

House Dinners.

By NORMAN J HULBERT, A M I Ae E

OUR first House Dinner was held on 28th January at The Engineers' Club Coventry Street, W 1 Mr M L Bramson, A F R Ae S , A C G I , M I Ae E , was in the Chair as deputy for Mr Fredk R Sims, who was absent on account of illness (Incidentally, the prevalence of colds kept quite a number of people away)

Major Hemming opened the discussion—without previous notice—on “Aeronautical Engineering,” with a special reference to its application to Aerial Survey

I am indebted to *Flight* for the following detailed report of the proceedings

Major H Hemming, Managing Director of the Aircraft Operating Co , pointed out that he was not a technical man, and thus he could not well undertake to speak to the company on aeronautical engineering The only subject upon which he could speak without having to prepare himself specially for it, was one particular branch of aeronautical engineering, *viz* , aerial survey Major Hemming stated that air survey offered a number of problems to the aeronautical engineer and he thought these problems could be divided into three heads (1) the aircraft, (2) instruments, (3) personnel As regards the machines, aerial survey had hitherto been somewhat handicapped by the necessity for using more or less makeshift material The ordinary type of aeroplane was not suitable and he thought it might assist aeronautical engineers if he were to state briefly some of the main points which had to be kept in mind in designing a machine specially for air survey To begin with, the tractor type of aeroplane was unsuitable for survey work, owing to the obstruction to forward view which an engine in the nose of the fuselage produced What they wanted was the pusher view He did not necessarily suggest that the machine should be a pusher, but thought the three-engined machine was probably ruled out, at any rate the type in which the centre engine was in the nose of the fuselage This brought them to the twin-engined machine, but was it essential that this should be so designed as to make the possibility of forced landings very remote, as usually the country over which aerial survey was carried out was of such a nature as to practically preclude any possibility of making a forced landing with safety With the present air survey equipment it was necessary that machines be able to fly at least 200 miles from their base and return to it without landing In air survey the question of cost was of relatively smaller importance than that of reliability, and performance should be good Thus a twin-engined machine must be able not only to fly level but to climb on one engine

On the subject of instruments, Major Hemming stated that what was badly needed was an instrument which would enable the pilot to keep the machine at

an exact height. Probably also an instrument that would indicate the position of the camera in relation to the earth would be of great help.

As regards personnel, Major Hemming thought that in the future it would be satisfactory for the pilot to do everything, since with automatic cameras, etc., there was really not very much for a separate observer to do. That meant that the pilot must become a ground surveyor. Major Hemming spoke in very complimentary terms of the pilots on the London-Paris air route. These pilots had an excellent training, and would make good survey pilots. Major Hemming also made the interesting statement that the air survey in Rhodesia, which his company was just starting to make, would cover an area of some 20,000 square miles. By ordinary ground survey methods it was estimated that a survey of this area would take ten years, whereas they hoped to complete their air survey in six months.

The Chairman thought that sky-writing pilots had to attain much the same accuracy, as that required in air survey work, and in saying so he was not hinting to Major Hemming that he might be coming to him for a job (laughter), although it was quite possible that that might come to pass.

Capt Tymms, after complaining that he had come to the dinner after obtaining a definite promise that he would not be called upon to speak, proceeded to elaborate Major Hemming's specification for an air survey machine. He agreed that this should be a twin-engined or three-engined type, and it should have an open front something like that of a flying-boat, and he thought some kind of sight was required to enable the pilot to keep on a leading mark. The photographer must have a view practically as good as that of the pilot in a forward and downward direction, and for taking oblique photographs it was essential that provision should be made for mounting the camera in such a manner that in its oblique position it could be traversed from 90 deg port to 90 deg starboard. In air survey over all kinds of different country it was not expedient for operating companies to have a number of different types of machines, so that a machine designed specially for air survey should be capable of being converted from land machine into seaplane and *vice versa*. It was very often the case that there was little space available in which to get off or alight and consequently the machine would have to have a good climb and be able to be put down in a very small area. For air survey work it was often desirable to fly at considerable height, and under present conditions air survey machines should have a ceiling of at least 16,000 feet. The load to be carried, inclusive of crew, must be about 1,000 lb., and, in addition, the machine should have sufficient fuel for five hours' flying. Good performance was essential, and he thought the cruising speed of the machine should not be less than 100 miles per hour.

Capt F. L. Barnard, in referring to Major Hemming's statement that the London-Paris pilots might like to turn to air surveying when they got too old or too fed up flying over the same route, said that Major Hemming had also stated that they would be required to fly over very difficult country, and in all kinds of climate from tropical to arctic, thought that air survey was something of which pilots ought to steer clear (Laughter). As regards the difficulty of flying on a

leading mark, he thought the gyro-rudder control was satisfactory and might solve that problem. As regards the engine in the nose, it did not necessarily follow that this obstructed the view of the pilot. For instance, in the Armstrong-Whitworth "Argosy," the pilot did not see the nose engine at all. Concerning an instrument for indicating the exact altitude, he had seen an electrical instrument which indicated very accurately the distance between the aeroplane and the ground, and he thought that might help the air survey people.

