PROCEEDINGS

SEVENTH MEETING. SECOND HALF, 63RD SESSION

A Meeting of the Royal Aeronautical Society was held in the rooms of the Royal Society of Arts, John Street, Adelphi, $W_{*}C.2.$, on Thursday, March 15t, 1928, when a paper by Wing-Commander R. M. Hill, on "Experiences on the Cairo-Baghdad Air Mail," was read and discussed. Colonel the Master of Sempill (Chairman of the Society) presided.

The CHAIRMAN, introducing Wing-Commander Hill, said that he had lectured before the Society on several previous occasions. In 1920 he had read a paper on "The Comparison of the Flying Qualities of Single and Twin-Engine Aeroplanes"; in 1921 he had lectured, before the main body of the Society and its branch in Scotland, on "The Technique of Flight, and the Manœuvres of Getting Off and Landing"; and in 1923 he had read a very remarkable paper on "The Manœuvres of Inverted Flight," which was awarded the Royal Aeronautical Society's Silver Medal for 1923 as being the best paper of that session. At present he was one of the instructors at the Royal Air Force Staff College at Andover, and had just returned from the Middle East, where he had served as Chief Technical Officer. Prior to occupying that position he was in command of the Squadron which had been operating the Cairo-Baghdad Air Mail, so that no one was better qualified to give a picture of the conditions affecting the operation of that route.

The Society's Gratitude to Mr. Guggenheim

The CHAIRMAN said the Society had received very great assistance during the last few years from the Guggenheim Fund in America. The members were privileged to have with them that evening Mr. Lester Gardner, who was one of the best known figures in aeronautical circles in America, and who was returning to that country in a few days time, and they would very much like him, if he would be good enough, to take back to Mr. Guggenheim a vote of thanks for the splendid help he had given, which had enabled the Society very greatly to extend its activities.

The vote of thanks to Mr. Guggenheim was accorded with acclamation. Wing-Commander HILL then read his paper.

EXPERIENCES ON THE CAIRO-BAGHDAD AIR MAIL.

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BY WING COMMANDER R. M. HILL, M.C., A.F.C., F.R.AE.S.

The Air Mail route from Cairo to Baghdad is now securely established. Seven years ago the major portion of it, from Transjordan to Iraq, was no more than a project in certain far-seeing minds. The maps of this region between Amman in Transjordan and Ramadi, a little market town on the Euphrates, 65 miles west of Baghdad, were until 1921 painfully reticent. The countries of Egypt, Palestine, and to some extent Transjordan, had been fairly accurately mapped for some time, and were flown over extensively during the war by ourselves and the Germans. The landmarks are generally speaking abundant, and from the navigational point of view they therefore present no outstanding difficulties. Neither is there the same scarcity of water and other

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amenities which is characteristic of the great sweep of Asian steppe which lies between the Jordan and the Euphrates.

I propose briefly to recall to you the why and wherefore of the Air Mail route. In March, 1921, a conference was held at Cairo, at which were present the Secretary of State for the Colonies, the Chief of the Air Staff and the local army and Royal Air Force commanders, for discussions prior to the inauguration of the Middle East Department of the Colonial Office. At this conference the momentous decision was taken to open a desert route between Amman and Ramadi. The objects of this route were to forge a link in the Imperial chain of communications between Europe, India, and eventually Australia; to enable aircraft and personnel to proceed direct to Iraq instead of by the enormously more lengthy route via the Red Sea and the Persian Gulf; to serve as a form of training in long distance flying; and to evolve a means of rapid communication for service purposes by a regular Service Air Mail. I ask you to note that the primary idea was a Service Air Mail and not an Air Mail Service.



Ramadi Landing Ground:

At the same time, after considerable negotiation with the Postmaster-General, civil mails were carried almost from the first. As you know, a letter by sea mail from London to Baghdad travels via the Suez Canal, Red Sea, Bombay, Karachi, the Persian Gulf and Basrah, and takes about a month, thus making Iraq far more inaccessible than its geographical position warrants. The Air Mail telescoped the 28 days into nine, and is a signal example of the value of transcontinental air communication in the absence of railways.

I think it is fair to say that initially this air route could never have been pioneered by a civil organisation. The first crossings were definitely in the nature of a military undertaking. On October 6th, 1921, Air Vice-Marshal Sir Robert Brooke Popham gave a lecture to this Society, describing his experiences in crossing the route shortly after it was opened. I must confess that when listening to him with the faint roar of London outside, I hardly appreciated his lecture at its true value. It was when I came to seek shelter from the burning sun in the shade of my aeroplane in the solitudes of the wilderness that some of his remarks, which repose in the pages of the Journal, came back upon mewith startling vividness.

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In the minds of the inaugurators of the route was never absent the ultimate possibility of a civilian air route, a route that may one day be 14,000 miles long. Far sooner, I fancy, than was originally anticipated, the section of the route between Cairo and Baghdad has been handed over to Imperial Airways, surveyed, constructed, pioneered and made reasonably safe for a non-military organisation to develop. The history of its construction from its actual inception in June, a921, of the flying organisation painfully but surely adapted to its peculiar hazards and difficulties, of the colossal fund of human energy poured into the work, is 'something of which we, who flew over it in later days, were very justly proud.



Landing Ground II. Changing an engine in the descrt.

Flying over the four historic rivers, which nourished some of the principal civilisations of antiquity, the Tigris, the Euphrates, the Jordan and the Nile, between the dawn and twilight of a long summer's day, as was not infrequently done, brings home to a pilot the magnitude of the military achievement of the ancients. The means by which they supplied and maintained enormous armies in this sort of geographical vacuum and kept any semblance of military organisation, fairly troubles one's sense of probability. Even in the twentieth century it was no light task that the original parties undertook in finding a way across this uncharted waste. Air Vice-Marshal Brooke Popham explained in his lecture why the pilot cannot simply set a compass course from Amman or Baghdad and fly straight across. The distance is roughly 540 miles, and, at any rate flying east, one could guarantee to hit the Euphrates. But if an aeroplane were forced

down en route by engine failure it would be about as easy to find as a needlein a haystack. Another reason for not navigating direct is that sometimes very strong head winds are encountered, and it was consequently found necessary to instal desert refuelling points at which an aeroplane with insufficient petrol to complete the journey could refuel with enough to carry it through. It would be almost impossible to find these points, or sunken tanks as they are now, by navigation alone. It therefore became imperative to mark a track all the way from Amman to Ramadi, as direct as was consistent with the feasibility of getting wheeled transport through. The aircraft could then follow this track. If for



Landing Ground II. A spare engine being transferred from the centre section of a Vickers-Vernon to the trolley on which it is conveyed to the aeroplane requiring it.

any reason they had to come down they could always be found and rescued; and thus the contingency of getting lost, admittedly remote, but none the less impossible to overlook, would be adequately provided for.

