Helicopter Operating Experiences

By A V J VERNIEUWE

A Lecture presented to The Helicopter Association of Great Britain, on Friday, 5th September, 1952, at The Institution of Civil Engineers, Great George Street, London, S W 1

In the Chair

PETER MASEFIELD, M A (ENG), F R Ae S

Mr NORMAN HILL briefly outlined the proceedings and drew the attention of the meeting to the presence of Mr E MENSFORTH, C B E, M A, M I Mech E, F R Ae S, the new President of the Association, this being his first attendance as President Mr MASEFIELD was then called on to open the meeting

INTRODUCTION BY THE CHAIRMAN

Mr President, Ladies and Gentlemen This really has been quite a remarkable week in Aviation, and I think perhaps this evening is a fitting climax During this week we have seen some excellent new aeroplanes, both the old fashioned fixed wing types (even if they do have jet engines) and, of course, the " shape of wings to come "—a number of new helicopters I personally feel after seeing the Bristol 173 in the air that no one can now doubt that one important trend of the future of air transport—and, indeed, of transport as a whole—is in the direction of the helicopter We seem to have got out of the " gold fish bowl " stage at last with helicopters to something which looks like a real vehicle I cannot help thinking, having seen the " 173 " humming along as if on rails that here is a reincarnation of those old tram cars which said farewell on the North Bank only a few weeks ago Surely the soul of the tram (I have always been given to understand that a tram has a soul !) is now translated in heavenly form into this " Flying Tram " —the Bristol 173—deserting the chilly North Bank for the more salubrious South Bank

Today too we have made another step forward in the progress of the helicopter For the first time a Minister of Transport, as well as of Civil Aviation, has flown from the centre of a Capital City on one of his, more or less lawful, occasions in a helicopter out of the South Bank Rotor station Mr Lennox-Boyd flew in a B E A helicopter to Lynmouth this morning

Incidentally I use the word rotor station advisably We believe that such a name is more appropriate than are those etymological abominations " air stop "—air being the last thing that stops—or even worse " heliport,"

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words which must cause Dr Johnson to rotate or—should I say " auto-rotate " in his grave

Well now, as a climax to this week we have, what I am sure is going to be an extremely interesting and valuable lecture by Mr Vernieuwe on " Two years of Scheduled Operational Experience of Helicopter Mail Service " This lecture, as Mr Vernieuwe has already said, is in the form of an appetiser for the Sixth Annual Dinner which will follow at Londonderry House

I would like to offer on your behalf a particularly warm welcome to Mr Vernieuwe, who is President of Operations of Sabena, the Belgian Air Line I extend that welcome not only on behalf of all of us in the Association but also if I may, as a representative of almost the only other major international airline operating helicopters in scheduled service to day

I think Sabena and B E A together are in fact the pioneers of the World's airlines in operating helicopters and I hope that one of these days we shall be operating nearly as many helicopters as fixed wing aircraft

We have a great admiration in B E A for what Mr Vernieuwe is doing, both on the fixed wing side and on the rotary wing side of the business Mr Vernieuwe was born in Antwerp in 1916 and I am informed that in his early days he specialised in the study of " L'humanite ancienne " particularly in the Latin and Greek Sections Since then he has obviously transferred his studies to one or two more up to date matters and as a result of that there is no question of this being " all Greek " to him !

He served with the Belgian Air Force from 1936 onwards and in 1940 he directed the evacuation of Allied Agents and Airmen to England and was later with R A F Bomber Command and R A F Transport Command Later he graduated to Civil Aviation, joining Sabena in 1945, as Head of Department of Operations In 1947 he became Vice-President of Operations and Sabena's helicopter operations are under his direct control

I know we are going to look forward very much to hearing what he has to tell us about some outstanding contributions to helicopter development during the past two years

I hope, too, that some of our own Post Office people are here to hear some of the things he is going to talk about on the advanced thinking of the Belgian Post Office Ladies and Gentlemen—Mr Vernieuwe

