aware of the striking perspective produced by the great length of the gallery in proportion to its modest height and to appreciate the sweet warm scent of tropical flowers and plants flourishing in bays that punctuate the otherwise unbroken length of windows running from end to end of the gallery. The windows give the passengers, from whichever channel they enter the gallery, a sudden and spectacular view of the apron on which departing and arriving aircraft start and end their journeys with, beyond, the whole panorama of the airfield. They will have time, perhaps, once more to note the quietness of the building, obtained in the airside galley by the layer of wood-wool that forms the low ceiling, before they are ushered by way of one of five ramps out on to the apron and into the aircraft. Then, as the departing passengers settle down comfortably in their seats, the pilot, who has been instructed by the Ground Controller, takes the aircraft through a selected route of taxiways on to the runway. When given clearance by the Air Controller, also in the tower, he opens the throttle. The aircraft gathers speed and in a few seconds has become airborne. The passengers settle down comfortably and casually with books and light refreshments as the aircraft climbs to its cruising altitude. Below, London Airport announces through its broadcast system the departure of one of the ninety thousand flights operated by the thirty-five airlines of twenty-seven different countries, which arrive at and depart from London Airport in the course of a year.

SOME OF THE AMENITIES AVAILABLE AT THE AIRPORT

Gordon Airport reckons on clearing an out-bound flight of, say, forty passengers from an assembly point in the Main Concourse to embarkation from the apron in twenty minutes.

Under pressure the normal speed can be increased without any loss of efficiency so long as general conditions are favourable. Gordon Airport, however, as much as any traditional seaport, is subject to the influence of natural elements beyond its control. If a flight is delayed by weather, or for any other reason, the passengers will have the opportunity to take advantage of the amenities in the spacious transit lounge situated off the airside gallery and which is designed to meet such emergencies. In addition to a restaurant and bars with their special independence of the licensing laws, the Lounge which is carpeted with gold invites the delayed passengers to relax in easy chairs and sofas upholstered in glove-coloured fabric. Near-by will be found a bookstall, a barber's shop, showerbaths, telephones and a pen where young children can be looked after during the period of waiting.

The sick and the crippled, as well as those requiring medical inspection by law, have their own facilities in a department controlled by a resident medical staff. In the General Treatment Room, first aid is administered. A special staircase from below leads to a landing giving access to male and female rooms equipped with radiant heat cages, the Sisters Office, the Staff Sick Room and Isolation Wards and finally the Physician's Room.

In eight months the Port Medical Service has assisted in the transportation of six hundred invalids and has dealt with two -

THE BALCONY LOUNGE

thousand cases. During the winter months there is a sharp rise in the number of incoming fractures, to as many as five a day, caused by the return of the less fortunate ski-ing enthusiasts.

Gordon Airport also caters for travellers and their friends who arrive in advance of their schedule. Instead of going straight to the assembly point beneath the illuminated sign of their channel-number in the Main Concourse, these passengers and their companions climb the stairs from the Main Concourse to the Balcony Lounge which overlooks the lively scene of activity below. The balcony forms a very good position of observation for those who wish to rest in comfort on the low mobile armchairs provided, while keeping in touch with the ceaseless stream of travellers coming and going beneath and around them. Those with an inclination to go shopping will find their tastes served by a crescent of shops around the back of the Balcony. There are further useful services of cloak-rooms, gift-shops and a pen where infants up to the age of eight may be left by their parents. This pen consists of lavishly equipped playrooms with rest room, bathroom and nursing facilities presided over by experienced staff. In nine months three thousand and forty children were left by their parents in the pen for periods of time ranging from half an hour to a day.

Beyond the Balcony Lounge, glass swing doors lead to the lounge bar and to the passenger restaurant with its tall windows overlooking a spacious terrace from which the arrival and departure of aircraft may be observed outside. The restaurant itself forms an observation gallery commanding wide views over the airfield. Here passengers waiting to depart and friends who have come to greet new arrivals can pass

OFF !!

the time with a bottle of good wine or a steak from the menu which reaches a standard that might be expected of British enterprise in this challenging field of international communications, where many important passengers from all parts of the globe arrive and depart all the year round.

CHAPTER EIGHT

THE PILOTS PROGRESS

1. THE OUTWARD JOURNEY

Many people are under the impression that all the work a pilot has to do is to sit and wait until his passengers have boarded the aircraft and then to take-off and head for his destination. Even if he could do this his job would be far from easy, but alas he cannot for his work begins long before the flight is due to depart.

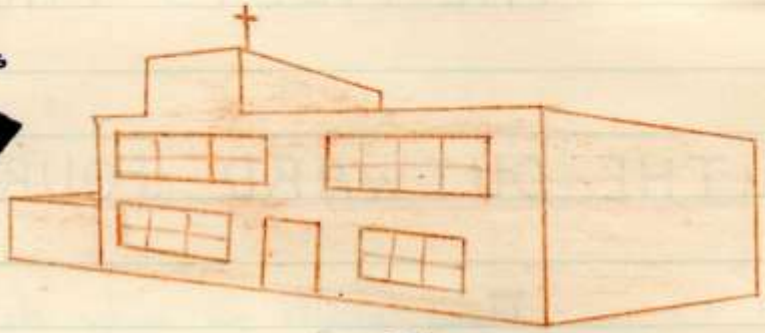
A. THE OPERATIONS ROOM.

First of all he will go to the Operations Room in order to decide which route he intends to follow. He will then find out the total weight that his aircraft will be carrying for the journey can be quite a problem, as in addition to the passengers, cargo and mail which will take up a large proportion of the total weight, nearly twenty tons of fuel have to be carried.

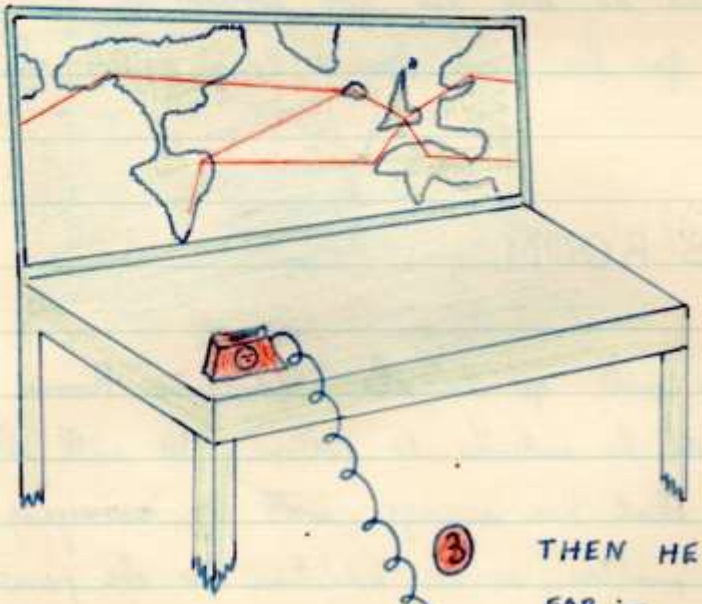
Before the Captain has arrived at the Operations Room the Operations Officer on duty will have obtained from the weather forecasting office in London Airport a complete forecast of the weather. He will then be able to show the Captain exactly what type of weather to expect and, in particular, from which direction and with

HOW THE CAPTAIN MAKES HIS FLIGHT PLAN

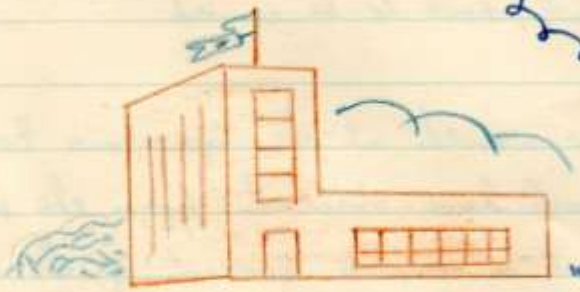
1. THE CAPTAIN GOES TO THE OPERATIONS ROOM



2. WHERE HE STUDIES ALL THESE THINGS WHICH WILL AFFECT HIS CHOICE OF PLAN



3. THEN HE MAKES HIS PLAN FOR :— ROUTE
HEIGHT
ALTERNATES



NEXT HE GOES TO THE METEOROLOGICAL OFFICE

WHERE HE STUDIES THE LATEST REPORTS ABOUT THE WEATHER ON THE ROUTE HE HAS CHOSEN. HE THEN CONFIRMS BY TELEPHONE TO THE OPP'S ROOM THAT HE WILL TAKE OFF AT THE SCHEDULED TIME.

+ his flight plan with ATS

what strength the wind will be blowing at different heights and over different parts of the route. All this information will be plotted on a map so that the Captain will have a complete picture before him to help him select the best route to follow.

B. THE METEOROLOGICAL OFFICE.

Having made this decision the Captain now goes to the Meteorological Office which is situated in the London Airport control tower. This is the office in which the weather forecasters work. The First Officer, Navigating Officer and the Radio Officer all go with the Captain and examine the weather map again discussing it in great detail with the forecaster on duty. They will be told any important changes which may have occurred since the map was prepared.

