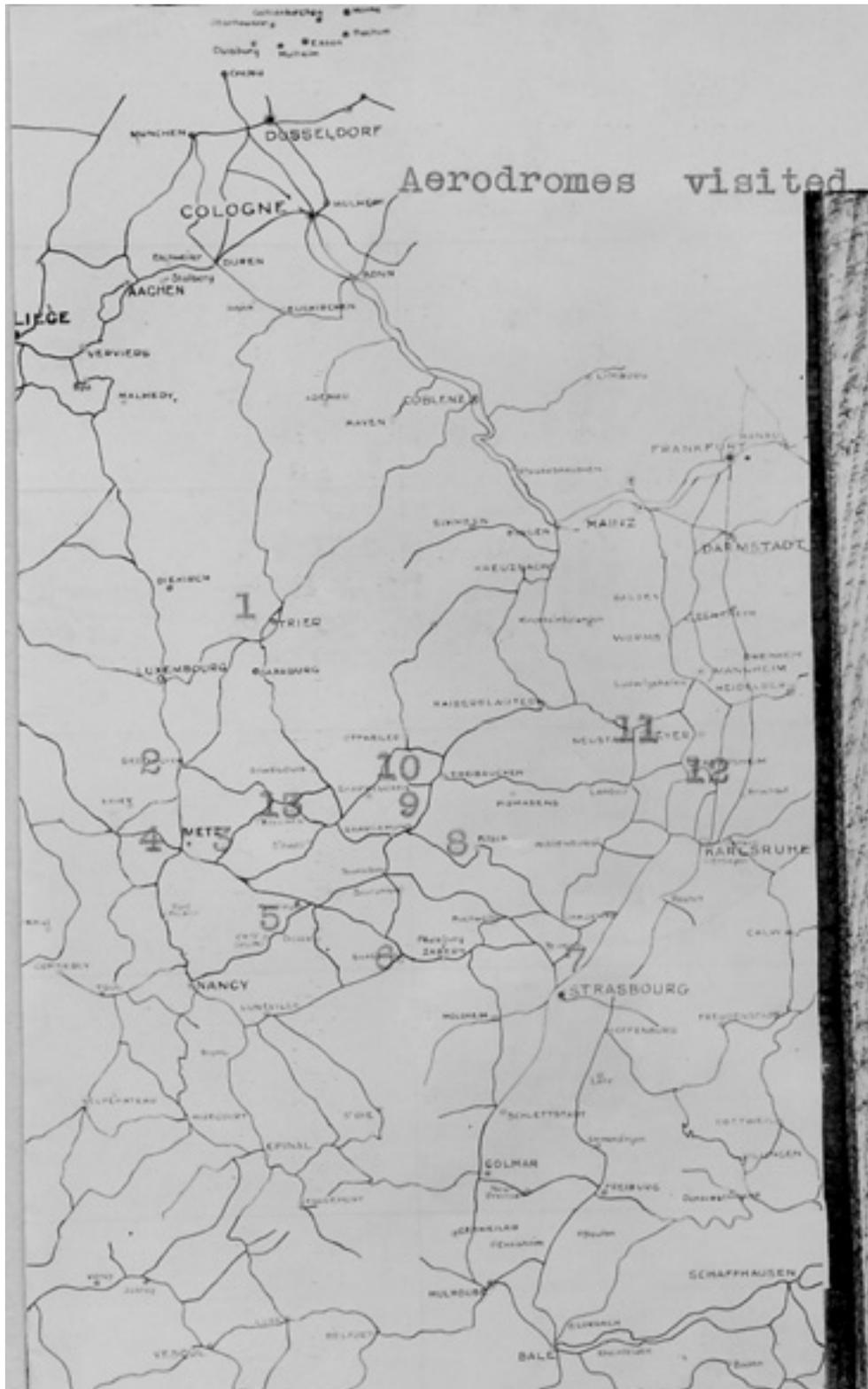


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DEPARTMENT OF INTELLIGENCE

REPORT ON THE EFFECTS AND RESULTS OF THE BOMBING OF GERMANY BY 8TH
BRIGADE AND INDEPENDENT FORCE, ROYAL AIR FORCE: (D) AERODROMES

Map showing Aerodromes Visited



A E R O D R O M E S .