MR VERNIEUWE

Mr Chairman, Ladies and Gentlemen—first of all may I express my thanks to the Helicopter Association of Great Britain for the honour of being here tonight to deliver this lecture However, when I compare the quality of this numerous audience with the value of the information gained through our small experience in the helicopter field, I cannot help feeling a bit embarrassed Notwithstanding the fact that on account of my poor English, you may miss part of my information, but I had the opportunity during the War whilst with the R A F in this country to appreciate the qualities of the British people—one of which is " fair play " and I will then assume that the audience will be most tolerant of the speech I divide this lecture into two parts, the first one will be an account or resume of our experience The second part, which I think will be suitable for general discussion, will be our future Sabena Policy on different items The first part will be divided into the following items

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Within Sabena we have two types of helicopter operations the first one based at Leopoldville in the Belgian Congo and the second one based at Brussels and about which I will mainly talk to you today

In the Congo we use three Westland-built Sikorsky with Pratt and Whitney engines to fight malaria and other tropical diseases by destroying mosquitoes, flies, etc This spraying operation which started at full swing only a few months ago has up to now been very successful and we have accumulated more than 1,000 flying hours

The only trouble we have encountered so far with the Westland Sikorsky was with the rotor blades—we have had to change the wooden blades for metal blades, mainly due to the humidity of the climate

The best field of experience is, of course, an every day scheduled flight with all the operational and technical problems involved and this is why I propose to talk about our experience on postal helicopters

However, before leaving the Congo operation I think that we may draw this early conclusion even there we need twin-engined helicopters with single-engine performance For this type of operation (spraying over forests, swamps, inaccessible valleys) in case of engine failure, the pilot has the limited choice either of finishing an autorotation at the top of 150 feet trees or if he goes for the river, of being eaten by crocodiles Our Pilot's Manual does not give any advice on that

CONTRACT BETWEEN THE BELGIAN POST OFFICE AND SABENA

Two years ago last week we signed a 5 years agreement with the Belgian Post Office for the carriage of mail on a definite route with a daily weekdays schedule, it being agreed that Sabena would run the circuit at cost price, our only interest being to gain experience on this new means of transportation of the near future

On the other hand although Belgium is a country where the railway network is one of the densest we have two poorly covered areas the Campine and the Ardennes The postal helicopter gives these two areas now the same delivery advantages as the rest of the country

Everyone is aware that railway organization is governed by consideration not often in accordance with the needs of the Postal service

The Postmaster General considers the operation of the postal network with helicopters merely as an experiment, the aim being eventually to transport the night mail with large helicopters carrying a payload of one ton throughout the country Realization of this aim should result in a large decrease of personnel and substantial savings by removing the need for railway postal vans

ROUTES FLOWN

The routes we have been flying for two years include 13 stops Haren Airport, where the helicopter are overhauled and maintained—Brussels Airport (Melsbroek) where they collect the mail brought by the airlines with a special tight connection for the B E A plane coming from London at 11 05 a m , the helicopter taking off at 11 20 a m From Melsbroek the route goes to Brussels Heliport which is located in the heart of the city The scheduled time on the ground at the heliport for the complete loading

and unloading is one minute with rotor and engine running There are two refuelling stops of 6 minutes at Libramont and Beringen From Brussels Heliport, the route goes on as follows Libramont—Liege—Tongres—Hasselt—Beringen—Turnhout—Herenthals—Antwerp and back to Brussels and Melsbroek

On top of the above the public can mail at these 13 stops last minute letters who will reach the capital within a short time

The total length of the circuit is 435 km or roughly 271 st miles During the last 24 months 288,000 pounds of mail were carried with the regularity shown in Tables 1 and 2

Navigation

Like fixed-wing aircraft pilots, prior to departure the helicopter pilots go to the met office to study the weather en route and file a flight plan