Two car convoys were sent out, one from Amman and one from Baghdad, and they met at El Jid, roughly half way. At El Jid there are deep wells cut in the limestone rock. The eastbound convoy was accompanied by Dr. Ball, who surveyed the route and whose map is still the pilot's guide. The cars of this party were also accompanied by D.H.9 A's from a detachment of No. 47 Squadron at Amman, which reconnoitred ahead and helped to straighten out the track. The westbound cars were accompanied by D.H.9 A's from No. 30 Squadron at Baghdad, which performed similar duties. Over most of the surface of the ground, which is of mud and gravel, and fairly hard except when softened by the winter rains, it was found that the track most visible from the air was that made by the wheels of the cars themselves. Over certain portions of the route a Fordson tractor with plough attached was employed to make a plough track as well; and arrows were ploughed in the desert at doubtful places for extra guidance. The plough track was subsequently completed over the whole route, all the way along which landing grounds were marked at an average distance of 20 miles. Luckily the ground is in most places very favourable for landing, and little clearing had to be done. As pilots say, one can land almost anywhere. This does not mean that the pilot is absolved from using the utmost care in landing, for an odd boulder or a concealed rut in the ground may easily cause a damaged undercarriage or tailskid. All that was done to mark the desert landing grounds was to plough a circle on a good piece of ground close to the track, with a letter or number within the circle.



Landing Ground IV. Photograph taken by means of a Very light. The evening meal in the desert.

The convoy from Amman lettered their landing grounds from C at Kasr Azrak, 50 miles east of Amman, to R, 17 miles west of El Jid, with the omission of I and Q. The convoy from Baghdad, on the other hand, numbered their landing grounds from I, 15 miles west of Ramadi, to XI, which is El Jid itself. Landing ground R marks the zonal division. As regards responsibility for salvage, all landing grounds east of it are in the Iraq zone, and those west of it are in the Egypt zone. When I was flying on the mail I used to smile to myself sometimes when sending the wireless signal, "O.K. passing R," as I pictured the countenances of those in Baghdad and Cairo, 300 and 560 miles to the east and west, simultaneously rising and falling with the thoughts of : "Thank goodness he's off our hands now," and "The mail is coming through; no rest in the office till they've landed."

It was always found that aeroplanes had difficulty in rising from the aerodrome at Amman in hot weather with a heavy load. This aerodrome is about 2,600 feet above sea level, and in summer time the reduced air density may make its height equivalent to 4,000 or 5,000 feet. With heavily loaded mail aircraft, the reduced rate of climb left a very slender margin of safety, especially in view of the proximity of the surrounding hills and an adjacent gorge with marked down currents. A search was therefore made for a landing ground from which it would be safer to take off. A landing ground was chosen at Ziza, 12 miles south. It is by a little station of that name on the Hedjaz Railway, and is some 200 feet lower and less locked by hills. Even at Ziza, however, with full load it was often impossible to climb over the surrounding hills after 10 or 11 a.m. in summer time. The main track runs, as I said, from Amman to Azrak, but an additional plough track was made from Ziza, and runs northeast, cutting into the main track a few miles after it leaves Amman.



Landing Ground IV. A flood in the desert in February.

At the end of 1922 and the beginning of 1923 further car convoys went out from each end and remarked the track, straightening it out, improving it in places, and reploughing the lonely furrow. Air co-operation was again used with excellent results. The officer in charge of the convoy would go into the air at intervals and review his handiwork.

When, in the summer of 1923, the Nairn Transport Company started running from Damascus, they joined our track about 30 miles north-east of El Jid, near the Rutbah Wells; and their wheel marks have riven a track which is easy and clear for the pilot to follow. Still, after the winter rains, and in the peculiar elusive lighting of the desert, which has been described as "full of things that are not there," it is not so difficult as might be imagined to lose the track, especially in low cloud and rain in the winter months. And the weather over the track can be like a witch's brew.

I have made a very hasty sketch of the ground work involved in the inauguration of the route, but its importance cannot be over estimated. For without adequate ground organisation, flying over long distances suffers not only from unreliability, but danger. We may next take a glance at the history of the actual flying over the route. From the beginning the idea was to run a fortnightly mail service, that is to say, aircraft would leave from either end once a fortnight. At the same time, the operation of the route was looked on as training for service personnel, and as a means of gaining experience in the suitability of various types of aircraft and classes of material for hot climates; and the idea of a regular mail service was subordinated to that of training, or to the operational requirements of the various units as dictated by the situation in Egypt or Iraq. The air route between Cairo and Baghdad was opened on June 23rd, 1921, on which day the three aircraft accompanying the first desert route survey party reached Baghdad from Amman. On June 30th Group Captain Fellowes flew from Baghdad to Cairo in one day, his actual flying time being 11 hours; and on July 11th Air Vice-Marshal Salmond



Landing Ground IV. A Vickers-Vimy bogged in the desert.

flew from Cairo to Baghdad, also in one day. On July 28th the first consignment of official air mail left Baghdad for London, arriving there on August 9th. On August 4th the first bag of official marked mails consigned "London to Iraq. By air, Cairo-Baghdad," left London and was delivered in Baghdad on August 17th. On October 8th the service air mail was thrown open to the public at a special fee of 1/- per oz. in addition to the ordinary postal charges. On December 13th the special air fee was reduced to 6d. per oz. It now stands at 3d. As time went on, the regularity and, incidentally, as more experience was gained, the reliability of the service increased, the amount of mail carried in the first sixteen months increased tenfold, and the air mail was timed to fit in as far as possible with European sailings.

During 1921 and early 1922 the D.H.9 A's of No. 47 Squadron at Helwan in Egypt and of No. 30 Squadron at Baghdad did the mail. At Heliopolis, which always seems to me like the Golder's Green of Cairo, No. 216 Squadron also worked the mail with twin-engined D.H.10's. As in those days there were no desert refuelling points, the D.H.9 A's had to strap on as many as twelve 4-gallon petrol tins underneath their planes on the bomb racks, and when the petrol in their tanks was exhausted, they landed and filled up from the tins. They looked like veritable Christmas trees, and the external addition of tins adversely affected their performance. No. 216 Squadron was later re-equipped with Vickers Vimys, the type on which Sir John Alcock flew the Atlantic and on which Sir John Ross Smith flew to Australia; and these then operated on the route.

Late in 1921 No. 70 Squadron formed in Egypt and in November flew across the track and settled in Baghdad, where it still is. In March, 1922, No. 45 Squadron followed it. Both these squadrons were equipped with Vickers Vernons with twin Rolls Eagle VIII engines. The Vernon was in effect a Vimy fitted with a saloon hull, capable of carrying up to twelve passengers, instead of with an open fuselage capable of carrying four. During 1922 Nos. 30 and 47 Squadrons gave up the regular service on D.H.9 A's, and No. 216 Squadron in Egypt thereafter shared the fortnightly service with Nos. 45 and 70 Squadrons. The Rolls Vernon with its big saloon hull when heavily loaded in hot weather



Landing Ground X. Two Vickers-Vernons in the desert with the ground wireless station creeted.

had a rather disappointing performance, and several mishaps occurred through pilots either failing to get off or being caught in down currents and having insufficient rate of climb to rise through them. To give it a higher performance, the 450 h.p. Napier Lion was therefore installed in the Vernon, and No. 70 Squadron's Eagle Vernons became animated with the fury of Lions. It happened almost inevitably that this squadron with its higher performance aircraft took over the ex-Iraq mail entirely from about September, 1923, until September, 1924. Meanwhile No. 45 Squadron had also captured its big game and took over the mail until early in 1926. No. 70 Squadron, then rapidly being equipped with Vickers Victorias, which had greater carrying capacity, were more lightly loaded, and moreover designed for the Lion engine, finally resumed the mail duties until the beginning of this year. At that time certain powerful and luxurious threeengined aircraft bearing the insignia of Imperial Airways appeared in the sky about the size of a man's hand, and inaugurated a fully-fledged civil air route.