DIFFERENT TYPES OF AERODROME VISITED

The types of aerodromes visited may be classified as under :-

- a). Temporary
- b). Permanent

a). Temporary Aerodromes.

In the selection of sites for aerodromes of this kind the enemy's choice was at times considerably limited owing to tactical and other considerations of a more or less transient character. Most of them were required to be at a distance of not more than 50 miles from the front line, and while a certain number of grounds selected under these conditions were necessarily of a more or less make shift character and it is not surprising to find that, in the latter case, no more labour or material was expended upon them than was necessary to meet immediate war requirements. Others, however, such as BOULAY, MORHANGE and THIONVILLE, were probably intended to become permanent aerodromes, and on those neither labour or expense was spared. At BOULAY in particular, although the ground had been occupied several months, work was still in progress when the Armistice brought hostilities to an end.

A study of the map will show that the enemy did not experience much difficulty in finding good temporary sites for aerodromes in the THIONVILLE, METZ, SAARBURG, SAARBRUCKEN area. In the lake district East of METZ, aerodromes and landing grounds were particularly numerous. They would consist of two or more hangars placed in an open field, along a road or railway, near the edge of a wood or on a manouevering ground. All types of machines had been housed on these temporary grounds, which appear to have answered their purpose very well.

b). Permanent Aerodromes.

Considering the mountainous tendency of the country a hundred miles distant from the front line, there are many permanent aerodromes. These were provided with several hangars of a permanent type. The grounds had in all cases been carefully selected, drained, levelled and well looked after.

These aerodromes were found on sites such as pre-war aerodromes, military parade grounds, and Zeppelin shed enclosures, (see photo No. 8.B.298), situated near broad main roads and railways.

No.8.B.298.



When selecting these aerodromes, the military situation from a bombing point of view was also taken into account. It should be mentioned that they were generally occupied by Aerial Training Schools, Home Defence Units and Parks.

Although, in almost every case, these aerodromes and their installations were not completed when the war ended, they were occupied and in every way fit to land on.

It is interesting to note that the possibility of these permanent aerodromes being attacked does not appear to have influenced the enemy in the erection of his hangars or buildings, which were placed close together. (See photos. Nos. 8.B.313, 318, 319, 287).

No. 8.B.313.



No. 8.B.318



No. 8.B.319.



No. 8.B.287.



Had hostilities been prolonged, it is certain that several alterations would have taken place as the direct result of bombing, such as the thinning out of hangars, increased A.A. defences etc.

As it was, his temporary aerodromes were very roughly handled by the 9 squadrons of the Independent Force, the suspension of hostilities just saving his permanent installations from serious attacks.

GENERAL STATE OF AERODROMES, SIZE, APPROACHES

The condition of all finished aerodromes must be admitted to have been excellent. The German Air Force had done everything possible to convert what had once been grass fields and broken ground into aerodromes satisfactory from all points of view.