In flight they are in permanent contact by V H F with the ground stations At any moment along the circuit the pilot can get bearings or fixes from the various VHF/DF stations at Brussels (Melsbroek and Grimbergen), Gosselies, St Hubert, Liege, and Antwerp)

The weather minima agreed upon with the Belgian C A A are as follows

	Ceiling	*Visibility*
Over city	400 ft	800 yards
Over countryside	300 ft	800 yards

There are no major difficulties in flying helicopter down to those minima in V F R conditions especially when as in this case one knows the route thoroughly In many instances flights were achieved in worse meteorological conditions at reduced airspeed

The average cruising altitude is between 1,000 and 2,000 feet, weather permitting, indicated airspeed 80 st miles/hr with 23 inches of boost and 3,000 engine r p m The average block to block speed has been in the summer 106 km/hr (around 70 st miles/hr) and 98 km in the winter (around 65 st miles/hr)

Encouraged by the very good regularity on the circuit for the first two years the Post Office will open a second one very shortly The circuit consists of thirteen stops Melsbroek — Brussels — Charleroi — La Louviere — Ath — Grammont — Renaix — Courtrai — Gand — Termonde — Alost — Brussels — Melsbroek The total length is 315 km or 197 st miles

We hope to start this second circuit on about September 15th

Heliports

At the beginning of our helicopter operation we got a special permit from the Belgian C A A to fly our single engine helicopters into the centre of the town Our heliports are always located near rivers or canals which the helicopters follow when approaching or leaving the landing area In fact, the only incident which occured during the past 24 months gave proof that this location was very wise On the 15th of September, 1950, taking off from the Liege platform, a blade of the engine fan broke away cutting the throttle link and the engine went into idling The altitude reached was 50 feet and the bank of the river could not be used for a landing owing to the crowd which always watches the arrival and departure of the helicopter The heliport could not be reached

TABLE 1 FIRST YEAR

		Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Mean
1 Regularity by circuits	%	96 2	92 6	90 9	63 6	80 8	91 8	92 3	88	100	96 5	100	100	91 2%
2 Regularity by sectors	%	92 2	87	80 2	58 7	72	82 2	78 6	83 4	98 5	92 8	98 5	99 4	86%
3 Punctuality—whole circuit														
(a) early	%	29 1	38 8	43 1	27 8	44 7	45 2	51 5	39 7	34 2	42 5	26 5	57	} 39%
(b) 2 to 15 mins late	%	66 3	50 9	46 1	46 7	36 9	32 7	39 3	59 1	54 3	49 7	67	41 2	
(c) more than 15 mins late	%	4 6	10 3	10 3	25 5	18 4	22 1	9 2	6 2	11 5	7 8	6 5	1 8	
4 Punctuality of arrival at Brussels														
(a) early or on time	%	45 8	50	58 8	47 4	41 1	46 6	68 9	58	79	65 3	39	65 4	} 90 6%
(b) 2 to 15 mins late	%	45 9	33 4	29 4	36 8	41 2	26 7	31 6	36 8	16 7	34 7	56 6	34 6	
(c) more than 15 mins late	%	8 3	16 6	11 8	15 8	17 7	26 7	—	5 2	4 3	—	4 4	—	
5														
(a) Block Speed (k p h)		103 1	100 2	98 5	101 8	95 5	95	100	102	103	103	101	102	100 k p h
(b) Commercial Speed (k p h)		87 3	87	88 5	85 5	79 6	85 4	85 7	89 5	90 5	90	88 8	87	87 2 k p h
6 Weight carried during month (kgm)		5773	4631	2605	2675	2265	2858	3231	4253	5010 3	6695 7	5396 6	5792	4273 kgm
7 Weight carried per day flown (kgm)		222	193	130	134	108	130	134 6	194	208 5	268	234 7	223	181 5 kgm
8 Time spent at stops (Hrs)		38	36	33	43 40	42 15	37 45	37 30	33 20	29 20	32	33 40	31 45	35 30
9 Cancellations														Total
(a) Technical		—	—	1	—	1	—	—	—	—	1	—	—	3
(b) Meteorological		1	2	3	8	3	2	2	3	—	—	—	—	24
10 Interrupted Flights														
(a) Technical		1	3	1	—	2	3	2	1	—	2	—	—	15
(b) Meteorological		—	—	—	3	—	—	1	—	—	—	—	—	4