I will now attempt to give you a description of a pilot's experiences on a mail trip in 1924 or 1925. It is extremely hard to say what experiences are typical, because the contrast between a trip when no unpleasant weather nor any

serious mechanical troubles were encountered, and the occasional one when it was one blessed thing after another, was so striking. As I do not want to give you a narrative in the form : "We flew from A to B, weather fine, engines O.K.," I shall introduce one or two of the difficulties met with. I ask you at



Kasr Kharana and the "track."

the same time not to consider them as an inevitable accompaniment to a mail flight of those days.

In order to give you a scale of distances I am going to superimpose on the mail route an imaginary flight from Penzance, via Plymouth, Exeter, Bristol,



The doorway of Kasr Kharana.

Worcester, Harrogate, Durham, Edinborough, Inverness, the Orkneys, to the Shetland Islands. When mentioning the principal points on the mail route, 1 will indicate the corresponding point in the British Isles. Imagine Penzance is Baghdad. We are standing on a great bare mud aerodrome by two Vernons drawn up in line. We are at the opposite end to the hangars, which are so far away that it is hard to make out the details of them, especially as the aerodrome is covered with clouds of dust raised by other aircraft taking off. We climb into our Vernon, run up the engines, test them on each magneto, and



Two Vickers-Vernons landed by Kasr Kharana.

ascertain that the petrol pumps are working. The dust clouds are a real nuisance, for if the wind is light they hang about like a grey fog, and we may have to wait a few minutes for the dust to subside. Although we are not going to fill up anything like full of petrol till we get to Ramadi, as it is the alternoon of a



Changing an engine in the desert by Kasr Kharana.

summer's day, the aeroplane takes a long run before it is safe to coax it into the air. When we have risen to about 400 feet we try to throttle down a little to take the load off the engines. We turn westwards over the Tigris and fly across a flat plain chequered with yellow and green cultivation in the neighbourhood of the river, which stretches out like a huge crawling snake. It is not long before we see another fringe of cultivation, which borders the Euphrates, on the banks of which lies Ramadi, our immediate destination. Ramadi is 65 miles from Baghdad, and it feels like a gate through which the pilot passes out to new and exciting adventures. Beyond is the open desert with all its mysterious fascination; and few who behold it thus for the first time can fail to experience the slight catch of the breath that comes with the sudden view of the sea from a high place. It seems to be a land with no ending; and it has an unreal atmospheric quality comparable with the sky. Perhaps this is why people call it the "Blue." As we glide down to land on the rather small landing ground at Ramadi we catch a glimpse of grey mud houses in the palm groves by the river bank, and away to the south stretches a pale blue lake called Habaniyah. We taxi up to the little serai where there is a wireless station and a supply of fuel.



Transferring the mail from a forced landed aircraft in the desert. Note the pilot checking the bags with his list.

The mail aircraft had to fill up full with petrol at Ramadi, because the trip from Baghdad to Ziza was just beyond the endurance of a Vernon. After filling up, we shall stay here the night, and wait for the cool air of dawn to take off with our load. As we take off to-morrow morning, carrying two pilots, a fitter, a wireless operator, three passengers, or two and the mail, with petrol for about $6\frac{3}{4}$ hours, our Vernon will weigh approximately 6 tons. We shall be supported by a wing area equivalent to the floor space of a village hall 70 feet long by 20 feet wide, and we shall be propelled by our two Lion engines, giving together at maximum revolutions somewhere near 1,000 h.p., or the power that an ordinary Atlantic type of locomotive gives.

We sleep outside at the foot of one of the wireless masts, and disengage ourselves as best we can from the attentions of the twin-engined sandfly, who also use Ramadi as an aerodrome. We hope a night breeze will spring up, because the sandfly is very lightly loaded, and he cannot land on you in a wind. A hot whisky before turning in is also a help; for during the first half of the night you do not notice the sandfly, and during the second half he becomes laterally unstable and cannot bite you.

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We get up at 3.30 a.m., and those of us who are not too exhausted with dodging sandflies and scorpions snatch a hasty breakfast, for we have a long day ahead. Figuratively speaking, we are now at Plymouth. On leaving Ramadi we climb very slowly, with throttles wide open. Maybe the sun has not yet risen, in which case we can just see the pink flames spouting from the exhausts.

The two revolution indicator needles would be trembling at 2,050 to 2,100 r.p.m., and we would be making sure that we had picked up the track, for there is a fork just after Ramadi which has led more than one pilot astray. Now we are on it, and we ascertain from the wireless operator that the aerial is unwound and that we are working Baghdad. All cultivation has disappeared and we are pushing out into the Blue. The infinite expanse of desert opens before us, appearing to move backwards under us. Its centre of gravity seems to find a locus in the sinuous thread of the track, twisting here and there to negotiate wadis, unwinding itself to the level horizon, which, owing to the high visibility, looks like a wall reared up against the vacuity of atmosphere. The Vernon drums steadily along in the early morning air. The petrol pumps are working, which we see by the float gently oscillating on the dashboard. Both oil pressure gauges are registering over 40 lbs. which is quite satisfactory, and we play about with the radiator shutters till the engines are running at a comfortable tempera-



Ziza Station.

ture. The flat plain is rising imperceptibly beneath us, and although we had tried to ease off the engines a bit to avoid detonation, we find that we have to open them out again to gain the necessary height. We fly close by a couple of vultures which swirl past the wing tip. We have been in the air for over an hour and a half when away on the horizon a pale yellow streak becomes gradually visible. It is the big mud flat at L.G.V., at an elevation of 1,600 feet. We have now climbed to 3,000 feet on our aneroid, so we can throttle down a bit. With the easing of the throttles, the engines take on a more comfortable, complacent note, and settle down to 1,050 r.p.m. quite contentedly. The important thing is to get them running where there is no periodic vibration, and to adjust them so that the aeroplane does not shake. This one can very often do by making them run at slightly different r.p.m. If we are working the wireless, the Vernon which is accompanying us will be flying just ahead so that we can keep him in sight. But it is essential that we shall both individually follow the track, so that the case shall never arise of the blind leading the blind.

We are now approaching L.G.V. We have taken an hour and fifty minutes to do the 112 miles from Ramadi. In England we should at this point be 12 miles beyond Exeter. From our low speed we deduce an unpleasant head wind; but never mind, it will probably turn with us at El Jid, as it often does. If we had taken two hours to reach L.G.V. we should have had to land and take in a few gallons from the desert tank, for which we carry a special key, in case the head wind persisted and we were unable to reach L.G.D., the next refuelling point, 280 miles ahead. Our ground speed is at present just about 60 m.p.h.; so with luck we shall reach L.G.D. in $6\frac{1}{2}$ hours from Ramadi, with a few gallons in hand. But if there is any doubt about it, it is well to follow the old proverb: "A gallon in the tank is worth two in the dump." As we leave L.G.V. behind us, the sun is well above the horizon. The air is rapidly heating up and the Vernon bumps occasionally. We have to open the radiator shutters fully. The little float on the dashboard has dropped, which indicates that the bottom tank in the hull has run out. After giving a few pumps with the hand pump to make sure that the float is not merely sticking, we turn on to one of the two 120-gallon gravity tanks on the top planes. These have calibrated glass petrol gauges, so that henceforward we can tell fairly accurately how the petrol supply is getting on, which will be particularly important when we begin to run low. As it is summer we probably set out from Ramadi in a shirt, khaki shorts and stockings, with a mackintosh on top just to keep out the early morning chill. If we are



A Vickers-Vernon at Ziza Landing Ground.

sensible we are wearing tinted goggles, for the glare of the desert and the perpetual watching of the track tend to fatigue the retina. We now feel that it is time to discard the mackintosh and open the throats of our shirts, as, although the top plane is still keeping the cockpit in shadow, the air feels as if it came out of an oven and gently roasts your hand if you put it outside.