A weather map is simply a chart on which has been plotted in code the kind of weather which places all over the map are having at a particular time of the day or night. It is based on reports sent in by observers. Some reports come in from ships which are specially stationed in the Atlantic Ocean for that very purpose. Others come in from aeroplanes in flight while the majority come from stations on the ground. The weather map gives a complete picture of the weather over a large area at any one moment of the day or night and so it must be prepared several times during twenty-four hours but by looking at them the forecaster can make an accurate forecast of the weather at any place to within very fine limits indeed.

(See MET BOOK FOR MET DIAG).

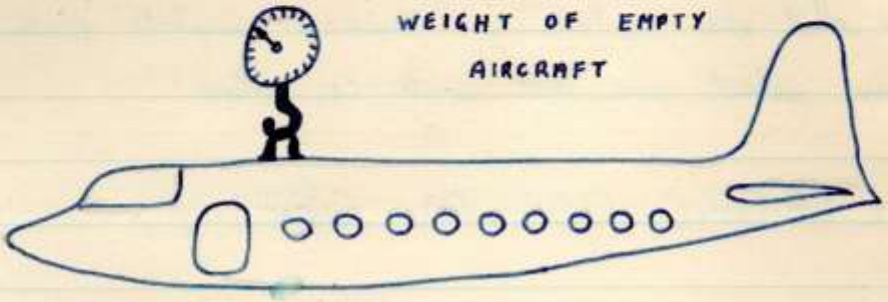
Flight Plan

WEIGHT DISTRIBUTION

TAKE-OFF WEIGHT

DEAD-LOAD

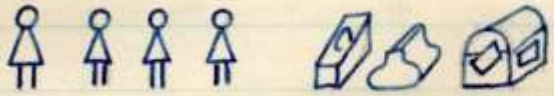
PAY-LOAD



WEIGHT OF EMPTY AIRCRAFT

WEIGHT OF FUEL

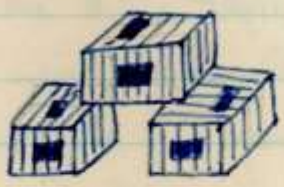
WEIGHT OF CREW & BAGGAGE



WEIGHT OF FUEL

WEIGHT OF PASSENGERS

WEIGHT OF PASSENGER'S BAGGAGE



WEIGHT OF CARGO

WEIGHT OF MAIL

C. THE 'SHIP'S PAPERS'

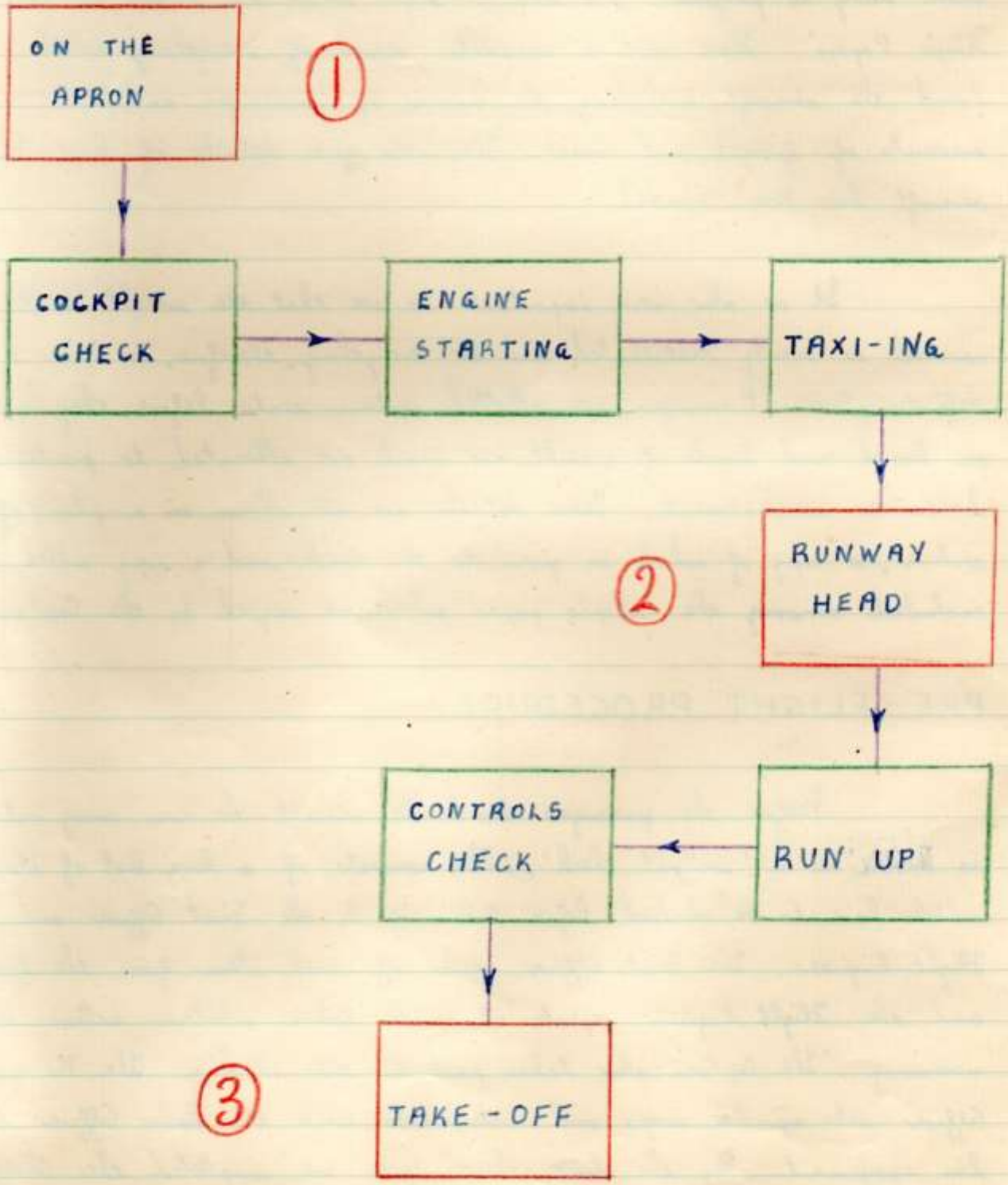
Before going out to his airliner, the Captain still has one more duty to perform. He has to sign what are known as the 'Ship's Papers'. These give a complete record of everything which is on board the aircraft, including the names of passengers and crew and amounts of freight and mail. They also give details of how the aircraft has been loaded.

It is also very important to see that the weight that is carried is evenly distributed and so everything, therefore, is given a definite place. Passengers are allotted certain seats before they appear on board and loads of freight and mail are allocated to particular holds or compartments. These details are all shown on a plan of the airliner, a copy of which is given to the loaders and a copy which is included among the 'ship's papers' which are signed by the Captain.

D. PRE-FLIGHT PROCEDURE.

Before the passengers board the aircraft the crew carry out what is known as a 'cockpit check'. This consists of a long list of items which have to be checked before take-off by the First Officer and the Flight Engineer. The First Officer reads off each item from the list and the Flight Engineer repeats it so he takes whatever action is necessary. The Captain also takes part in this checking. The Navigating Officer sets up his maps and instruments while the Radio Officer tests his equipment. By the time these tests are completed the Chief Steward has reported that all the passengers are on board and