TABLE 2 SECOND YEAR

	Sept	*Oct*	*Nov*	*Dec*	*Jan*	*Feb*	*Mar*	*April*	*May*	*June*	*July*	*Aug*	*Mean*
1 Regularity by circuits %	100	88 9	100	91 8	96 2	88 2	100	100	100	100	100	100	97 1%
2 Regularity by sectors %	99 9	84 3	98 5	90	94	79	98 5	99 2	99	100	100	99	95 1%
3 Punctuality—whole circuit													
(*a*) early %	58 6	43 3	55 3	73 4	73	59 6	60	67 3	70 5	66	57 1	75	63 3%
(*b*) 2 to 15 mins late %	30 4	44 3	37 1	22 8	23 2	29 9	33 3	31	25 5	33 4	39 6	24 2	30 4%
(*c*) more than 15 mins late %	11	12 4	7 6	3 8	3 8	10 5	6 7	1 7	4	0 6	3 3	0 8	5 5%
4 Punctuality of arrival at Brussels													
(*a*) early or on time %	72	77 2	42 8	63 5	82 8	78 7	69 2	91 6	100	96	74	100	79 8%
(*b*) 2 to 15 mins late %	20	22 8	23 4	36 5	17 2	16 2	30 8	4 2	—	4	16	—	15 9%
(*c*) more than 15 mins late %	8	—	23 8	—	—	5 4	—	4 2	—	—	—	—	3 5%
5													
(*a*) Block Speed (k p h)	102		100	103	101 5	102	103	105	106	102	104	104	103 k p h
(*b*) Commercial Speed (k p h)	90 5		89	89	90 5	91	90 5	92	93	92	92 5	92 5	91 1 k p h
6 Weight carried during month (kgm)	5482	3766	3156	3185	3180	2678 5	3558 3	4814 7	5985 8	6374 8	6816 7	6825	4652 kgm
7 Weight carried per day flown (kgm)	219	145	143	145	128	121 7	137 5	193	238	265 6	262	263	188 4 kgm
8 Time spent at stops (Hrs)	—	—	—	—	—	29	31 30	32	29	27 30	29	30	30 4
9 Cancellations													Total
(*a*) Technical	?	?	?	?	?	—	—	—	—	—	—	—	—
(*b*) Meteorological						3	—	—	—	—	—	—	8 (?)
10 Interrupted Flights													
(*a*) Technical	?	?	?	?	?	—	—	—	1	—	—	—	3 (?)
(*b*) Meteorological						3	—	—	—	—	—	—	3 (?)

The pilot landed in the river A few seconds afterwards the helicopter sank in water 5 metres deep The mail was salvaged by the pilot who swam away The same helicopter was on the run again three weeks later and the pilot the next day, after allowing him time to dry himself

The heliports are always located at 500 to 1,000 yards from the Post Office They consist of an area of 50 by 50 yards or less, fenced in by a low wire mesh fence Sometimes there is an hard asphalt surface in the middle In fact dimensions of 20 by 20 yards are sufficient, the main thing being the approach path In that respect consideration is given to the direction of the prevailing winds and the final approach path obstruction gradient is never less than 1 in 5

We did encounter some trouble when landing in strong winds on heliports surrounded by buildings In some instances we were even compelled to overfly the station This is why the new heliport for mail services in Brussels will be located at the top of the new seven floor post office building

The landing area will be immediately above and connected by lifts to the sorting office

The dimensions are 75 m by 24 m Orientation is N E -S W , *i e* , into the prevailing winds The roof is stressed to 25 tons We intend to use helicopters up to 11 tons in weight