We now send a wireless message to our companion in front asking him how his petrol is getting on. In five minutes or so the wireless operator hands us back the reply: "Petrol O.K., but port oil pressure only 30 lbs." This is not very encouraging, but it may be only a piece of grit under the oil relief valve which will free itself.

Meanwhile far ahead on the track we see what look like three tiny tongues of flame. As we come up with them they turn out to be sunlit trails of dust raised by three cars of the Nairn Transport Company, racing along at 50 to 60 m.p.h. and at about 400 yards distance from each other. To the south there are low hills serrating the skyline, and from the north-east shallow drainage tines are running across the track. In about an hour from L.G.V. we cross the Wadi Hauran, at the Rutbah Wells, which are a meeting place for nomad tribes. It is usual to see several dozen to several hundred black goatskin tents along the edge of the wadi. Now a combined Police Post, Rest House and Wireless Station has been built there, close by a well marked landing ground for Imperial Airways. The massive grey stone building, with an avenue leading up to it from the landing ground, is strangely impressive, and seems to dominate the inhospitable upland 2,000 feet high like a lonely sentinel. At the time of which I am speaking, the Bedouin had the place to himself, and quarrelled spasmodically with his brethren as to the title deeds of wells.

On the western horizon we can see a rugged line of hills, which seem to have curved in from the south and swung across the track. At this point the air track bends sharply south-west, while other tracks continue along valleys like the fingers of an outstretched hand. One of these leads eventually to Damascus, and has had a fatal attraction for unwary pilots. Legend has it that there was once a king of this country, who ruled from Rutbah to El Jid, and who hewed out deep wells at these places. There are still to be seen on the barren hillsides what seem to be remains of walls of houses and of mine shafts. But now the remnants of this civilisation are spread out on the desert like the bones of the old camel that sleeps peacefully at El Jid.

As we follow the turn of the track among the hills, sure enough the wind has changed; and we estimate by our drift that it is now blowing from the south-



A Vickers-Vimy flying on the Air Mail.

east, for the nose of the Vernon is inclined to the south when we keep our shadow moving parallel with the track. The sun now looks down over our top plane and scorches our necks and wrists. It sets up a dull ache in the left shoulder blade just where it projects from the spine pad which the cautious pilot wears. We drink some lemonade from a thermos flask and eat some pheasant and ham sandwiches. The wireless operator passes up a weather report from Amman saying that the best height to fly to obtain a favourable wind is 6,000 feet; but as that height is beyond our capacity to reach, the information leaves us hopeful but unenthusiastic. We then get another message saying that the petrol in the tank at L.G.D. has run out owing to heavy demands by armoured cars, but that a convoy is on its way to fill the tank and should be there by noon. The air by now is thoroughly disturbed, and the Vernon in front is shooting up and down like a lift. We constantly have to work the controls to keep anything like an even keel. The thermos that we have propped up on the floor of the cockpit without its cork in falls over with a violent lurch and spills its valuable contents. We glance back at the petrol gauges and turn on to the other top tank to even up the supply in each. We feel that if only a cloud would cover up that sun for five minutes, things would be incomparably more bearable. The drumming of the engines makes us feel a little sleepy, and we seem to have been flying along a track of infinite length. Now and then it eludes our gaze, and we have to zig-zag slightly to pick it up again. One by one the landing grounds pass

underneath. We check the times and find that our ground speed is now 75 m.p.h. We have left the hills behind, and have passed over El Jid and out on to the upland 120 miles wide, which sometimes looks like an enormous tiger-skin spread out. The curved markings are caused by the sparse vegetation running across the paths of wadis. At other times it looks like hard polished metal reflecting the brazen sun. To-day the portion of the desert within reach of our eyes appears as an amber disc, some ninety miles in diameter, to which the rocking and swaying of the aeroplane has given a reflection of its own motion.

Our position now would correspond to a few miles beyond Worcester. The wireless operator passes up a message to say that the Director of Civil Aviation is on his way to Baghdad, escorted by two D.H.9 A's and that he passed L.G.D. an hour ago. We make a rapid mental calculation and come to the conclusion that we shall cross him at L.G.N., the highest point on the track, just over 2,900 feet. As we approach this landing ground we see three tiny specks in the sky, which materialise into aircraft, and the two companies of aircraft move past each other like ships sailing on opposite courses across the open sea. In five minutes the Director and his escort are swallowed up in the sunlit distance and we are alone again.

Suddenly a stream of red flashes out from the Vernon ahead, hangs in the air for a moment, and then tumbles downwards like a dull spark. This is a red Very light, and means that he is forced to land. However, the country is good, and we watch him circling downwards and his shadow gradually drawing nearer to him until a little trail of dust shines out and shows that he is down. He has the mail on board, so that unless he can rectify the trouble at once, we must land too. We circle round meanwhile to watch for his ground strip signal. Soon the door of his hull opens, two minute black figures hop out and put out a tee in white cloth strips. We send out a wireless signal giving our position, wind in the aerial and throttle down the engines. The Vernon drops her nose. It is very gusty, as we can see from the erratic course described by the smoke from the smoke-candle that the men on the ground have just lighted. We must glide down with a good margin of speed, as the air is thin and hot; and although we have got rid of over half a ton of petrol, the ground is more than 2,000 feet high, and if the air density is considered, its equivalent height may be anything up to 4,000 feet. We find that the Vernon drops quickly when we come to flatten out; in fact, the ground seems to rush up towards us. However, we effect a landing without positively damaging anything or colliding with the camelthorn, and taxi up beside the other Vernon.

It is, of course, the oil trouble that he reported to us by wireless at L.G.V. The port oil pressure has fallen to zero, yet there is plenty of oil in the tank and the engine is not overheating unreasonably. It may be a piece of grit in the relief valve, or it may be the oil gauge itself. A mechanic is unscrewing the valve. Soon it is replaced and the engine is run up. The needle in the gauge only makes one or two ineffectual flutters. The radiation from the ground hits us in the face like something solid, and we keep wanting to take refuge in the shadow of the planes. Someone picks up a spanner that has been left in the sun and hurriedly drops it again as it is too hot to hold. We decide that the oil gauge must be defective. We fortunately have a spare one. The offending gauge has to be renewed amid much vituperation and leakage of oil, and when all concerned have got in a thorough mess and a worse temper, the job is complete and the engine restarted. The needle spins round at once and assures us that all is well. But a valuable hour has been wasted before we are in the air again. In a quarter of an hour or so we see ugly-looking black hills ahead. This is the beginning of the basalt country. The belt of basalt where it crosses the Mail route is about sixty miles wide, and runs northward into the Druse country and southward towards the oasis of Kaf. The black basalt caps all the hills which rise gaunt and flat-topped like grim slag heaps. This country always imparts an eerie feeling. Its barrenness, its utter loneliness seem to embody something sinister. It makes one imagine the primal twilight of the first toil of creation. Originally the lava appears to have welled up in some great seismic disturbance, and it has spread itself as a thick sheet over the limestone rocks. In the course of ages it has been gradually eroded away from the interspaces between the hills. Owing to its extreme hardness, these interspaces are covered with basalt boulders often more than two feet in diameter. These have rolled down the hills and have ranged themselves like giant cobble stone over miles of comparatively flat-bottomed valleys, amongst which sparse thorn and scrub find a precarious existence.