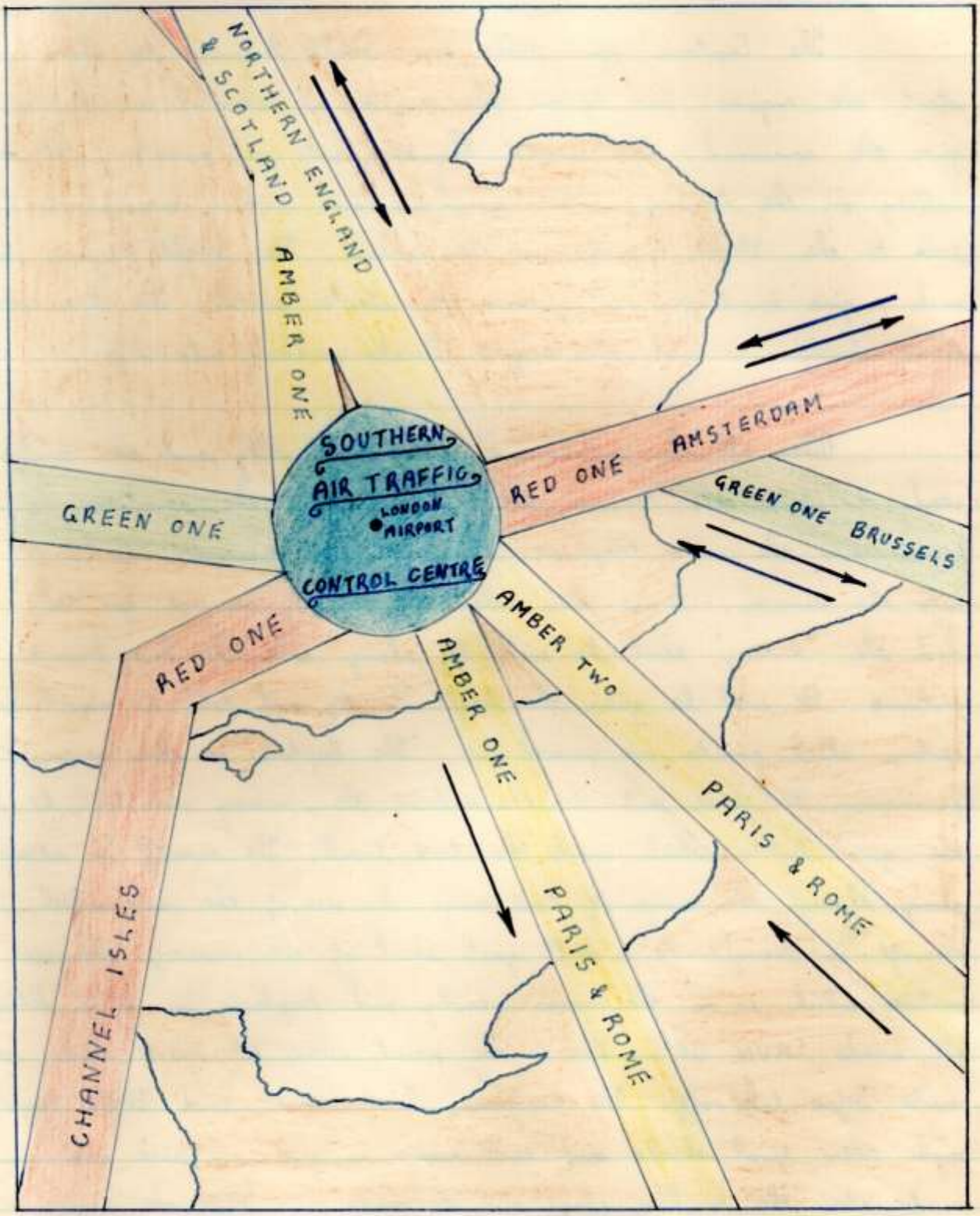
TAKE - OFF PROCEDURE.



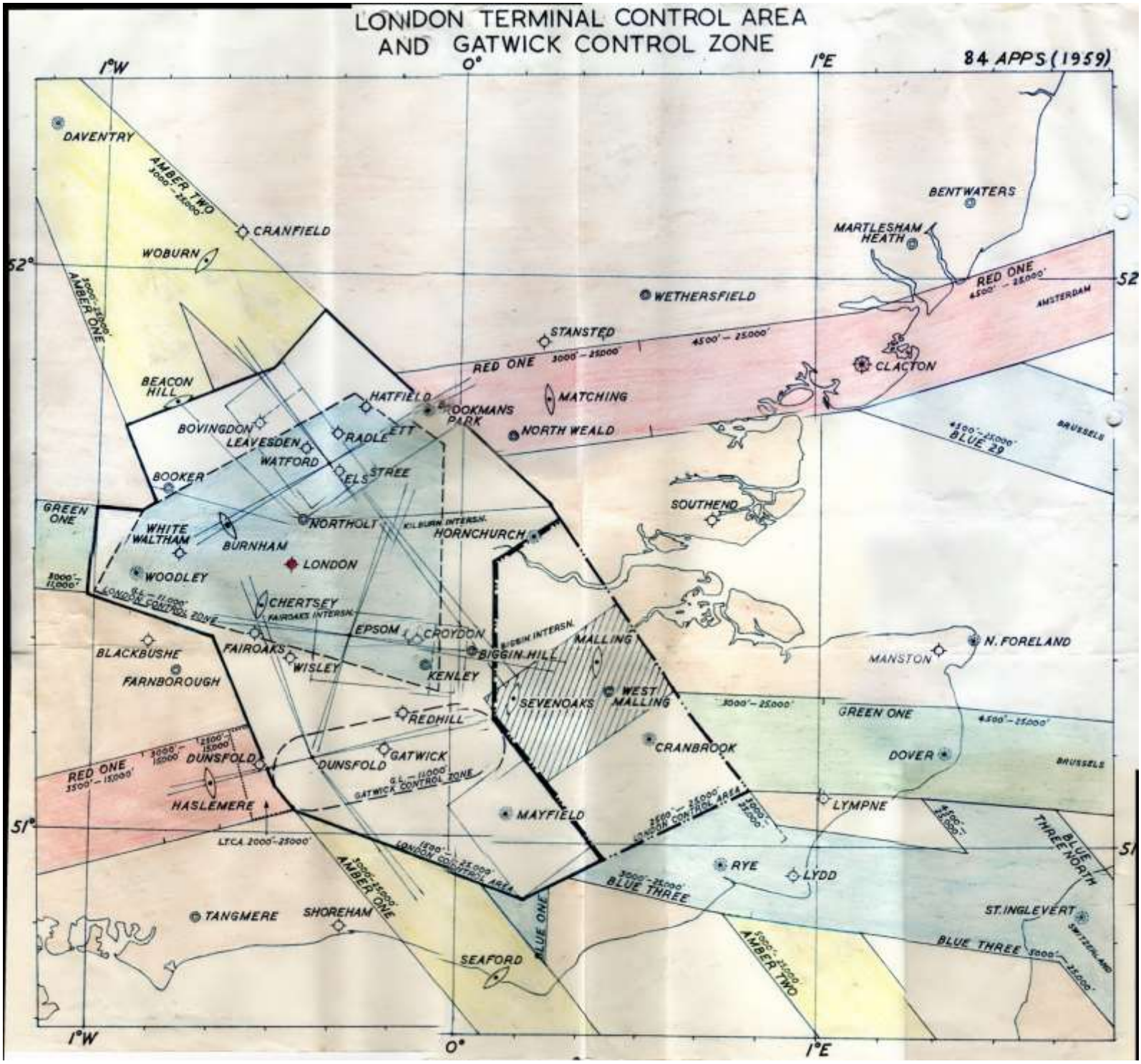
that the main door has been closed.

The Captain now tells the Flight Engineer to stand-by to start the engines. One by one the engines are started as the Captain gives the command. The Ground Engineer, who is operating the starter battery on the tarmac, wears earphones and uses a microphone to talk to the Flight Engineer in the cockpit. The Flight Engineer selects each engine in turn and presses the starter switch. The huge propeller turns slowly over and the engine bursts suddenly into life.

When all the engines are running smoothly and the airliner is ready to leave the tarmac, the Captain calls the aerodrome Control Officer over the radio telephone and asks for permission to taxi out onto the runway. He is then told the runway in use for take-off and the 'Airway' that he will fly along when he has become airborne. He will be given the height to fly and told to report when certain check points are passed over. The Captain is then given permission to taxi out to the end of the runway and told to follow the green lights which mark the taxi-track. The aircraft is steered along through the maze of taxi-ways by use of the nose-wheel. The aircraft is brought to a halt just short of the runway alongside a notice which is on the grass nearby and displays in large letters the words 'RUN UP'. This is the point where the final checks are made before take-off. The Captain, First Officer and Flight Engineer make their final checks and each engine is given a quick run-up. This is to clear the sparking plugs and to make sure that the engine is giving full power. The Captain checks that his ailerons, elevators and rudder move freely as he moves the control column and rudder bars.



THE AIRWAYS THROUGH LONDON AIRPORT


LONDON TERMINAL CONTROL AREA
AND GATWICK CONTROL ZONE
84 APPS (1959)
1°W
0°
1°E
52°
51°
DAVENTRY
AMBER TWO
3000' – 25000'
CRANFIELD
WOBURN
AMBER ONE
3000'–25000'
BEACON HILL
BOVINGDON
LEAVESDEN
WATFORD
RADLETT
STREE
BOOKER
GREEN ONE
WHITE WALTHAM
BURNHAM
NORTHOLT
KILBURN INTERSN.
HORNCHURCH
LONDON
WOODLEY
3000'–15000'
G.L. – 11000'
LONDON CONTROL ZONE
CHERTSEY
FAIROAKS INTERSN.
EPSOM
CROYDON
BIGGIN INTERSN.
BIGGIN HILL
MALLING
BLACKBUSHE
FAIROAKS
WISLEY
KENLEY
FARNBOROUGH
SEVENOAKS
WEST MALLING
REDHILL
RED ONE
3500' – 15000'
3000'–15000'
2500'–15000'
DUNSFOLD
GATWICK
GATWICK CONTROL ZONE
HASLEMERE
LTCA 2000'–25000'
MAYFIELD
2500' – 25000'
LONDON CONTROL AREA
3000'–25000'
AMBER ONE
TANGMERE
SHOREHAM
SEAFORD
BLUE ONE
BENTWATERS
MARTLESHAM HEATH
RED ONE
4500' – 25000'
AMSTERDAM
WETHERSFIELD
STANSTED
RED ONE
3000' – 25000'
4500' – 25000'
CLACTON
HATFIELD
BROOKMANS PARK
MATCHING
NORTH WEALD
4500'–25000'
BLUE 29
BRUSSELS
SOUTHEND
N. FORELAND
MANSTON
3000'–25000'
GREEN ONE
4500'–25000'
CRANBROOK
DOVER
BRUSSELS
LYMPNE
4500'–25000'
BLUE THREE NORTH
RYE
LYDD
3000'–25000'
BLUE THREE
ST. INGLEVERT
SWITZERLAND
BLUE THREE 3000'–25000'
3000'–25000'
AMBER TWO

When the Controller gives the 'Clear to take-off' the aircraft is moved onto the end of the runway facing into the wind.

