

REMINISCENCES OF THE EARLY DAYS OF AVIATION AT BROOKLANDS.

Paper read by Mr. R. L. Howard-Flanders,
A.F.R.Ae.S., A.M.I.Mech.E., Honours Member,
before the Institution, at the Engineers' Club,
Coventry Street, W., on Friday, 11th January,
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MR. HOWARD FLANDERS said :—

In 1919 I was travelling from London to Cambridge. An R.A.F. pilot, who was looking out of the window of the dining car, remarked on the curiously shaped piece of water we were passing.

I looked out and saw that we were passing the flooded Lea Marshes. My thoughts went back to ten years before, and the work which was done on this marsh by Mr. A. V. Roe and his assistants.

All this pioneer work is now largely forgotten. The memories of those days of hard work and high hopes, some of the hopes fulfilled and some of them disappointed, made me consider that it would be well that I should write them down while still fairly fresh in my mind.

As I thought of the men who had done the work, I began to realise that most of them had paid the penalty of pioneers and could never relate their memories. So I am endeavouring to tell you of those days, drawing on memory only, and not referring to any periodicals or diary. If, as a result, I omit the work of any pioneer or cast a slight on the work of anyone, I ask indulgence. All memories are apt to be distorted by time, and events take a personal perspective instead of historical sequence.

On July 13th, 1909, Mr. A. V. Roe made a hop of about 100 feet length on his triplane fitted with a 9 h.p. Jap motor-cycle engine.

This was the first flight on an all-British aeroplane. Two days later this was repeated, and a photograph of the flight was published in the "Daily Mail" of the following day.

It was not much of a flight; just a hop with a minor crash, but it was a beginning.

The triplane was a curious construction showing much originality, and more nearly resembled modern machines than did any other aeroplane of that date.

The Lea Marshes was far from being an ideal aerodrome. The ground was divided by three fences. The two parts near the railway arches, which

served as hangar and workshops, were covered with stumps of wood, used to tether donkeys and goats. The further portion was of fair surface but small, probably about 10 acres, and was bounded on two sides by water, on the other sides by Lea Bridge Road and a fence.

Those were days of toil. Every hop meant a crash. The procedure was as follows. At 4 or 5 a.m. we assembled and carefully wheeled the triplane out of the railway arch down the tow-path beside the River Lea—a difficult job as there was a small gate to pass through, and the tow-path was narrow. Having pushed the triplane to a suitable corner of the ground, amid the jeers of the onlookers, we endeavoured to start the engine, which usually took 15 minutes.

Mr. Roe having given the word "let go," all his assistants seized tools, pieces of timber, and other appliances, to repair the inevitable smash. One kept a cycle and a fire extinguisher handy and followed as close as possible in case of fire, which was not infrequent. When the landing took place after a hop, which might be anything from 10 to 120 yards, if a miracle had occurred and the machine was still intact, the process was repeated until the inevitable crash took place. We then partly dismantled the triplane and carried it home amid further jeers from the onlookers. Then work started and we worked for days in the very damp and dark railway arches to prepare for the next crash. The average programme was two weeks' work, a 50-yards hop, crash, and work again.

At first no one with any sense stopped to watch the madmen, but after M. Bleriot had crossed the Channel we had another difficulty—that of sight-seers. On one occasion the trams and 'buses were stopped and the police complained, so Mr. Roe had police persecution added to his other difficulties.

The story of Brooklands aerodrome commenced with Mr. A. V. Roe's attempts in 1908, but the first real flights were made by Paulhan in October, 1909, and shortly afterwards the aerodrome commenced its activities, with Messrs. Astley, Lane, and Neale. Mr. Raynham came to the aerodrome to learn construction in December, 1909.

The original sheds had no windows, so we had to take the shutters down for light, and during the cold winter we had an old bucket with a coke fire to warm the handles of the tools. It was an awful time: mud floor, leaky roof (we used the sheds before the roofs were finished), cold, long hours and floods. However, the coke fire cheered us a lot because the smoke made us think it was warm.