A very noticeable feature of the basaltic region is the existence of extensive mud flats. These occupy shallow depressions, and are the result of the evaporation of drainage water loaded with sand and a fine reddish mud which has collected in these depressions after years. They are frequently of an elliptical or kidney shape, and anything up to two miles across. They have a surface like a billiard table, and when dry make perfect landing grounds. But heaven



Two Vickers-Vernons landed by the mud flat at Landing Ground F.

help the pilot who lands on one when it is really wet. Luckily this can be judged pretty well from the air by their colour; and in addition they make characteristic and conspicuous landmarks, in sharp colour contrast to the surrounding country. In hot weather the glare from them is excessive, and the pilot has to use great care in landing on them, as he is apt to misjudge the surface in the same way as that of the water when it is without a ripple. The best way is to touch your wheels near the edge, or to drop a smoke candle and land close to and parallel with the trail of smoke.

The kind of country I have attempted to describe unfolds itself beneath us as we fly westwards through the turbulent air. Our aneroid shows that we are ballooning up and down about 500 feet every now and then, the crests of the invisible waves seeming to be roughly at five miles distance from each other. As we pass over the well-known kidney-shaped mud flat at L.G.F. with its whalebacked basalt hill to the north of it, we have been $5\frac{1}{2}$ hours in the air since We have roughly another half-hour to go to reach L.G.D., leaving Ramadi. where the petrol supply is. We have now ten gallons of petrol in one top tank, twenty in the other, and fifteen in the emergency tank, so that we should have a little over fifteen gallons in hand on reaching L.G.D., which is none too big a margin on a flight of nearly 400 miles. We wend our way through this country of the dead until we sight the twin mud flats at L.G.D., and on approaching them we catch sight of the convoy of motor transport by the desert tank. We send a wireless message reporting that we are landing to re-fuel, wind in the aerial, fly over the landing ground and drop a smoke candle to ascertain the direction of the wind for landing. Here we have to be very careful of the camelthorn which grows in quite large bushes, and is such a deadly enemy to our tyres. It is not long before we are chatting with our friends of the armoured cars and hearing the latest gossip of the desert.

We take in about 80 gallons of petrol, rapidly inspect the engines, and push on to Ziza, 86 miles ahead. If we had started at Penzance, L.G.D. would be equivalent to Durham, and Ziza to Edinburgh. We pass over the pools at Kasr Azrak, which in winter develop into quite a large lake. We are now in Transjordan, and the sunlight picks out the old fort of Kasr Kharana, which is one of a series running north-east from the Dead Sea, built possibly by the Romans, and used subsequently by the military forces of the Caliphs of Damascus. Kasr Kharana is a square fortified building standing about 200 yards south of the track. When I visited it, it was full of skeletons.

We find an escort of armoured cars waiting for us at Ziza station, together with a small party from Amman to help fill up the petrol tanks. The aircraft always had to be filled laboriously by hand out of four-gallon tins of petrol and five-gallon drums of benzol. Assuming that we were using an 80/20 mixture, we should need five four-gallon tins of petrol to each five-gallon drum of benzol. On the westbound journey we usually took in 300 gallons of mixture, which would give us a good five hours' flying. This involved manhandling sixty tins of petrol, twelve drums of benzol, and, say, two drums of oil per aircraft. To fill two aircraft in this way, and give the aircraft and engines a rapid inspection, normally took two hours.

On this occasion we spent the night in the little upper room of the railway station, which has a few iron bedsteads and mattresses. There are not enough to go round, so those that have beds go without mattresses, while the remainder spread the mattresses on the floor. The aircraft are taxied down as near the station as possible, and securely picketed down by the wing tips and tail portion of the fuselage; for if a sudden dust storm gets up in the night, it is apt to carry all before it. The control wheels are also securely strapped up to prevent the ailerons lashing up and down and stretching the control cables. There may be a certain amount of work to be done, and this is willingly carried out by tired hands, if necessary on into the darkness with wandering leads and electric bulbs, or with the help of headlights of the desert tenders. To-morrow morning we shall have to cross the Judæan Hills and the Dead Sea, en route for Cairo. It is Friday night, and the mail train does not leave Cairo until 6 p.m. on Sunday evening, so we have plenty of time. We check over the mail bags carefully, and place a guard over the aircraft. The wooden labels on the mail bags from Baghdad marked "London City," and despatches from Persia, destined perhaps for Westminster, used to give me a queer feeling in those To-morrow, when we pass over Beersheba in Palestine, we distant places. should have arrived at Inverness on our imaginary trip from Penzance; by the time we have sighted Kantara on the Suez Canal we should have reached the northern shores of the Orkneys; and finally, when we fly down the eastern fringe of the Nile delta and see in the distance the minarets of the Mahomet Ali mosque in Cairo, we should have arrived in the Shetland Islands. Accordingly, the length of the Mail route, 860 miles, would just have taken us from Land's End to the Shetland Islands. And this trip was accomplished once a fortnight in fair weather or foul, in intense heat and sometimes in bitter cold, as a part of the Squadrons' normal duties. The mail itself was practically never late, which meant that one aircraft at least practically always got through in the scheduled time.

I have not had time to refer to the excellent Signals service, nor to the Meteorological service, except incidentally. It is no exaggeration to say that without wireless the task would have been impossible to carry out with a reasonable margin of safety. The modern civil aircraft, with radial air-cooled engines and a 30 per cent. higher cruising speed, now fly over the route almost as easily as they fly from London to Paris.

There was a time when the mails used to travel from Baghdad to Damascus on the backs of racing camels. Compared with the centuries during which that method of transport remained unchanged, the coming of air transport seems instantaneous. But the 1400 h.p. air liner as we see it in 1928, more wonderful in construction than those monuments of the past which watch over the desert, was not conjured up by the rubbing of a lamp. The rare and heated atmosphere of Iraq put every difficulty in the way of getting into the air at all.

The following story is told of an officer coming home on leave. He was travelling as second pilot in a twin-engined aircraft. They were attempting to take off in the heat of the day; and after running over the ground for what seemed to him an interminable distance, he turned nervously to his first pilot and said: "I say, old chap, if you are going to motor home, I wish you would go a bit more slowly."

If I were asked to sum up in a few words what I thought were the difficulties of the Mail which left the sharpest impression on my mind, I should say, first, mechanical troubles with water-cooled engine installations; second, tyres; and third, the laborious hand-filling of petrol tanks. But one impression that will remain when all those are blotted out will be that of the deep satisfaction we got out of those mail trips over the desert, in which such trials as there were only served to beget enduring friendships.

DISCUSSION

The CHAIRMAN said Wing-Commander Hill had given an extremely interesting description of the pioneer work which was carried out by the Royal Air Force in opening up the only link so far in what all hoped would be a great chain of air routes operated by civil aircraft. The paper had certainly illustrated the great benefits which the Royal Air Force had conferred, and, he was sure, would continue to confer upon the civil flying movement.