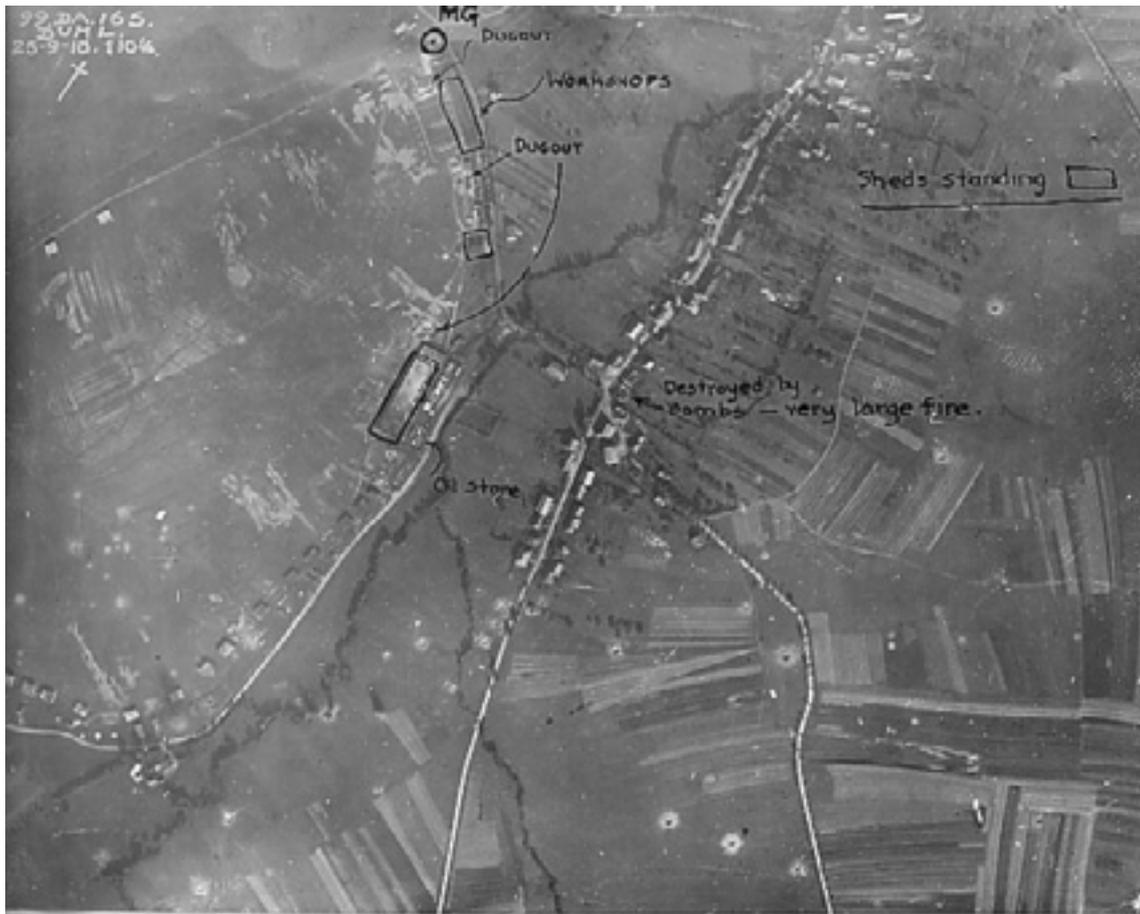
Aerodromes were visited in December and the first half of January, and in spite of the fact that these aerodromes had been subjected to very inclement weather, they were remarkably dry, and fit to land on or "take off" from at any time. (This refers to temporary and permanent aerodromes alike, constructed during the war up to August 1918).

However, the country between the VOSGE MTS. And the R. MOSELLE was naturally adapted for the construction of good aerodromes, being not too hilly and having good natural drainage. Although the country was flat East of the VOSGES MTS., the R. RHINE provided an excellent drainage system, and the aerodromes provided in this area were found to be comparatively dry. Drainage had been very thorough and well done, and few wet patches were visible on the landing part of the aerodrome. Levelling also had been systematically carried out, with the result that all aerodromes (with the possible exception of HAGENAU) had good surfaces. Owing, possibly, to the urgency of the military situation at the time, the enemy appears to have occupied certain aerodromes almost as soon as they were sufficiently drained or levelled to enable machines to land and "take off". This had occurred notably at BOULAY, SPEYERDORF, and MONTROY.

The approaches by air to all aerodromes visited, with the exception of SAARBRUCKEN and TREVES aerodromes, were excellent. Trees alongside roads had been freely cut down. There were no overhead telegraph lines. Aerodromes W. of the VOSGES were found to lie almost on broad large knolls, well above the level of the surrounding country, which was very open. On the other hand, the country outside the limits of the aerodromes was not suitable for forced landings, there being many valleys and depressions.