The Lane monoplanes were a very promising type, well made and of fair design. The chief point of note was the undercarriage. The wheels were in forks, which allowed them to track and also move fore and aft, this latter motion giving the shock-absorbing vertical motion. It was not unlike the front forks of a Triumph motor-cycle reversed.

These monoplanes had biplane tails, the lower plane fixed and upper plane hinged to act as an elevator. The results were rather poor on account of interference. However, I saw some good flights with these.

The first aeroplane designed and built at Brooklands was the Neale Pup, a monoplane of 29 feet span and 5 feet chord with aileron control. The engine was a 5 h.p. Jap without auxiliary exhaust ports, and was geared down $3\frac{1}{4}$ to 1 with a spur gear, so the propeller shaft lay on top of the crank case between the cylinders. The motor unit was heavy—about 14 lbs. per h.p. The whole machine, with Mr. Raynham in the seat, and petrol and oil for two hours, weighed 450 lbs. The factor of safety was high—probably about 7, but the undercarriage—on the lines of a Bleriot—was weak.

The planes had too little camber—about 2 inches for the under surface and 6 inches for top surface, with a parabolic curve drawn by eye from a small drawing. This gave 45 lbs. per h.p., $3\frac{1}{2}$ lbs. per square foot, which, with the inefficient camber, prevented sustained flight. The streamline was good, so the machine could be got of the ground without trouble, but it sank back to earth after a short hop.

By Easter, Brooklands was a very busy place. The Petre Brothers brought their monoplane, which was a marvellous piece of construction. The fuselage, spars and ribs were of lattice-gorder construction rivetted together with copper boat nails and rooves, the material being ash and swamp elm, no wires being used except for external bracing. The construction was light and rigid; the cross-sectional areas were insufficient to take the compression forces, hence it was not strong. It was unsuitable for experimental use, because a slight smash strained every joint.

The outstanding feature was the position of the engine and propeller. The engine was just between the main spars, driving a long shaft of 2-inch 16 s.w.g. tube with universal joints at each end, to the propeller in the tail. As the tail skid was long, to protect the propeller and fix the height of the tail, the angle of the main plane was variable. The pilot sat in front. This monoplane was engined with a 40 h.p. N.E.C. two-stroke engine, which gave much trouble and little power—probably about 25 h.p.

The first Martinsyde monoplane was there, a small Antoinette type machine with an 8-cylinder J.A.P. engine.

This was the forerunner of the well-known Martinsyde aeroplanes, and was nicknamed "the little oil bath" because the auxiliary exhaust ports let the castor oil escape from the crank case on to the pilot's face at the rate of two gallons per hour.

A very interesting monoplane, the Gregoire Gyp, was housed in shed No. 7. It was a single-spar machine with the spars pivoted on the top of the fuselage, and by means of a pair of bevels, somewhat on the lines of a motor-car differential, the relative incidence of the wings could be altered for lateral balance. The engine was a four-cylinder, water-cooled Gregoire motor run in an inverted position. It seemed to run very well and without undue lubrication troubles.

This machine, like so many of the early attempts, was never re-built after its first flight, which also meant its first crash on landing.

The Blue Bird restaurant opened in this shed about Whitsun.

Shortly after Easter the Howard T. Wright Company appeared in shed No. 9 with Mr. Boyle's Avis monoplane, designed by Mr. W. O. Manning, 28 h.p. Anzani Fan-type engine, with cruciform tail universally jointed forming rudder and elevator. This monoplane made some fine flights of 30 minutes or more—a great feat for those days.

The Humber monoplanes were housed in sheds Nos. 4 and 5. They were of Bleriot type. Some were fitted with an improved type of engine similar to the Fan Anzani; others with Clerget-type, water-cooled motor (four vertical cylinders, copper water-jackets, overhead valves with concentric push-rods, dimensions about 110 × 130 m/m.). Both of these motors were built by the Humber Company and ran better than any engines of that date. Mr. Barnes, the racing motor-cyclist, obtained his ticket on one of these. It is a pity the Humber Company gave up aviation, because they were just getting over the preliminary difficulties when they closed this branch.

Several large motor and engineering firms, both in England and France, burnt their fingers in 1910-11. When M. Bleriot crossed the Channel they thought aviation was perfected, whereas it was not even at the half-way house, so without considering the fact that they had to train a personnel and feel their way, they launched out with a large expenditure, often controlled by unscrupulous men, and then wondered why there was no return.