Sir ARNOLD WILSON (late Civil Commissioner Baghdad and Political Resident in the Persian Gulf) joined with the Chairman in congratulating the lecturer upon an extraordinarily good lecture. He had listened to many lectures by members of the Services, but did not remember ever having listened to a lecturer who had conveyed so well to his audience his own feelings, as well as an idea of what he had seen and what the country was like. He had struck a new note in lecturing, and it was a very pleasant one. The lecturer's references to the early history of the route, however, did not go back as far as they might have done. The first flight from Baghdad to Cairo, via Damascus and Ramleh, was undertaken ostensibly to convey him (Sir Arnold) to Cairo, in February, 1919. The members of the party were Squadron-Leader Boyd, Flying-Officer Lapraik, and the late Flying-Officer Nuttall, and himself as passenger. They had two D.H.4's, both old and in none too good repair. The route was from Baghdad to Al Bu Kamal, thence to Palmyra, where they were forced to land to make engine adjustments, and had great difficulty in getting off owing to the hummocky soil, and thence to Damascus, where torrential rains-which had kept them there for some days -had flooded their hotel to a depth of 4ft. From there they set off for Ramleh, but when about half-way there the machine in which he was travelling developed trouble, and had to descend in a fog on the hills around Lake Galilee. By God's grace, they happened to strike a patch of green on the slopes of the hills, and, after carrying out the necessary repairs, resumed the flight. At Tul Karaim they had to descend again. The heavy rains had turned the aerodrome into a morass, and the machine, when landing, had turned on to its nose. They pulled the tail down, cleaned up the "prop," and subsequently had resumed the flight. There was a further forced landing, which had nearly ended in disaster, just outside Ramleh, but they eventually reached Cairo, and were careful to say nothing of

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their mishaps, lest it might interfere with the return journey. He had returned to Baghdad six weeks later, with D.H.9A's, via Aleppo and Deir ez Zor.

The second flight across the desert from Baghdad to Cairo was undertaken three months after the first, *i.e.*, in May. The two machines used were D.H.9A's, but one of them had konked out half-an-hour after leaving Baghdad, and his pilot, Mills, a young man of not more than eighteen summers, had performed the flight alone, with a non-stop run from Ramadi to Damascus, a flight which had done him the more credit because he had never previously crossed the Desert and had never been further north than Ramadi; moreover, he had had little or no experience of long-distance flying alone. They had reached Gantara that evening, and had for the first time accomplished the Baghdad-Egypt flight in a single day. The Royal Air Force had many things to their credit, but nothing was more creditable in Mesopotamia, he considered, that the way in which they had started and worked the Air Mail.

He (Sir Arnold) had flown in the Middle East as a passenger rather more than four hundred hours, mostly between the years 1918 and 1920, and he believed he had landed on every aerodrome that had ever existed in Mesopotamia, and upon a good many patches that were never designed to receive aircraft; indeed, he had had nine aeroplanes smashed under him at different times, not including miscellaneous minor mishaps. None of those crashes were due to climatic difficulties, however. The furthest north he had ever reached was Qazvin, the furthest south Kuwait and Bushire, and the furthest west Cairo and Suez. He had been flown at all heights up to about 15,000ft., and in all weathers, and his experience was that, given a competent pilot, there was nothing formidable in the climatic conditions, even at their worst. Indeed, he had been very much impressed by the general suitability of the Middle East for aerial transport generally. Fog was almost unknown; the weather could be predicted ahead with considerable accuracy, and was the same over wide areas; the rainfall varied from an inch or so at Cairo to an average of six inches at Baghdad and Bushire. Aerodromeswere easily found and easily maintained. The heat at ground level, of course, was great during the summer, and a pall of hot air hung over the whole country at a height of about 3,000ft., so that in summer the air temperature was actually hotter at 3,000ft. than it was at 500ft.; but above 3,000ft. the air rapidly cooled, and at 5,000 or 6,000ft. it was as cool and as pleasant as could be wished. and the sun's rays were little hotter there than on the ground in England. From this point of view aviation had undoubtedly a great future.

He believed that the early trial trips he had described were responsible for the warm advocacy of the air route at the Cairo Conference in 1921 by Mr. Winston Churchhill, to whose vision and foresight we owed much. But even he could scarcely have brought the air route into being had he not been at that time both Secretary of State for Air and for the Colonies, and thus responsible for the Middle East. Inasmuch as he had held both jobs, he was in a position to give instructions to himself, as from one office to the other, and was able to get the thing through in a few weeks, whereas if conditions had been otherwise, it might have taken many months. It was now a well recognised route which, he believed, had had as good a record during the last six years for reliability as any route in Europe, as well it might, for the conditions were essentially good. Mails from Cairo to Baghdad were transported in as many hours by air as they were days in the past. But this section, 866 miles long, was only a link in a long chain, and that chain, as would be seen from the map, must extend to India either through Persia or down the Persian Gulf. If amphibians could be used, the route down the southern side of the Persian Gulf, which was surveyed last year, had much to be said in its favour. The harbours of Kuwait and Bahrein, Abu Dhabi and Gwadar were land-locked, and suitable for landing in any weather, as were several intermediate harbours, and the

risks that would be run by passengers were no greater than those involved on the route along the Persian side of the Persian Gulf through Bushire and Bandar Abbas, which was in some ways inevitably unsatisfactory. To begin with, it was exceedingly hot in summer, and for more than three months in the year there was a strong north-west wind sweeping down the Gulf, which would handicap machines flying from India, and monsoon conditions in June, July and August on the last thousand miles to Karachi would make things difficult. The ground was broken, good aerodromes were none too common, and if a machine were obliged to land and required assistance it would take weeks to obtain spare parts, etc., as there were no motor roads along the southern shore, nor were there likely to be any. These objections applied in some degree to both sides of the Gulf. The only alternative was to fly across Central Persia, through Kermanshah and Hamadan to Ispahan and Kerman, and thus to India, or from Baghdad to Ahwaz, Shiraz and Kerman. The most serious objection to both these routes was the height of the Persian Plateau, which averaged 5,000ft., whilst no route for aeroplanes could be devised which would altogether avoid the mountain ranges, which were about 8,000ft. high, and this was bound to be a very serious handicap in present circumstances for commercial flying, but it was a handicap which had not deterred the Junkers Company.

On the other hand, except for a month or six weeks of light snow, the climate throughout this sector of the route offered less difficulty than the Persian Gulf route, and there were prospects of local mail and other traffic on this route which the Persian Gulf route did not offer. Therefore, much as we might regret the attitude of the Persian Government in regard to the air route along the Persian Gulf, it was possible that further research and technical developments would put us into a position to secure a connection between Baghdad and India, either by following the southern shores of the Persian Gulf, or by reaching a compromise with the Persian Government in regard to a central Persian route.