The Captain gives a final word of instruction to the Flight Engineer who then eases the throttles open. The aircraft quickly gathers speed as the throttles are opened and the Captain steers it by means of the nose-wheel until sufficient speed has been reached to enable the rudder to be operated. Until then the First Officer, who has his own control column and rudder bars, will have been holding his control column steady. The Captain now takes over these controls and the First Officer watches the Air-Speed Indicator and calls out the speeds to the Captain until a certain speed is reached when the Captain gently eases the control column back and the airliner becomes airborne. When he is told to do so, the First Officer operates the lever which retracts the undercarriage, the main wheels folding into the inner engine nacelles and the nose-wheel into the fuselage. The flaps, which were partly lowered for take-off, are then raised.

Immediately after take-off, the Radio Officer gets into touch with the Air Traffic Control Centre and tells them at what time the airliner became airborne. From then on he will keep in constant touch with Air Traffic Control and will be passed from one Control Centre to another as the airliner leaves and enters each Area along the 'Airway'.

An 'Airway' is a special corridor which is a belt of air extending from a lower level varying between 1,500 and 3,000 feet, upwards to 11,000 feet and is about ten miles wide. Each airway is given a designation ie 'Amber One', and most of them pass through London Airport.

THE "BRAINS" OF LONDON AIRPORT

2. THE INWARD JOURNEY

It has been seen just how much work goes into the safe dispatch of an aircraft from London Airport on route for any destination in the world but the far greater and more exacting task is that of bringing an aircraft safely down from one of the many "airways" onto the tarmac of London Airport, a job which entails a vast amount of concentration and precision.

As the aircraft approaching London Airport passes into the radius of Airport Control, over either Epsom or Watford, to the moment when it halts safely at its allotted stand on the terminal area, it is directed and ordered to execute every essential movement by the 'brains' of London Airport which is situated in the top floors of the Tower in the Control Building. Here three teams, Approach Control, Aerodrome Control and Ground Control, working in close co-operation, are operating to guide the aircraft to a safe landing.

The control exercised from this Tower, however, is confined to aircraft operating within a few miles of the runways. To obtain a picture of the overall pattern of controlling the incoming aircraft, the huddle of buildings beside the Bath Road near the North-west corner of the Airport must be turned to. Here the striking orange and white radar scanners maintain a steady rate of revolutions as they probe the skies over South-east England, presenting the radar controllers with a plan picture of aircraft flying in the area. This is the Southern Air Traffic Control Centre, one of the three main centres which together direct and assist air movements over the United Kingdom. The Southern

SOUTHERN AIR TRAFFIC CONTROL

SCANNERS

OPERATORS

Air Traffic Control Centre, therefore, although situated at London Airport, has wider responsibilities and its sphere of influence extends over the whole of Southern England and South Wales.

Radar is the heart and soul of the Centre. Recent developments of this great invention have enabled the controllers to speed-up the flow of traffic by handling greater numbers of aircraft in a congested air-space than would have been possible had they been unable to "see" the movements of the individual aircraft and had to allow a comparitively lengthy time interval to elapse between the passage of aircraft over any particular area.

The spacious Control Room at the Centre is the scene of intensive but quiet and orderly activity. Special lighting enables the radar staff to watch their cathode-ray tubes without distraction and other members of the team to work in normal room light. This result has been achieved by using flourescent tubes of blue, green and red which together give a whitish light. Because this light is deficient in yellow it does not interfere with the viewing of radar 'blips' which are seen through amber filters. Radar information is presented on desk-mounted consoles, very similar to table television sets. Most of the electronic equipment associated with these displays is housed in a large area immediately beneath the Control Room. Some of the controllers use a short-range display which enables them to see aircraft almost as soon as they are airborne from London Airport and they subsequently hand them over to the long-range controllers. The maximum range of the equipment is 130 miles but the controllers can arrange their displays (off-centring) so that they observe only that section of

THE CONTROLLERS AT WORK IN THE SOUTHERN AIR TRAFFIC CONTROL CENTRE

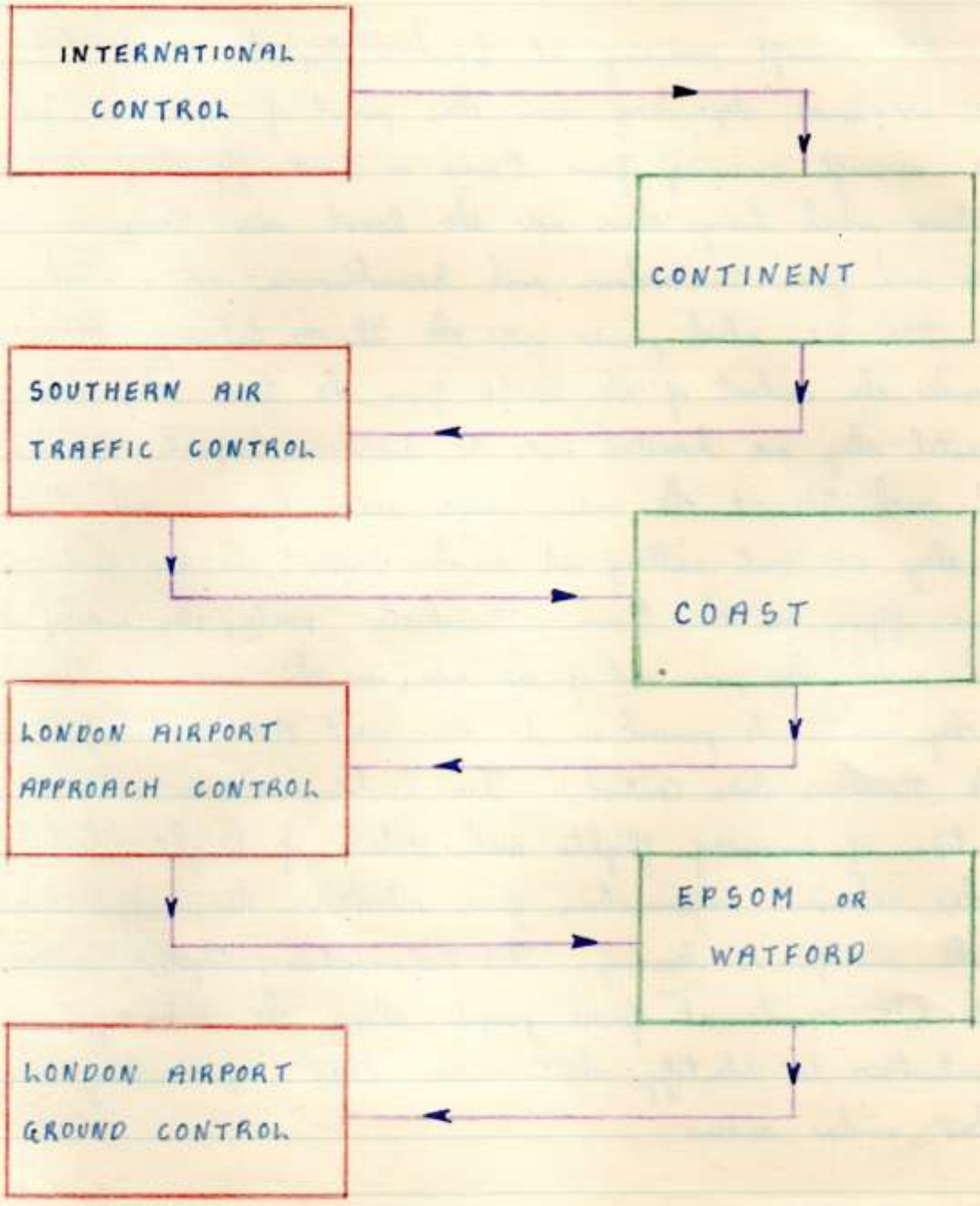
NOTICE THE FLIGHT PROGRESS STRIPS WHICH ARE INSERTED IN METAL CARRIERS. ON THE DESKS

the surrounding air space for which they are responsible. Communication between controllers and aircraft is by means of Very High Frequency Radio-telephony, the message travelling over land-lines from the Centre to a number of transmitting stations reaching from Suffolk to Cornwall.