Messrs. Blondeau and Hewlett first arrived at Brooklands in this summer, and everyone was astonished at the hard work Mrs. Hewlett did on their Farman biplane. Without any doubt, Messrs. Hewlett and Blandeau earned their success by hard work and method. Their shed was always tidy and always busy.

Brooklands grew steadily, and the community of workers increased. We were all poor and all good friends.

This part of the Brooklands life must include Mr. V. Hammond, who worked in a little shed of felt and rough timber, and built what was probably the lightest triplane ever made. All metal work was lightened out with holes regardless of the labour entailed, and all these holes were drilled with a hand brace.

I was very sorry when engine failure brought this venture to an end. The engine was a four-cylinder Vee which appeared to give absolutely no power at all.

Mr. Roe put up some fine flights on his triplanes during this summer, and he began to get pupils and form the successful school which during the next year turned out several well-known pilots, such as Messrs. Raynham, Pixton, etc.

Later on in the year Mr. Sopwith gained his ticket on his Howard T. Wright monoplane, and afterwards flew his H. T. W. biplane which he took with him to America next year and won many prizes. Both these machines were designed by Mr. W. O. Manning, who was a frequent visitor to Brooklands. Mr. Sopwith had a pet bear which used to escape the vigilance of its keeper and get into other people's sheds in search of tins of condensed milk.

The year 1911 at Brooklands was entirely a year of expansion; sheds were built, reaching the number of forty by the end of the year, and the aerodrome was gradually improved. When the first sheds were built the ground was full of ditches and hedges, and the only decent piece of ground extended from the sewage farm corner to just beyond shed No. 9, and was about 100 yards wide. Between the sewage farm corner and the paddock there were deep ponds where the earth had been dug to make the track. There was also a farm house and a barn.

The river made several bends in the aerodrome, and there were several more pits or ponds at the south end of the ground. An army of men worked all this year and right up to the end of 1911 levelling the ground and diverting the river. Practically every inch of the present aerodrome has been dug and levelled by hand. In 1910 the ground was bare, sandy earth, but grass grew in the autumn.

Mr. Dashwood Lang was busy with propellers which seemed to develop from a toy boomerang which he was making for Gamage's. These early propellers gave good results, and soon showed themselves superior to the best French propellers.

The feeling of general good fellowship among the workers on the aerodrome began to grow, and we were all good friends, like a large family without any serious disputes, using each others' tools and generally borrowing and lending everything, including advice.

The next year, which was perhaps the most eventful year that aviation has ever seen or will ever see, opened with some fine flights by Mr. Pixton on the Avro biplane fitted with a 35 h.p. Green engine. It is interesting to note that this was the same engine which was flown to Brussels in 1919, and subsequently to Rome, after eight years' use—a good record for any engine.

One of the interesting early machines which came to Brooklands in 1911 was the Weiss monoplane—an automatically stable machine without a tail plane.

The planes had a very heavy top camber, with back and upswept tips something like a duck's wing.

The Hanriot school was in full swing early in 1911. The pupils who learned on the old "Henrietta" were Messrs. England, Fisher, Bell, Henry Petre and Gnosspelius. This monoplane had one peculiarity which seems to have been unique, in that it could be flown *cabré* without becoming unstable; when too *cabré* it simply subsided gently to earth without sideslip. It was not a suitable pupil 'bus because the boat built half round the fuselage was so difficult to repair.

It was during the spring of 1911 that the A.B.C. Engine Company started in the small works on the aerodrome, with their four- and eight-cylinder water-cooled engines very similar to the Curtiss.

Mr. Macfie was down on the aerodrome with his biplane fitted with 50 h.p. Gnome on which Messrs. Macfie and Valentine gained their certificates.

There was great excitement at the time of the circuit of Europe.

On the return flight from Hendon Mr. Valentine landed at Brooklands and abandoned the race so as to get his machine tuned up for the circuit of Britain.