The position adopted by the Persian Government, as he understood it, was that whilst they had adhered to the International Air Convention of 13th October, 1919, it had not yet been ratified by the National Assembly, and was not in present circumstances likely to be ratified. Inconvenient as it was to us to have our well-laid plans frustrated by what must seem to a layman to be a pure technicality, we must be chary of imputing bad faith to foreign Governments in such matters. It was no new thing for nations to be parties to international conventions and then to fail to ratify them. As stated in the House of Commons on February 28th, France had voted for nine Conventions which she had not thought fit to ratify; Czecho-Slovakia for twelve; the Netherlands for thirteen; Norway for ten; and Great Britain for four. Persia's record in these matters was probably at least as good as that of any other European nation, except Great Britain. The fact was that international conventions devised at Geneva were apt to go considerably further than national Governments were prepared to go, and hitches of this sort were in present circumstances inseparable from the running of aerial transport systems through foreign lands. The truth was that we could not have an "Imperial" airway which traversed a succession of foreign countries. It ceased to be "Imperial," and became an international airway, and the needs of aviation would probably be best met by the formation of international airway companies which would not be distinctively connected with any particular country. He saw no other solution, nor did he think that our national interests need suffer. The needs of aviation would probably be best met thereby, our own requirements could be met, and he fancied that we should find it very much easier to deal with foreign Governments, such as the Persian, the Turkish, and so on, if the services from Europe eastwards were placed on an international rather than what was considered as an "Imperial" basis.

In again expressing his satisfaction in having listened to Wing-Commander

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Hill's lecture, Sir Arnold expressed the hope that on some future occasion something more might be heard as to the very great achievements of the Royal Air Force in Iraq during the last few few years, for he did not think anything like enough had been said or written about it. It had been a great civilising force, and the most effective for the maintenance of law and order that had yet been known.

Air-Commodore BORTON (who carried out many flights in the early days of these big Imperial adventures) said that, owing to lack of sufficient time, it was inevitable that Wing-Commander Hill should have been unable to give many of the details with regard to the construction of the track across the desert. He would like to place on record, however, the fact that the party engaged in the marking of the track had received their supplies by air. The marking of the track from Ramadi to El Jid had occupied about six weeks; they had started out with a Fordson tractor, a plough and one or two cars, and during the whole period they had received the whole of their food, water and petrol, as well as other supplies, by air. On one occasion the big driving wheel of the tractor was broken, and a new wheel, about 5ft. in diameter, had been transported to the party by air. It was rather remarkable that the party should have been supported entirely by supplies transported by air.

Wing-Commander HARRIS said he would like to criticise the lecturer on one or two points; everybody had patted him on the back so far, and it was high time that somebody took an opposite line. (Laughter.) A good deal had been said about the amount of mail, and so on, carried by the machines, but the lecturer had omitted to say that the chief load carried by the machines on the return journey from Cairo to Baghdad consisted of kippers and haddocks, from the Nile Cold Storage Company, for consumption in the Officers' Mess. Anything more unpleasant than a case of haddock when one had been forced to land for two or three days, with a ground temperature of about 100 degrees, he could not imagine. (Laughter.) With regard to the lecturer's recommendation, when landing on a mud flat, to drop a smoke candle and to land parallel with the smoke from it, he said he had not seen that done, but he had seen the results of it being done. The atmospheric conditions on this route were very queer at certain times of the day, and sometimes the smoke would ascend vertically to a height of about 40ft., and then spread out more or less horizontally, so that if one could not see the surface of the mud flat clearly, and tried to land parallel with the smoke, one would have to go a very long way before reaching the surface. As to the possibility of operating the route by night, he said he believed it could be done if a few Bedouin-proof lighthouses were established. He believed arrangements could be made for the lights to be turned on automatically when the sun went down, and turned off automatically when the sun rose, and the lighthouses would then need attention only once in a few months. He assured would-be passengers that they would find it much more comfortable to fly across that route at night than in the daytime, and it would speed up the Service.

Colonel EDWARDS (Department of Civil Aviation), after thanking the lecturer for his interesting lecture and for the graphic manner in which he had described the route, said that the officials of the Department of Civil Aviation were very deeply sensible of the debt they owed to the Royal Air Force for having opened up the route, and fully realised the difficulties that had had to be met in the early days. Dealing with the events since the Royal Air Force had handed over the operation of the route to Imperial Airways, Ltd., he said the route was opened for Imperial Airways, Ltd., by Sir Samuel Hoare (Secretary of State for Air), who was accompanied by part of his staff and by Lady Maude Hoare. The party had left Croydon on December 27th, 1926, and had arrived at Delhi on January 8th, 1927. They had flown absolutely to schedule except

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for the last stage before Karachi, where they had run into such heavy dust storms that they had had to turn back, and were delayed for a day. A passenger in the machine was Sir Geoffrey Salmond, who had flown to India to take over the command of the Royal Air Force there. This flight was followed by a regular fortnightly service from Cairo, the original intention being to operate right through to Karachi, but, owing to the difficulties with the Persian Government, the service at present extended only as far as Basra. In April, 1927, it was decided to run a weekly service, and from that time onwards it had been operated once a week with the utmost regularity and reliability, the machines carrying constantly increasing loads backwards and forwards. It was now possible -in fact, it was quite the ordinary course of events-to leave London on a Thursday by the boat train one would normally travel by when going to the East, proceed to Marseilles by the ordinary route, and continue by boat from there to Port Said, reaching the latter place on the following Wednesday morning; then to proceed to Cairo, leaving there by aeroplane at 6 o'clock on Thursday morning, and arriving at Baghdad about 5 o'clock in the afternoon; then leaving Baghdad at 7 o'clock on Friday morning, and arriving at Basra at about 10.30 that morning. During the summer of 1928 it would be possible to speed up the journey by leaving London by air at 9 o'clock on a Friday morning, instead of by train on Thursday, arriving at Marseilles on the Friday evening; then to proceed in the manner already indicated to Baghdad, but, instead of spending the night there, to continue the journey to Basra, arriving there at about 10.45 p.m. on Thursday. That would facilitate the mail service, and would involve night flying.

Mr. Coxon (of the Anglo-Persian Oil Company) said he had travelled on the Cairo-Baghdad route as a common or garden passenger, and a feature which impressed him was the enormous amount of care taken to ensure the safety of the passengers and the continuity of the service. The first thing one noticed at the aerodrome at Cairo was the careful examination of the machines and the weighing of the baggage. Owing to the excess baggage of himself and his fellow passengers, it was found necessary to reduce the quantity of petrol carried by the machine, which indicated that the examination of weight had been developed to a fine art. The pilot of the machine was Lieut. Travers, who, at every stop, had examined the machine completely and had taken great care to ensure that its reliability was maintained. Another feature that had impressed him was the enormous amount of reserve power which the machine possessed. This being his first flight, he had expected the machine to "dribble" off the ground, but it had left the ground with ease, and it seemed to him that it had far more power than was needed, at any rate for the winter service, although in the summer the reserve of power might be necessary. A criticism he made, from the point of view of a passenger, was that the chairs in the machines badly needed improvement. They were very uncomfortable; and not at all suitable for a 10-hour journey. Passengers, when they paid for service, wanted comfort, otherwise they would prefer to travel by motor car, and if Imperial Airways, Ltd., did not improve the seating accommodation in the machines their passenger traffic would be adversely affected.

Squadron-Leader ENGLAND said he was glad Wing-Commander Hill had emphasised the reason why the ploughed track across the desert was necessary, as he had frequently been questioned by a large number of intelligent people connected with air transport as to why pilots could navigate over the sea, yet could not navigate over the land.