All aircraft arriving at London Airport are directed along specific air-lanes depending upon their point of departure. For instance aircraft arriving from Paris or Rome fly along Airway Amber Two which brings them over the Coast near Dungeness. Aircraft flying to and from Amsterdam and Scandinavia are routed along Airway Red One which passes over the Thames Estuary. The aircraft come under the control of the Centre from the time they enter the area until they are handed over to London Airport Approach Control authorities at the radio ranges near Epsom and Watford or, if they are not calling at London Airport, as for instance if they are flying on the Paris-Manchester route, they would be watched until they pass out of the area (in this case at Daventry) when they would be passed on to the next Area Control (in this case the Northern Area Control). This Centre receives advance notification of incoming flights with details of height, destination and other relevant information from whichever Air Traffic Control Area the aircraft is leaving. This information, together with aircraft R/T reports at fixed points along the Airways, enables the controllers to identify the various 'blips' representing aircraft on their radar screens.

The following example will illustrate how the work of the Area Control Centre and the London Airport control authorities is

HOW AND WHERE AN AICRAFT IS CONTROLLED TO LONDON AIRPORT

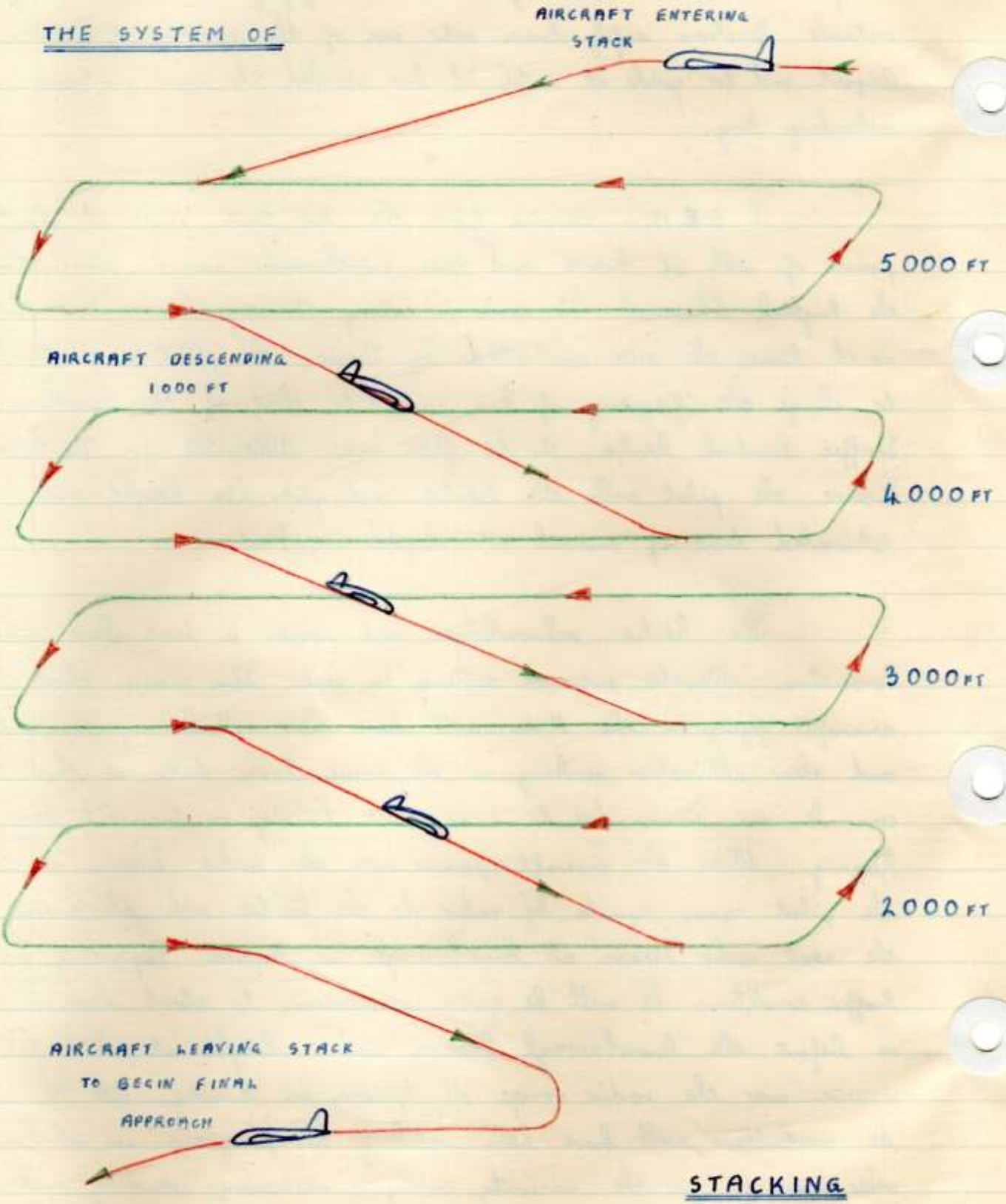


integrated in order to bring an airliner flying in on an Airway from outside Britain safely down onto one of the runways of London Airport and to guide it until it has reached its own particular unloading bay.

A B.E.A. service from the Far East makes its last point of call at Rome and flies northwards across France towards the English Channel. It comes in along Airway Amber Two and, as it leaves the area controlled by Paris, the pilot is instructed to change the frequency of his radio to that of the Southern Air Traffic Control Centre. As he flies over Abbeville in Northern France the pilot calls the Centre and gives his height and estimated time of arrival over Sydd in Kent.

The Centre acknowledges and passes a time check and the barometric altimeter pressure setting in use. This ensures that all aircraft flying in the Area will have their clocks synchronised and their altimeters working on the same basic data so that there can be no errors due to inaccurate timing or incorrect height-keeping. When the aircraft passes over the radio beacon at Sydd the pilot again reports by radio to the Centre and sets course for the next radio beacon at Crowborough in Sussex. Depending on traffic conditions he will be given permission to start descending at or before the Crowborough beacon and a height at which to arrive over the radio range at Epsom in Surrey. All this time the controllers will have been watching his progress in relation to other aircraft in the vicinity and, if necessary, sending instructions for changes in course or altitude. As the aircraft approaches Epsom

THE SYSTEM OF



STACKING

the pilot is told to switch to the radio frequency of London Approach and this is the point at which control passes from the Area Control to London Airport's Approach Control. Had the aircraft flown to London from a northerly direction it would have been directed to the radio range at Watford in Hertfordshire where the changeover from Area Control to Approach Control would have taken place.

London Approach Control is situated near the top of the Tower in the Central Area of London Airport and it is equipped with radar consoles similar to those in the Area Control Centre. The task of the Approach Controllers is to maintain the flow of aircraft in an orderly sequence from the radio ranges at Epsom or Watford towards the runways.

Due to the large amount of traffic that London Airport has to handle the aircraft on arriving at Epsom will be "stacked" under the supervision of London Airport Approach Control. A "stack" is a continuous moving queue of aircraft which are given a definite position to circle, over a wireless beacon, and different heights to fly. There is a difference of a thousand feet between the height given to each aircraft. The lowest aircraft is usually at about two thousand feet. The aircraft at this height will be the one whose turn it is to leave the stack and land at the Airport. As an aircraft comes in to land each of the others in the stack is stepped down to the next height below it. Instructions for this procedure are given over the Radio Telephone by the Control Officer to each pilot. In this way each airline, including the one from the

THE TICKER-TAPE MESSAGES

now 93

There are some twenty-six tape machines in London Airport and they are there to ensure that everyone concerned has up-to-the-minute information about aircraft movements.

BEA FLIGHT 131 G-OP VISCOUNT STAND 13 CHANNEL 8 GATE D3 ESTIMATED (TIME OF ARRIVAL) 1618 HOURS.