From the attached photographs, the sizes of the various aerodromes visited will be gauged. (Photos. Nos. 8.B.406, 407, 408, 409, 410, 411).

No. 8.B.406.



No. 8.B.407.



No. 8.B.408.



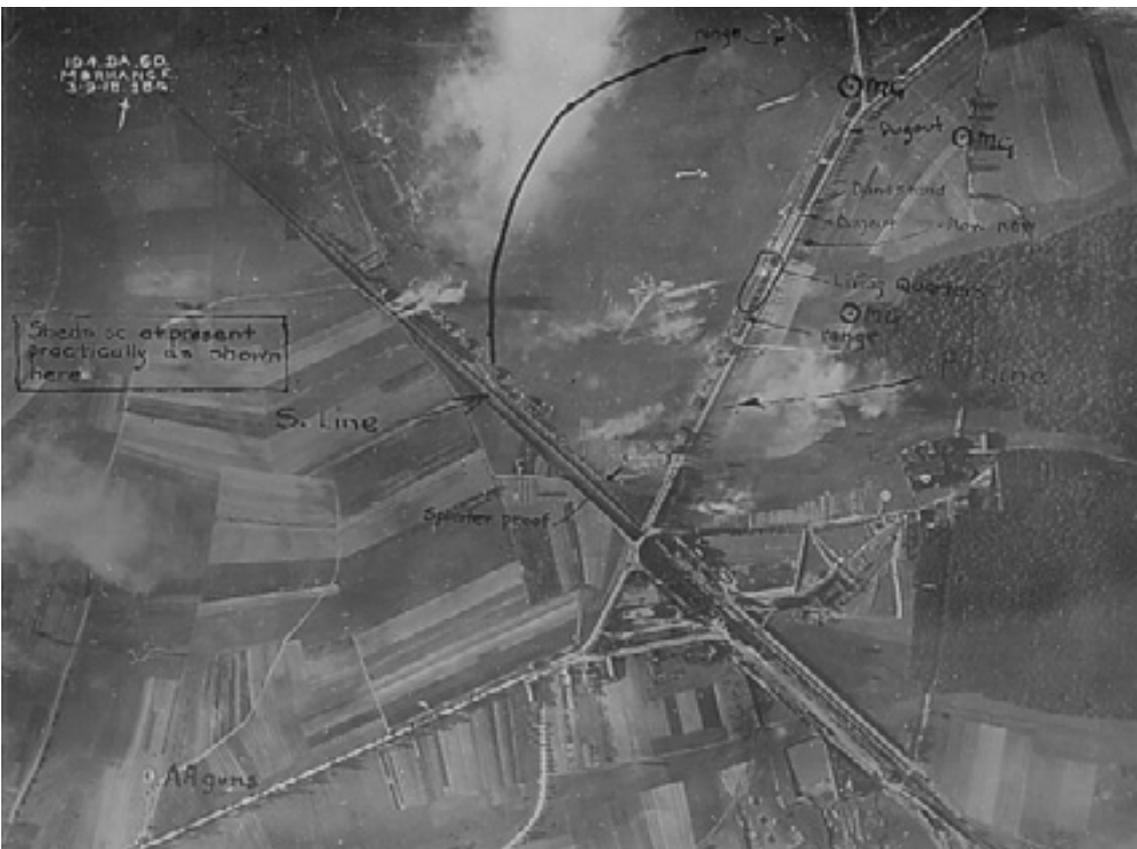
No. 8.B.409.



No. 8.B.410.