Major Brackley declared himself unable to discuss air survey problems, and said he would confine himself to the subject with which he was most familiar, *viz*, that of commercial flying. A good deal had been said about absence of forced landings and the machine to acquire the immunity therefrom. The twin-engined had been mentioned. Well, he thought definitely that no twin-engined machine yet flown would carry on on one engine. As regards the three-engined machine, it might or might not fly on two engines, and he thought the ideal commercial machine had not yet been evolved. Passengers still complained of noise, and he would ask aeronautical engineers to try their best to cut out the noise of present machines. The comfort of commercial aeroplanes also left much to be desired, and here, again, was a field for the aeronautical engineer.

Flight-Lieut Reid pointed out that as regards the difficulty of flying on a leading mark, the gyro-rudder control had been found to keep on a line within 3 deg or so, whereas flying on compass course one got errors of 15 deg. In order to ascertain the position of the camera at the moment the picture was taken, he suggested as a possible solution of the problem that an azimuth gyro and a delicate tilt indicator might fairly easily be so arranged as to be photographed on to the plate in each exposure, thus indicating the position in relation to the earth. Concerning various mechanical aids to control of machines, he recalled that first they had the Avéline stabiliser. This was heavy because it was experimental, and actuated the controls, through relays, by the usual control cables. He thought that later on one would have hydraulic operation of the controls, with thin hydraulic pipe lines running from the instrument in the machine direct to the ailerons.

Capt Sayers stated that the subject under discussion was originally aeronautical engineering. That brought up the subject of general engineering, and before one could discuss that it would be necessary to define what constituted an engineer. There were many definitions, but the one he liked best was the American one, which said that an engineer could do for one dollar what any d—fool could do for two. Reference had been made to the disadvantage of having an engine in the nose. There was no reason why Major Hemming should not have a pusher type, a single-engined one at that, which would give the same performance as a tractor. It was only a question of how much Major Hemming was prepared to pay for it.

Capt Lamplugh referred to the great importance of the training of personnel, and Capt Boothby, R N, expressed the view that at present British aeronautical engineers were not getting the practice which they ought to have. In Germany they

were pushing on with commercial air lines and, consequently, German designers got a chance to get practice and experience. He thought in this country aeronautical engineers were rather being let down by the business people, in that sufficient money was not forthcoming to enable the engineers to get experience in producing commercial types. He thought that the airship could do all that was required in air survey work.

Wing Commander Wynn said it seemed to him that there was a similarity of the difficulties of bomb dropping and photography. During the war it was found that it was not satisfactory for the pilot to have also to drop the bombs, since devoting his attention to the bomb's sight meant that he could not look after the piloting, and unless the cameras used in air survey were automatic, it occurred to him that the difficulties might be similar. He would also like to know what was the largest size of machine that could be built, as he thought the future of British Empire air lines would rest with the big machine.

Major Hemming replied that the camera used nowadays was automatic, and explained in some detail how it was operated, the system used not calling for any great attention from the pilot, such as that required in dropping bombs. Major F. A. de V. Robertson said he had that morning been having a talk with Mr Kemp on air surveying, and the talk turned to India, a country which they both knew. Well, now, India was a ghastly country for forced landings, and he thought that for air survey there it was absolutely essential that the aircraft used should be entirely immune from forced landings. Perhaps in the future some specialised type of airship might be used. He did not suggest that any hitherto built were suitable, but thought one might be produced in the future.

Capt Tymms referred to the "Proximeter," an electrical instrument depending upon capacity effect between it and the earth, mentioned by Capt Barnard. This instrument only worked accurately at low altitudes and, moreover, it did not necessarily register the distance between the machine and the ground, but the distance between the machine and the nearest good conductor on the ground, such as a pond or lake. He quite agreed with Capt Barnard that the gyro-rudder control was satisfactory and enabled the pilot to fly in a straight line. It did not, however, give the location of that straight line. In air survey the pilot flew outwards along one straight line, turned round and came back along another straight line parallel with the first one, but displaced a certain distance laterally. The rudder control would not give this lateral displacement, which was very necessary in order to get the requisite amount of lateral overlap on the return flight. He said there was no getting away from the fact that a good pilot was enabled to do this by observing the ground and horizon, but to enable him to do his best the steep angle view to which he had referred was essential.

Major Hemming said that in order to be a commercial proposition, it was essential that air survey should be carried out on a large scale. The time was coming when they would be able to get large contracts, and when that came about he would assure Capt Sayers that they could afford to pay for expensive machines,

provided these were reliable and had the necessary performance. For instance, they could afford a 1,000 h p machine to carry their survey load of 1,000 lb plus fuel for five hours. As regards the question of overlap and the difficulty of flying so as to get the requisite lateral overlap on the return flight, they were now using large overlaps, something in the order of 60 per cent. By doing that the necessary accuracy could be obtained in piecing the photographs together. He could not agree with Capt Boothby and Major Robertson that the airship would be a suitable craft, as it would, he thought, be much too slow.

A very successful gathering then concluded by Mr Hulbert thanking Major Hemming, Capt Tymms, and Capt Lamplugh for their valuable contributions.

The next House Dinner will be held on Friday, 4th March, at 7.30 p.m., at The Engineers' Club, when Lieut-Colonel J. T. C. Moore-Brabazon, M.C., M.P., will preside. Tickets, as before, will be 5s each for members and guests, and may be obtained from the Honorary Secretary.