Another landing area will be erected on the top of the new Sabena Air Terminal in the centre of Brussels, which will be completed within the next 16 months The dimensions are 65 m by 21 m This will serve for passengers services

The Helicopter

The three helicopter used are Bell 47 B1 which carry 385 lbs of mail in the cabin and the two side bins They are fitted with landing skids instead of wheels

Engines are Franklin 200 h p with 300 hours time between overhaul The semi-rigid type rotor (overhauled after 400 hours) is especially good and did not give any trouble

The daily utilization for the last two years has been 2 01h per day The number of manhours for maintenance per flying hour is 3 65

For this type of mail operations the Bell 47 is suitable , although in general, to comply with military specifications, a minimum weight of components was achieved in order to have a maximum payload For scheduled operations we would gladly sacrifice a few pounds of payload in order to have a more sturdy helicopter

On the circuit the Bell 47 flew in icing conditions, hail and heavy rain without any damage to the rotor Some difficulty was encountered through snow building up on the front screen We overcame that problem by fitting two heat exchangers from the exhaust

Personnel

Flight crews

Until recently there were only two pilots flying the mail Both were trained at the Bell Aircraft company in Buffalo Their previous flying experience was 600 hours on light aeroplanes In view of a second mail run we trained a third one within the company

Fixed-wing pilots in Belgium are allowed by our C A A to fly 1,200

hours a year but the helicopter pilots are limited to 1 000 hours a year and 85 hours per month

They have the same instrument training on the link trainer as the airline pilots Once a week they practice fully autorotational landings and instrument flying under the hood Each of them has now around 1,500 helicopter flying hours

Flying a helicopter is much more tiring than flying a conventional airplane The people who fly must have very high spirits and have what we call in French " le feu sacre " It seems that the morale of helicopter pilots must be more often checked than that of the other pilots because of the greater strain of this type of flying

Ground crews

Our ground crews consist of one engineer, one foreman and two mechanics The first two have been trained at the Bell factory during the pilots' training over there

As you can see, the staff dealing with helicopter operations and maintenance is limited to a minimum and there is nobody else in the company who is employed full time in this capacity

Blind Flying

There is, of course, no future for helicopters engaged in scheduled operations, without the ability to fly on instruments

We have equipped our Bell's with the normal type of artificial horizon, directional gyro, turn and bank and rate of climb indicator

Experience on instrument flying has been gained under the hood and at speeds down to 35 miles per hour , no major problems were encountered A few G C A practice approaches were made at Melsbroek with very good results

In this connection, helicopters standing still at different altitudes in the approach zone were used to calibrate the G C A scope With nearly 100 hours of simulated Instrument Flying we are now seeking limited C A A approval for IFR flight along the same lines as the permit granted by the American C A A to L A Airways

Cost of Operation

In its present form the helicopter is an expensive means of transport

The operating costs of the equipment based on a five years amortization period were

Table No 3
Provisional Operating Cost per Kilometer
First Year

		fr	*sh/d*
1	Fuel }	3 98	—/11
2	Oil }		
3	Landing fees	—	—
4	Maintenance (Wages)	2 —	—/06
5	Materials	4 61	01/01
6	Pilots (salaries, insurances, Flight pay)	4 —	—/11
7	Insurance	4 38	01/—
8	Obsolescence (5 year life)	6 38	01/06
		25 35	05/11
9	Share of indirect costs	4 75	01/01
10	Total	30 10	07/—

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SECOND YEAR

		fr	*sh/d*
1	Fuel	3 12	—/09
2	Oil	0 25	—/01
3	Landing Fees	0 69	—/02
4	Maintenance (Wages)	2 87	—/08
5	Materials	7 04	01/07
6	Pilots (salaries, insurances, Flight pay)		
	6A Pilots salaries and insurances	2 65	—/07
	6B Pilots flight pay	1 88	—/05
7	Insurance	3 71	—/10
8	Obsolescence (5 year life)	7 48	01/09
		29 69	06/10
9	Share of indirect costs	3 74	—/10
10	Total	33 43	07/08