(1) BE. 131 GOP VIS SD13 C8 GT D3 EST 1618--6--

BEA G-OP LEAVING EPSOM RADIO RANGE 1611 HOURS

(2) BEA GOP LVG MYE 1611--3--

BEA G-OP FINALS 1618 HOURS

(3) BEA GOP FNA 1618--8--

BEA G-OP LANDED 1620 HOURS

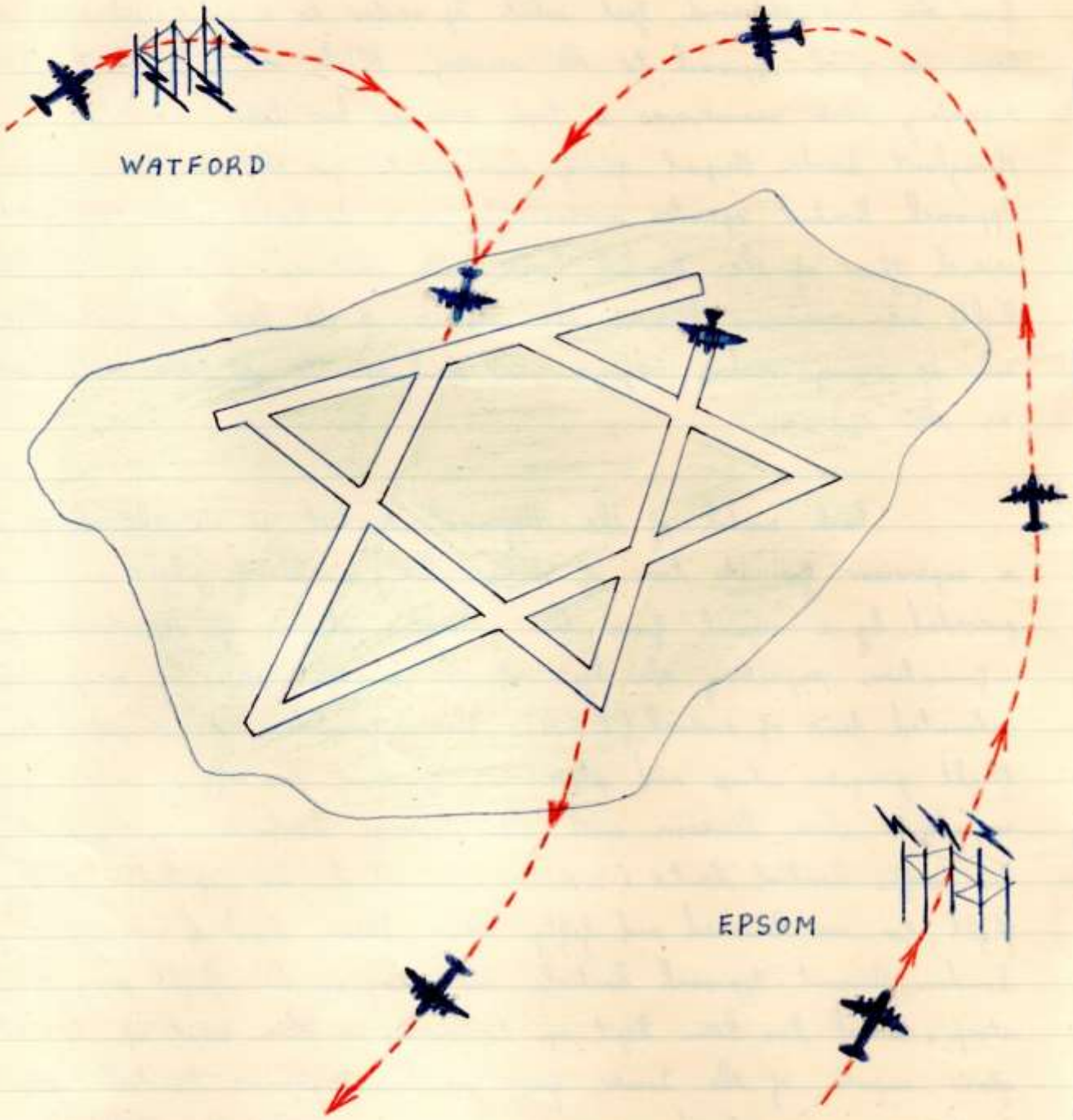
(4) BEA GOP LD 1620--1--

Tor East, eventually reaches the bottom of the stack when it is guided from this two thousand feet orbit by radar to a point where it will begin its final approach to the runway. While the aircraft has been executing these manoeuvres a tape message has been circulated throughout London Airport giving arrangements for the aircraft's reception. Approach Control operates unceasingly in a darkened room on the seventh floor of the Control Tower. The curtained windows and shaded lights are necessary because the members of the team of controllers, who are using radar, require near darkness to get the best trace on their screens.

Each watch of the Approach Control is in the charge of a supervisor for its tour of duty. Every incoming plane is preceded by a signal from the aircraft's station of departure, giving information respecting the type of the aircraft, place of origin and estimated time of arrival (E.T.A). This information is recorded on a flight progress strip and placed in front of an officer who maintains close liaison with the Airways Controller of the Southern Air Traffic Control Centre (S.A.T.C.C), which has controlled the flight for one hundred and fifty miles before handing over to the London Airport Approach Control. One copy of the flight progress strip, which has been kept up to date, is then sent up to the glass cupola of the Tower from which Aerodrome Control operates. Another copy is placed on one of two sides of the Flight Progress Board, according to whether the plane is approaching from Epsom or Watford.

As our aircraft from the Tar East leaves the stack

THE APPROACH



SHOWING HOW LONDON AIRPORT APPROACH CONTROL BRINGS IN AIRCRAFT AFTER PICKING THEM UP FROM SOUTHERN AIR TRAFFIC CONTROL. AIRCRAFT TAKE-OFF ON THE PARALLEL RUNWAY AT THE SAME TIME.

wher it was kept at an interval of not less than three miles between it and its predecessor and constantly supplied with information on the weather, runway in use and any specific instructions that may have been necessary, the pilot is given his initial course adjustments by the No. 1 Radar Director, who has been conducting this stage of the approach, before handing him over to the No. 2 Radar Director and turning his attention to the next aircraft in the queue. The No. 2 Radar Director gives the pilot his final course adjustments to put the aircraft in a position to begin its approach to the runway, using the Instrument Landing System. This system guides the pilot electronically, by an instrument in the cockpit, down the glide path to a position where he can obtain visual guidance to the runway threshold from the Calvert approach-lighting system.

During the final stages of the descent the aircraft will also have been watched by precision approach radar to check the pilots approach and ensure that the correct separation between successive aircraft has been maintained. On the final approach, as soon as the pilot can see the runway, he informs Approach Control which is responsible for all aircraft landing on or taking off from the runways. High up in the glass cupola at the top of the Tower the Ground Controller sits at his raised desk which gives him a panoramic and complete visual command of the entire Airport and, as the aircraft comes into land he sends out the final tape message from the Tower saying that the aircraft has landed. As the aircraft reaches the end of the runway the Ground Controller, by switching on the appropriate daylight route indicator board, directs the pilot through the mesh of taxiways by a route that he has selected

HOME!!

with the aid of a model of the airport. In bad visibility a radar screen which registers the movement of every vehicle on the Airport is used. At night he will use lights to regulate the progress of the aircraft through the taxiways. The aircraft can be halted by turning on a row of red lights called a 'stop-bar' across its path. On extinction the aircraft can proceed again on its selected route astride a track of green lights until it arrives at its stand on the apron when it is truly home.

So ends a routine performance of modern air transport which is achieved every hour of the day and every day of the year. The passengers after disembarking and mounting the ramp, enter the airside gallery where they proceed through the stages of their channel in reverse order to the departing passengers as already described.

CHAPTER NINE

AIDS TO TRAFFIC CONTROL

London Airport has already gained the reputation of being one of the safest and best-equipped airports in the world from the pilots point of view. It possesses every modern aid and convenience to ensure that everything can run smoothly and efficiently with the least possible amount of delay.

1. AIR TRAFFIC CONTROL.

The function of Air Traffic Control is to enable air traffic to operate with as little hinderance and as great a degree of safety as possible.

The most important of all air traffic control requirements is the need for accurate assistance in the prevention of air-to-air collisions. Although the use of separation between aircraft in the vertical and horizontal senses will achieve this and to a high degree of success, the method is wasteful in that unacceptable delays result. The only way in which narrower clearance limits may be safely used is by making the whole of the controlled airspace visible to the control authorities and, at present, the only way to do this is by radar which, when used in this sense, becomes known as surveillance radar. When surveillance radar is used in controlling the local airspace above and around the airport, however, it is usually referred to as aerodrome

AIR TRAFFIC CONTROL

THE S.232

control radar, or A.C.R for short.

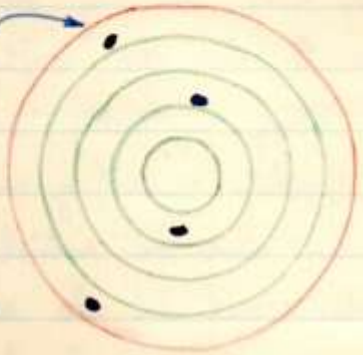
The type of surveillance radar that is used at London Airport is the M.E.W, or Micro wave Early Warning system. It is the Marconi Type S.232 which operates on the fifty centimetre band. This results in the equipment being virtually unaffected by rain or cloud returns, while those radars operating on higher frequencies possess weather effects which can never be entirely eliminated. It is in fact the longest range radar unit in the world and it can pick up aircraft at distances of up to one hundred and fifty miles away. The distinctive orange and white aerials or 'scanners' of 'London Radar', which can be clearly seen from the Bath Road, are used by the Southern Air Traffic Control Centre to speed up air traffic by reducing separation standards with safety, assist with navigation if required and finally to keep a check on all unidentified aircraft.

In order to provide height information from aircraft approaching London Airport the Marconi Type S.13 long range height finder is used in conjunction with the range equipment. This radar operates in the Ten Centimetre band and its aerial head can be remotely turned to any bearing in azimuth. Thus, when an echo is detected by the range equipment, the S.13 is swung manually onto the bearing of the echo and gives a similar echo in the vertical sense which can be observed on a cathode ray tube scaled with altitude marks.

This then is how Air Traffic Control functions in order to obtain a swift and smooth flow of aircraft approaching and leaving London Airport.