The next event of note was, of course, the circuit of Britain. Owing to the high entrance charge on the day of the start many young enthusiasts came in the day before and slept in the sheds. As far as I can remember there were ten in my shed. In the early morning we went out to witness the preliminary trials of some of the new arrivals.

One of the machines began to lose pieces of plane in the air at about 400 feet, and came to earth gradually breaking up. The final smash was comprehensive, the whole biplane was packed up in small packing-cases without the need of any more breaking or cutting on the part of the volunteer packers. Three cylinders of the E.N.V. motor were torn off the crankcase. Strange and happy to relate, the pilot, Mr. R. Kemp, was uninjured, except for a slight cut.

The extraordinary Etrich monoplane caused much interest. It was an all-steel contraption with single-surfaced planes. The tips were bent back and up-swept, and were flexible, with a kingpost and umbrella-like bracing. The planes were braced with a biplane bracing, having the lower spar exposed. The whole machine was a mass of wires and head resistance. It had a real 120 A.D. motor, and the general noise and thrust from its propeller impressed us all. It failed at Luton, but I don't remember why.

The start was rather late in the afternoon and the heat was intense. Most of the competitors started from the north end of the aerodrome. Lieut. Porte, on his Dep, had a smash when starting. Many competitors, including D. G. Gilmour, could not get off in the heated air. Those who did manage to get off went several miles south to find better atmospheric conditions before they turned.

Mr. Cody, following his usual custom, however, waited until the air was somewhat cooler and flew straight to Hendon, only clearing the telegraph wires over the railway line by inches. So ended one of the most noteworthy days of British aviation.

During the circuit Brooklands was rather quiet till the arrival of Mr. Beaumont, the winner, who was welcomed by everyone.

After three such exciting days the remainder of 1911 was quiet.

1912 opened with the bugbear of commercialism beginning to destroy the feeling of good-fellowship. Nearly everyone was hoping to make money, and some were beginning to spend it. The Heath Club became the headquarters instead of the "Blue Bird," and billiards became the evening occupation instead of working till bed time. This was the year in which so many of the Old Brigade lost their lives—Messrs. Astley, Gilmour, Fisher, Johnstone, Petre, and others—all from the good company of Brooklands. It was altogether a bad year, with the worry of trying to get a financial backing, and the question—Will the Government really assist, or is their talk mere dope?

The outstanding aeroplane of the year was Mr. Sopwith's American-built Wright biplane fitted with a 40 h.p. A.B.C. piloted by Mr. Hawker. This biplane won nearly all the weekly Brookland's handicaps. Each time it won the gear ratio to the propellers was reduced, speeding up the engine and increasing the speed. I don't remember the exact figures, but it was probably worked up to 55 m.p.h.

The first Marconi wireless messages were transmitted and received by Mr. Bangay, on my monoplane. This was the first instance of receiving in the air in Europe, and the first of transmitting from an aeroplane in England (April and May).

The military trials were the great feature of the year. The weather was uniformly bad; it rained all day and every day, our tents leaked and blew down. No one was satisfied with either the trials or the result, yet I think the rules were fairly good, but they were too severe for an impoverished collection of experimenters who then represented British Aviation. It showed that aviation was not to be developed by brains and hard work, the chief test being money. These trials mark the end of the early days of aviation; there were no more days of the old good-fellowship.

Aviation became a trade. Those who had worked for the love of the science, asking only the poorest food and lodging, were either dead or bankrupt, and so finished days which can never be repeated in the growth of a science. This example of a group of men sacrificing everything for the work has been seen in steam, electricity, motor-cars, etc., but never in quite the form shown in aviation, because the earlier engineering sciences did not necessitate living in communities, as did aviation. It is improbable that anything of the sort will arise again, because money has apparently become definitely the key to all progress. The next openings in science will probably be too elaborate for the needy worker.

However, those few years in every country produced a similar condition, and it would be interesting to hear accounts from other aerodromes.

Aviation in its present form has been built up by the failures and successes of those early pioneers.

DISCUSSION.

MR. MOLESWORTH (Chairman): Mr. Howard-Flanders has given us a most interesting account of the early days.

I myself started making an aeroplane early in 1908. I did not arrive at Brooklands until June, 1910, and left some time in 1911. Although,