But when we will start operating two circuits with three helicopters, those costs will decrease as follows

THIRD YEAR

		fr	*sh/d*
1	Fuel	3 31	—/09
2	Oil	0 25	—/01
3	Landing Fees	0 50	—/01
4	Maintenance (Wages)	2 28	—/06
5	Materials	5 37	01/03
6	Pilots (salaries, insurances, Flight pay)		
	6A Pilots salaries and insurances	1 99	—/05
	6B Pilots flight pay	1 34	—/04
7	Insurance	—	—
8	Obsolescence (5 year life)	6 60	01/06
		21 64	04/11
9	Share of indirect costs	4 21	01/—
10	Total	25 85	05/11

FUTURE POLICY

Now, I will talk to you about the Policy which we feel that we are going to follow First of all I must say this year we had the opportunity of discussion for the first time within the Technical Committee of I A T A (January 22nd, 1952, in Madrid) First B E A presented a very good paper on the requirements of the helicopter for commercial transportation

Sabena brought the following points for policy consideration

1 Special call signs to identify helicopter from fixed-wing aircraft Every day now when the weather is bad at Melsbroek the helicopter comes into the Airport following a certain path, and at the same moment a fixed-wing aeroplane makes its approach on the fixed-wing instrument approach It is very confusing for the pilot, because he listens on the R/T and he does not like to know that there is another aircraft at 200 feet when visibility is so bad , on the other hand the Tower should know straight away from the Call Sign if the plane that calls is a helicopter or a fixed-wing aeroplane

2 Strength of the landing area The heliport to be operated by the airlines There are no rules in Belgium yet on this matter In the

United States also there is no definite rule I think there is a Paper in England issued by M C A which gives some figure on the strength of the landing area for helicopters To give you an example, on the Air Terminal in Brussels, on the roof of which we are building a landing area, if we stress for 6G it will cost us 6,000,000 francs more and if we stress for 2G it will cost only 2,000,000 francs more The other point is—who is going to operate the heliport ? Our feeling is that the airlines should operate the heliport and leave to the local C A A or the Local Port Authority the running of all navigation and navigational aids From what we see now for the future we do believe that within 5, 10 or 15 years we shall operate helicopters in cabotage inside Belgium for the mail service or passengers There will not be the most important services , the most important will be inter-city services Taking Belgium for instance, we only fly aeroplanes into Brussels where there is a large air port There is no reason why we should not link Liege or Mons with Paris, with Amsterdam, or Cologne The idea would be to have a Ticket Office in the centre of these Towns on the roof of which is the small landing area—just big enough for one helicopter at a time Flights would be made direct from these towns to cities in countries around Belgium

3 The integration of helicopter operations in airways and control areas Our idea is that due to the very large expense involved in building very large landing areas in the heart of cities, we rather feel that we should limit the size to a minimum In the case of Brussels for example, we should devote to the helicopter air space in the airways below (say) 4,000 feet We should pick out in the surroundings of Brussels large spaces where we can put heliports away from buildings and on the ground Let us say that the helicopter is flying the airway, on reaching a beacon (for example), the helicopter leaves the airway and descends to one of the heliports on the outskirts of the town Helicopters leaving airways coming from different directions will go to their appropriate satellite heliport There will be no refuelling at the city centre heliport , due to its small dimensions it will be able only to accommodate one helicopter at a time The stopping time there will be maximum of three or four minutes—just time to dis-embark and re-embark passengers Because of the ability of the helicopter to make stops en route in a very short time I do not think that this will much reduce the average block to block speed on a trip like Brussels-London In good visibility a Despatcher at the city centre heliport will be able to despatch the helicopters from all directions in order that only one at a time will be on the central landing area