HOW GROUND CONTROLLED APPROACH (G.C.A.) WORKS

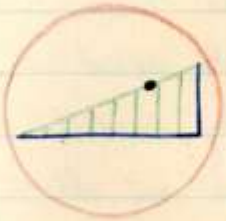
AIRCRAFT APPEAR AS 'BLIPS' ON SCREEN SHOWING CONTROLLER POSITION OF ALL AIRCRAFT IN THE AREA



① UP TO 30 MILES AWAY

② DURING THE FINAL TEN MILES

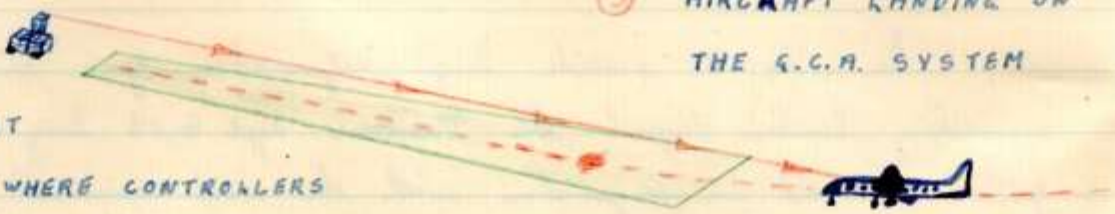
HEIGHT



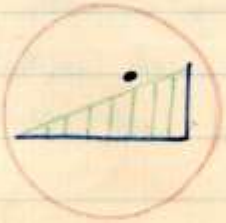
PLAN

AIRCRAFT ON THE CORRECT PATH AND AT THE CORRECT HEIGHT FOR TOUCHDOWN

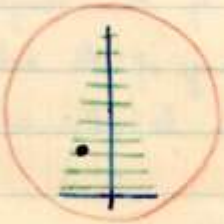
③ AIRCRAFT LANDING ON THE G.C.A. SYSTEM



GCA TRAILER AT END OF RUNWAY WHERE CONTROLLERS PLOT AIRCRAFT'S POSITION IN RELATION TO THE IDEAL GLIDE-PATH



AIRCRAFT TOO HIGH AND TOO FAR TO THE LEFT OF THE CORRECT GLIDE-PATH



2. APPROACH CONTROL.

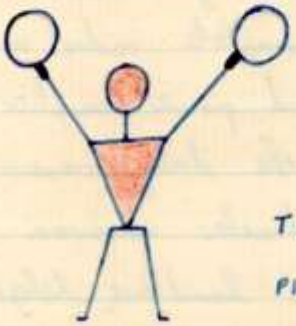
GCA now influenced by ACR & PAR.

The main aid that is used at London Airport to guide the approaching aircraft to the runway is the G.C.A or Ground Controlled Approach system. It consists virtually of a complete radio and radar station with its own communications and power supplies. It is positioned just off the left-hand side of the duty runway, three-quarters of a mile from touchdown. A trailer caravan houses the radio, radar and controllers and a landline telephone is provided for communicating with air traffic control.

Inside the G.C.A. trailer there are two radar search displays, a search and precision system and these are controlled by two directors whose job it is to locate and identify the aircraft requiring G.C.A. assistance. This is accomplished by requesting the aircraft to alter course, the controllers quickly noticing the kink which appears on their screens as the trace changes. They then follow the aircraft and relay constantly its exact position to Approach Controller who directs the pilot right over the threshold of the runway and within thirty feet of the ground. So delicate is the equipment that, during the final approach, the pilot need not acknowledge his instructions for the approach controller can tell at a glance whether they have been obeyed.

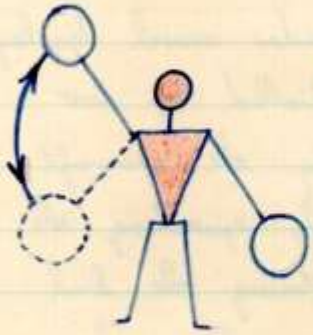
The system works no matter what course the aircraft was initially on each pilot being directed so that he circles the aerodrome in the proper manner and lands on the runway in the right direction. Yet despite all this the Ground Controlled Approach

THE BAT SIGNALS



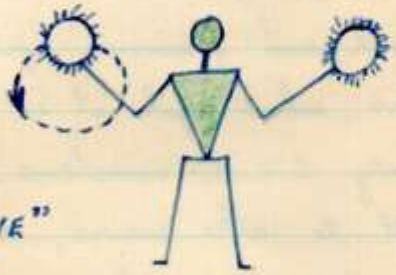
"THIS BAY"

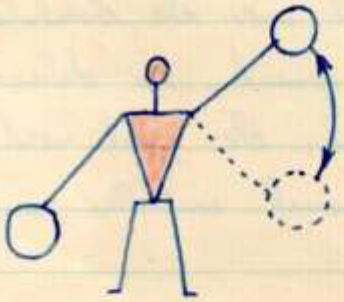
THE ULTIMATE RESTING PLACE OF THE AIRCRAFT.



"TURN TO RIGHT"

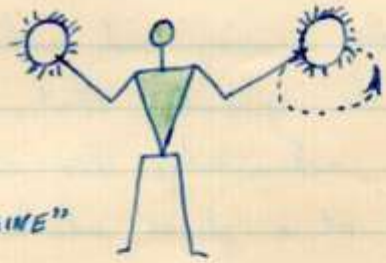
OR ALTERNATIVELY TO "OPEN UP PORT ENGINE"





"TURN TO LEFT"

OR ALTERNATIVELY TO "OPEN UP STARBOARD ENGINE"



BY DAY

BY NIGHT

system can never be more than an emergency measure for it can only handle one aircraft in every three minutes. Furthermore its whole conception is diametrically opposed to modern ideas of air navigation in which the responsibility of the aircraft and the safety of the passengers rests primarily in the hands of the pilot.

Is this opinion correct?

No mention of ILS which is primary approach aid + pilot interpreted GCA (or PAR) is secondary aid.

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3. GROUND CONTROL

One of the most important aspects of ground control is to manoeuvre an aircraft in a confined space to the exact position for unloading, as quickly and as efficiently as possible. The person who is responsible for this job is the batman who during the day uses bats to give his signals and make use of powerful white lamps at night or when the visibility is so bad the bats might not be seen.

BAT SIGNALS (CONT)

"COME ON" REV UP ON BOTH ENGINES

"STOP"

BUT KEEP ENGINES RUNNING

"CUT ENGINES"

BY DAY

BY NIGHT

CHAPTER TEN

BEHIND THE SCENES

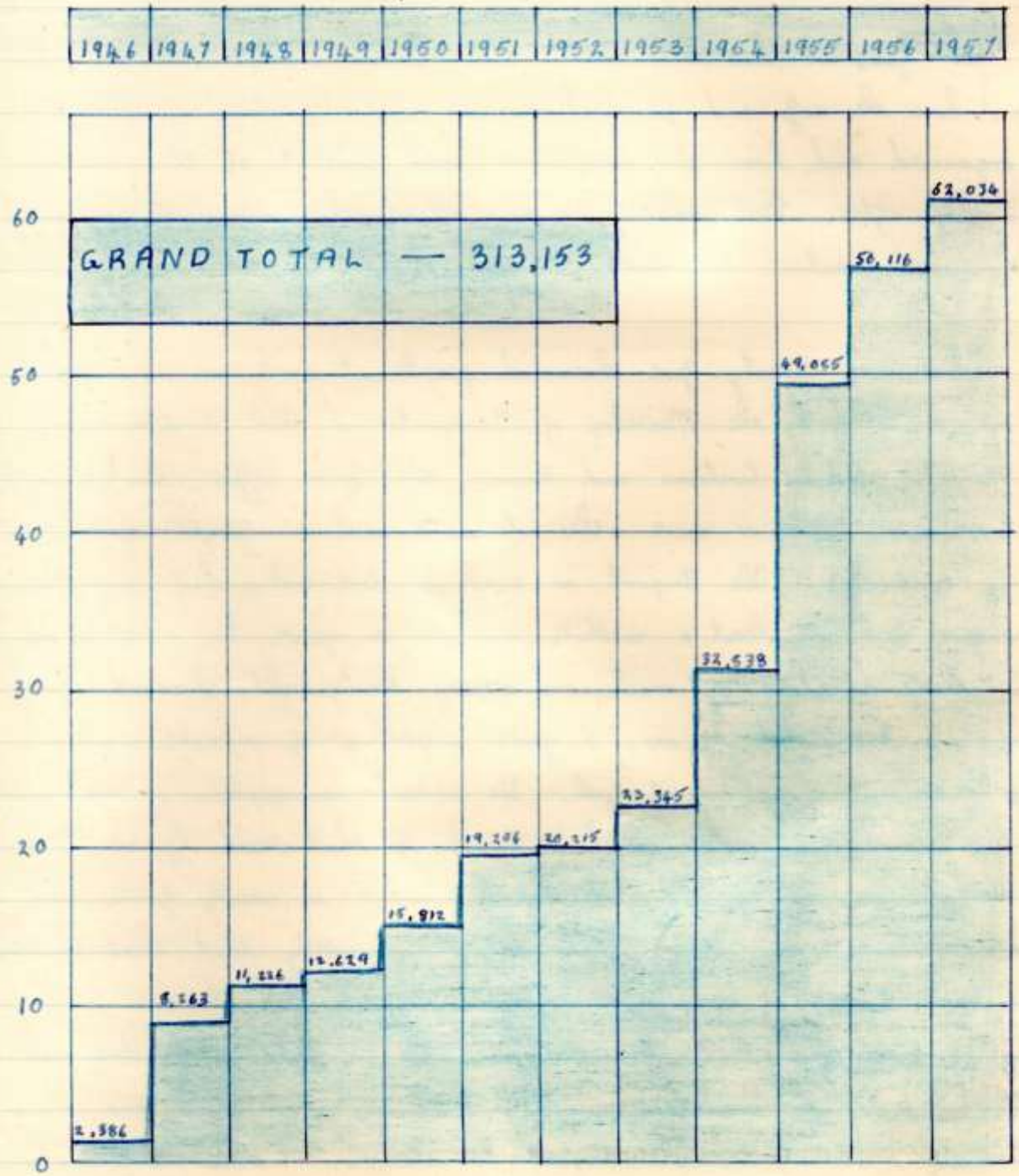
So far, it has been seen how London Airport came into being, how the safe and punctual arrival and departure of aircraft are organised and how the convenience and comfort of the passengers are looked after. But what goes on behind the scenes of this great world travel centre to make all this possible.