He was greatly interested in the vivid description of the trip from Baghdad to Cairo, because his personal experience of this trip took him 5 days, and on one occasion there had been thirteen forced landings in one day. Doubtless this was due to the fact that the journey was commenced on the 13th of the month. Flight-Lieut. G. G. H. DU BOULAY said that he had accomplished the journey as pilot at one of the worst times of the year—in January, and that was the first time he had flown over the route. The weather was fine when the mail machines left Ramadi, until they approached L.G.R., which was very nearly the highest point of the route. Here the weather became very cloudy and gradually grew worse until the machines were forced down to within about 50 feet of the ground, which necessitated the winding in of the wireless aerial. It was very difficult to follow the track at this height, but luckily the pilot of the other machine had very considerable experience of the route; and it was possible to carry on by following his machine very closely. He hoped, however, that some means could be found whereby it would be possible for pilots to follow the track more easily in really bad weather as is often experienced during the winter months.

General GROVES, who recalled that he had had the honour, when at the Air Ministry, to authorise the first Royal Air Force flight over the route immediately after the Armistice, said he was impressed by the remarkable efficiency. -100 per cent.—with which the route had been operated during the past year. At the same time, it was sad to think of the lost opportunities for developing air routes in the East during the last nine years, after the magnificent pioneer work of the Royal Air Force in surveying the route and operating part of it. He had just heard that only ten days previously the Russo-German Moscow-Teheran line had been extended to Bushire, and he supposed that the Russo-German concern would now push along the Persian Gulf and would continue the route to India. Then the Indian Assembly would say: "Why should we not buy the excellent all-metal German machines at half the price of the British "? and so we should lose opportunities for marketing the products of the British aircraft industry. He deprecated the procrastination of the last eight or nine years, and said it was essential to arouse public interest to ensure that this procrastination should not 'continue. We could have obtained all the flying rights we wanted in Persia if we had taken action earlier, for we had had the whole theatre to ourselves for nearly eight years with the Royal Air Force on one side, the Indian Government on another and the sea on a third. Not only was Persia very important to us from the flying point of view, for it provided the best route to India all the year round, but before it came into the picture from the flying point of view it was a very important sphere of political influence. Its importance has now increased, owing to the development of the Persian oilfields and the ever-increasing military and commercial importance of oil. As the results of Russian political influence, backed by German commercial enterprise, we had experienced a very nasty set-back as regards our aerial contact with the Far East. We had the finest Air Force in the world, and in commercial aviation we had the finest quality in the world, but in each case quantity was lacking and was, in fact, insignificant. He ventured to say that if the Germans had had the same opportunities as we had had for developing air routes within the Empire they would have had about 60,000 miles of air routes in operation to-day. At present they had about 15,000 miles of air routes against our 2,000 miles, which latter included the Cairo-Basra route. It was vital that we should educate public opinion in this country to demand a really go-ahead policy. If we were not allowed to go overland in certain places, let us resort to the alternative of the flying boat. As an ocean State we possessed special facilities for the employment of flying boats in commercial aviation, but this form of development had been neglected. The need for energetic action to make up for lost time was now most urgent.

Lord THOMSON OF CARDINGTON (late Secretary of State for Air) said he had had no hairbreadth escapes from disaster on this particular route. On the occasion on which he had flown over it he had experienced "roses all the way"; there was not one hitch, and the machines had arrived at each stopping place within ten minutes of schedule time. The party had stopped at Ziza, and had then travelled on light machines to Amman, where they had had dinner with the Emir Abdullah; they had then returned to Ziza and had continued the flight to Baghdad, stopping at Ramadi for a drink, so far as he was concerned. He had flown about 5,600 miles in rather less than a week, in various machines, and could not remember a single occasion on which any plan of action had been in the least upset. Wing-Commander Harris was his pilot on the return flight, the machine used being a Vickers Vernon; Harris was not at that time a Wing-Commander, and it was pleasing to know that he had received well-merited promotion. His experience of flying with the Royal Air Force was apt to spoil one for flying under ordinary conditions. He did not remember ever having seen previously anything like the pageant which marked his arrival at Baghdad, when about 12 Vickers Vernons were in the air alongside, as well as 18 or 27 escorting planes. Sir Henry Dobbs, the High Commissioner, had said that he had never seen anything like it in his life. The real point about the route, of course, was that it was only one link in an immense Empire chain, which would go much further than India eventually. It was a very valuable link, and, as had been pointed out, it had its political complications. It was for that reason that he had listened with very great interest and profit to the remarks of Sir Arnold Wilson. Those remarks were well worth pondering, because there were very few people who knew more than Sir Arnold about conditions in Persia and that part of the world. It was a pity that his advice had not been taken in the past. When he (Lord Thomson) was at the Supreme War Council it had been his privilege to read a great many of Sir Arnold's reports, and, whether or not one agreed with him on every point, only a very foolish person would not weigh well and ponder any observations that were made by Sir Arnold on this particular subject, and, no doubt, on others. It would appear that night flying would solve a great many of the problems met with in the operation of the air route across Arabia. Although he knew nothing of the details, it did appear that the climatic conditions at night would be almost ideal. He had not experienced trouble with sand flies, nor had he slept in the fortress which contained the skeletons, but he would have thought that we had now reached a point at which, instead of wasting time in the manner indicated, we could certainly fly across the desert by night; it would be a very wonderful experience. The development of the route, of course, was all important, and it was now in most competent hands. The cruising speed of the Vickers Vernons, he believed, was about 70 m.p.h., but the civil machines travelled more quickly, and Sir Henry Dobbs had flown from Cairo to Baghdad in rather less than eight hours. In congratulating Wing-Commander Hill upon his graphic lecture, Lord Thomson said he had certainly struck a new note in lecturing, and had brought back to him (Lord Thomson) some of the most agreeable memories of his life.

Wing-Commander HILL, who briefly replied, said he had been particularly fortunate in having provoked a discussion which had thrown a good deal of light upon the problems connected with the operation of the Air Mail route from all sorts of aspects. The really valuable part of the proceedings had been the discussion, because people who had had all sorts of experience in the Middle East, and particularly of the area served by the Air Mail, had expressed their opinions in a most illuminating way. Sir Arnold Wilson—than whom no one was more qualified to speak—had put the matter in its true perspective, for, indeed, we must never forget that this route was a link in the great chain of communications which we hoped would run across the world. Air-Commodore Borton had referred to the manner in which the aeroplanes had fed the ground parties, and, of course, the comradeship that existed between those in the armoured cars and those in the aeroplanes was a great feature. In Iraq they were all in the same Service. Occasionally, when a ground party had been running

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out of supplies, an aeroplane had been sent out to them to drop food and water by parachute, and the arrival of an aeroplane in those circumstances had been likened to the arrival of a ship into harbour. Lord Thomson, in referring to the cruising speed of the Vickers Vernons as being about 70 m.p.h., was perhaps a little optimistic; the average for 12 months over the Air Mail route had been found to be 65 m.p.h. The success of Lord Thomson's trip was very largely due to his pilot, Wing-Commander Harris, who always made his passengers comfortable and safe. His own first experience was gained under the care of Wing-Commander Harris. There were other things than kippers taken back to Baghdad by air, as for example, a litter of sucking pigs, which had now reached the fourth generation. Night flying, he agreed, was very important, and he personally was an enthusiast in this direction. Wing-Commander Harris had done a tremendous amount of night flying in Iraq. Not so long ago the whole route had been flown over at night, and he believed that if a chain of three or four lighthouses were established, night operation could be carried through successfully, and the conditions for flying would be very much better on the whole. The journey from Cairo would average probably not more than ten hours.

A hearty vote of thanks was accorded Wing-Commander Hill for his paper, and the meeting closed.