In the case of bad visibility the helicopter will be able to fly contact with much lower ceiling than fixed-wing aeroplanes So, on the platform we will not have any refuelling facilities—just the bare minimum for maintenance in case of failure or trouble and all the helicopters will be maintained at the Melsbroek Air Plant Our idea for dealing with the problem of the moment is another landing area somewhere North West of Brussels

At the next I A T A technical committee which will take place in Brussels on December 1st, further consideration will be given to the helicopter problems and half a day of the working committee time will be devoted to them

There are a number of legal points to be considered For instance the ability of the helicopter to stop en route without significantly reducing the block to block speed will enable us to stop en route between Brussels and

Paris to pick up passengers The " freedom of the air " will have to be discussed because the question of cabotage will arise An important item is the facilities to be provided , I don't think that the Customs will agree to checking passengers on the roof of the Heliport I am quite sure that we shall have twin-engined helicopters with at least 40 passengers long before this facility is available The licensing of personnel should be taken up within I A T A

Mr Masefield (*Chairman*) We have listened to a quite fascinating description on the way to go about such a pioneering enterprise as Sabena has tackled We have heard too some very interesting thinking for the future One cannot help feeling that in a small country like Belgium they have in some directions made more progress, and got on with action faster than we have over here It is also nice to think, that when the British Aircraft Industry has done its stuff on the large helicopter specification, there will be a second customer for the large fifty-passenger helicopters

I am now going to call upon Mr ROWE to open the discussion

Discussion

Mr N E Rowe (*Member—Blackburn and General Aircraft Ltd*) I think we have listened to an extremely valuable account of what our Chairman for this evening has described as a " pioneering operation " and although the Lecturer asked for our tolerance for his English, he did not really need it and I congratulate him on his presentation because one heard every word and there was never any doubt that we obtained the full value and meaning of what he had to say I was interested particularly to hear of the enterprising steps the Post Office in Belgium were prepared to take to sign up a contract for five years I think it was good I was doing something similar in BEA—our own Post Office were enterprising but they did not sign a contract for five years ! They signed up for three months and then one for six months and then ceased, finding it all too expensive What a help it must be to the Operator to have that sort of solid foundation to go forward on I was extremely interested to hear that the objective apparently of the Belgian Post Office is to carry all the mail at night (Mr Vernieuwe interjected and said " That is correct, except newspapers ") —that really is a very fine ambition and I hope that it will fire our own people to do the same in this country and fire others to provide the aircraft very rapidly It would take a lot of carrying and would be a very fine thing to do

There are so many points of interest I would like to comment on, but I must restrict myself to one or two that interest me especially Mr Vernieuwe referred to regularity and that it was extremely good Could I ask him what are the causes of irregularity in his operation ? In the BEA experiment the main causes of irregularity was low visibility, while high winds caused poor punctuality We concluded that visibility and wind were particularly important, since this form of transport, which really should be as regular as the surface transport with which it competes, must be able to operate under all but the most exceptional circumstances If he has the figures with him, I should rather like to hear them Then he refers to navigation specifically, and also indirectly, in the Airways Scheme On the black-board he brings the helicopter into the general airways scheme as operated for fixed wing machines whereas I think our conclusion had been that the helicopter might be best served by the Decca Flight Log to show the Pilot where he is at all stages of his flying and therefore should be able to help him to operate in the lowest conditions of visibility On that point would he tell us if Sabena (or the corresponding MCA Authorities in Belgium) have any idea what the limiting visibility might be with multi-engined helicopters ? I think it is a very important point because it will have repercussions on the navigational aids I think if one considers that matter then operations should be possible in such low visibility with multi-engine equipment that the approach is made on instruments entirely , this implies that one needs a precise navigational aid, and the aircraft must have the qualities that allow blind flying to be done at comparatively low speeds which I think is one of the great difficulties

One last point which really is of the very greatest significance to the future use of the helicopter is this matter of alighting platforms and their size We gave a good deal of thought I remember, whilst I was at BEA to this question—is a structure to