There are twenty-five thousand people at work on the Airport. They are employed by the Ministry of Transport and Civil Aviation, the Air Ministry, H.M. Customs and Excise, the Home Office, thirty-five (43) operators and fifty or more other tenants such as freight agents and catering contractors. The Airport is used by two-and-a-half million (3) passengers and at least a million visitors a year. In addition, over eleven-thousand tons of mail and nearly thirty-eight-thousand of freight are transported by air. A years refuelling of aircraft requires thirty-five-million gallons of fuel. The annual consumption of electricity is 432 million units which is equal to that used by the town of Reigate in Surrey, the population of which is nearly forty-eight thousand inhabitants. It is vital to flying safety that there should never be a failure of supply so London Airport has its own emergency electrical plant. Engineers are also on duty both day and night in order to maintain water, heating, ventilation and air-conditioning installations. The Airport has its own Police Force with a control room from which mobile patrols are directed by radio.

+ Fire Service

MAIL AND FREIGHT

THOUSANDS OF SHORT TONS



Besides helping and directing the travelling public the Airport Police ensure the safety of the great volume of valuable goods, including precious stones and bullion, that is transported by air. The vast freight sheds may hold at any one time from fifty to a hundred-million pounds worth of cargo. Air travel, swift and smooth, is often the best way of moving sick and injured people. To provide for this there is a fully equipped Hospital in the Control Tower which is in addition to the facilities in the Passenger Buildings mentioned earlier. There are five postal districts within the Airport and thirty-two miles of roads. + Telephone Exchange

In order to deal with the infinite variety of live freight now being carried as a matter of course, the R.S.P.C.A has built an Animal Air Hostel on the North-west corner of the Airport. Here animals who may be starting or finishing their travel or else in transit can be fed and watered and given clean bedding if necessary in quarantine conditions. The hostel has a veterinary unit with an operating theatre capable of dealing with any creature and there are special quarters which can be kept at a high temperature for animal or birds which cannot stand the rigours of the British climate. Since November, 1962 when the hostel opened, an endless variety of creatures including elephants, spiders, crocodiles, snakes, ostriches, penguins, dogs, leopards, monkeys, horses and cats have been cared for. A record was established recently when no less than forty-seven thousand creatures used the hostel in one month.

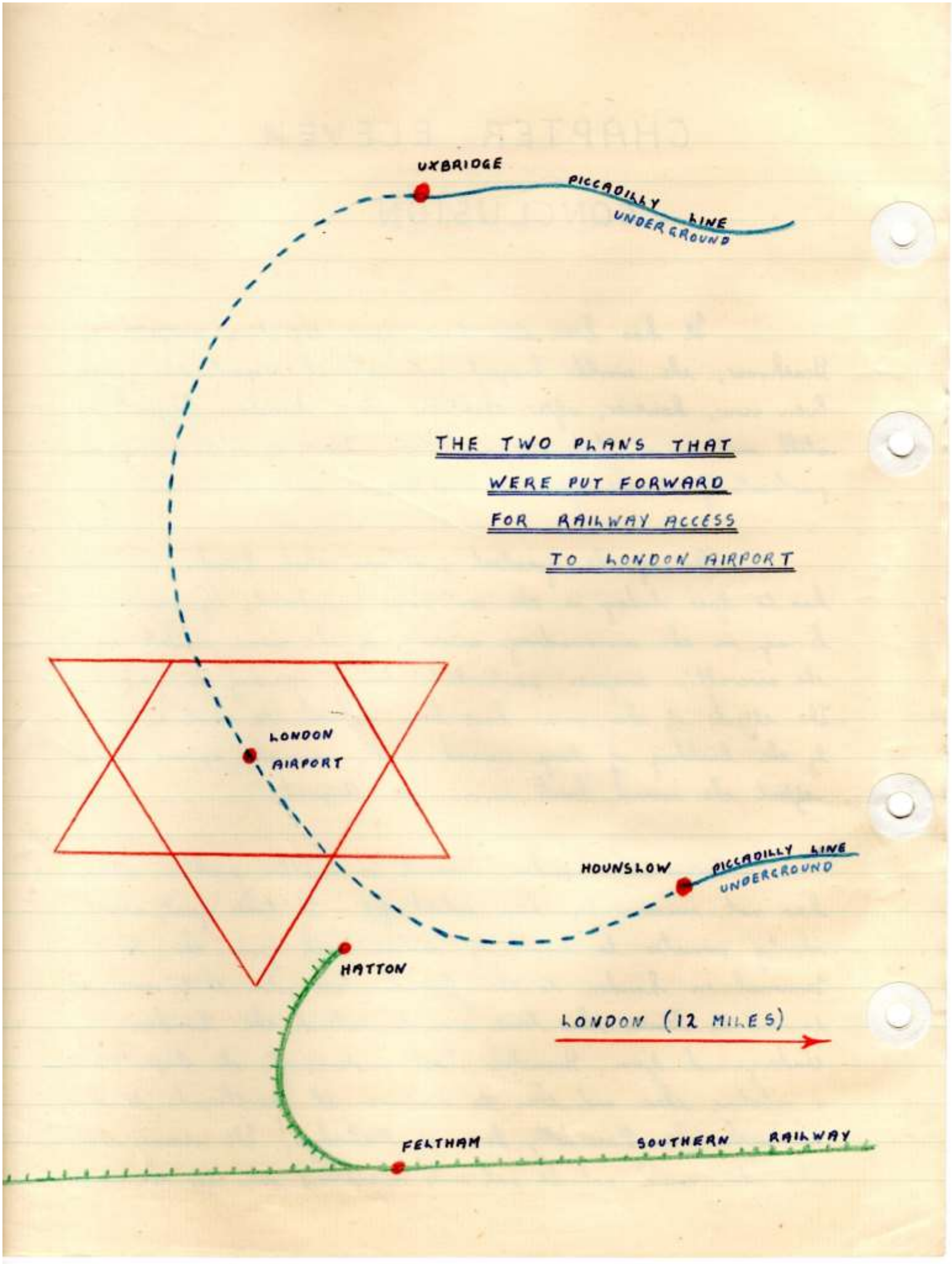
CHAPTER ELEVEN

CONCLUSION

It has been seen how, from the tiny airfield of Heathrow, the worlds largest international airport has grown. Even now, however, after thirteen years, London Airport is still not in a state of completion. Work is still going on particularly in the form of maintenance area construction.

One of the greatest problems that London Airport has to face today is the continuous complaint, by people living in the surrounding suburbs, of the noise created by the aircraft's engines particularly during running up periods. The effects of this noise have been reduced to some extent by the building of large curved walls on the aprons which reflect the sound back across the Airport.

Access to London Airport is another problem which has not successfully been solved yet. It takes just about thirty minutes to travel by airline coach from the Air Terminal in London to the Airport. One plan that was put forward to lessen this time was to extend the London Underground from Hounslow West underneath the Airport, have a station there and then to continue it northwards to link up with the Piccadilly line at Uxbridge. The reason that this plan could not be put into operation was for the same


UXBRIDGE
PICCADILLY LINE UNDERGROUND
THE TWO PLANS THAT WERE PUT FORWARD FOR RAILWAY ACCESS TO LONDON AIRPORT
LONDON AIRPORT
HOUNSLOW
PICCADILLY LINE UNDERGROUND
HATTON
LONDON (12 MILES)
FELTHAM
SOUTHERN RAILWAY

reason that the Tunnel to the Central Terminal Area could not be bored is because of the nature of the soil. Another plan to build a branch line from Feltham, on the Southern Railway, to Hatton has just been submitted but like practical considerations such as housing estates and roads must be taken into account and given careful consideration.

So, the quest for ultimate perfection goes on. Perhaps in a few years hence they might achieve this end but by then airports as such may no longer be needed. Who knows?

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