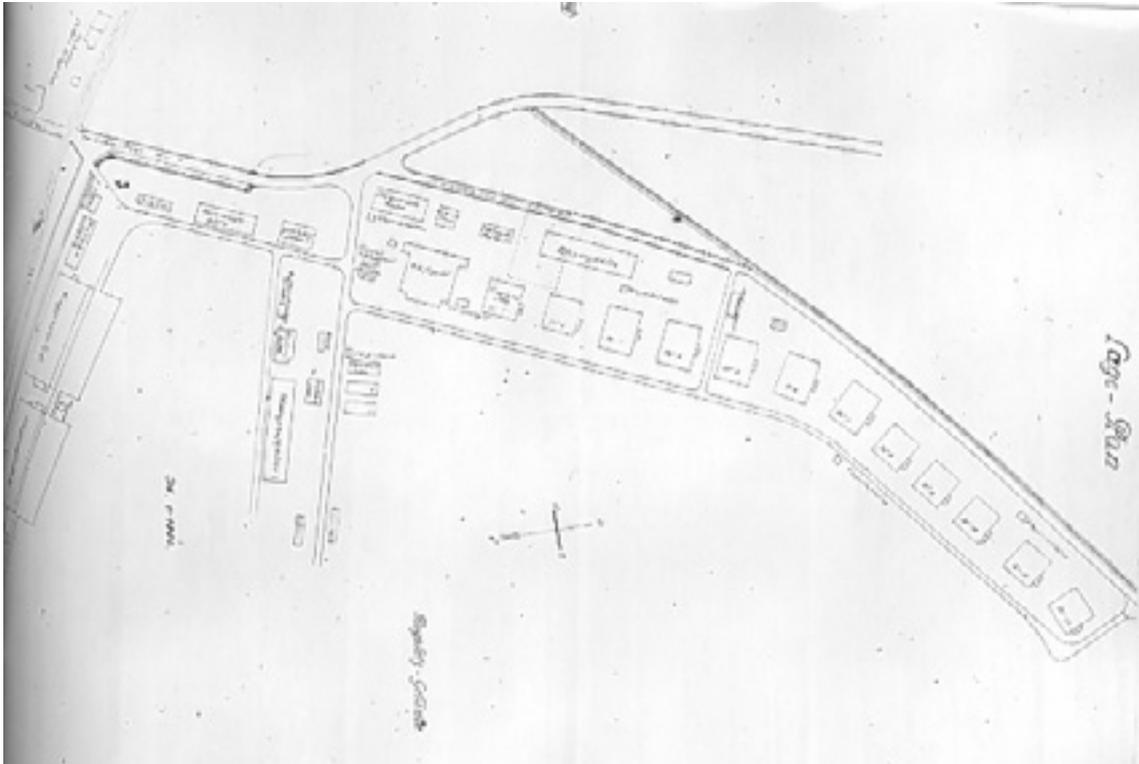
No. 8.B.411.



ENEMY'S AERIAL SCHOOLS.

Three such aerodromes were visited at SPEYERDORF (E. of NEUSTADT) GERMERSHEIM and HAGENAU. (Plans and photos of the aerodromes are attached. Nos. 8.B.256, 321, 314, 315, 412, 413).

No. 8.B.256.



No. 8.B.321.



No 8.B.314.



No. 8.B.315.



It is interesting to note that all three were laid out in 1918, and were of Bavarian organisation. At the cessation of hostilities these aerodromes were still incomplete. The construction was very elaborate, and appliances and installations were up-to-date and solid. It will be seen from the plans that all were built on a stereotyped form, with ample accommodation both for machines and personnel. The buildings, both for pupils and men, were very comfortable and well fitted up. No dugout accommodation was found at any of the above three aerodromes. The approaches and surface of these three aerodromes (perhaps with the exception of HAGENAU) were good.

The presence of the following unity was confirmed; At SPEYERDORF, No. 2 Bavarian Military Flying School, and at GEMMERSHEIM, No. 7 Bavarian Military Flying School.

(Note: Details with regard to hangars and other installations are dealt with later).

TYPES OF HANGARS, HUTTING ACCOMMODATION, & OTHER INSTALLATIONS.

For purposes of explanation, 8 types of hangars visited will be considered.

a). The most common type of hangar used by the Germans is shown in photograph No. 8.B.336.

No. 8.B.336.



These hangars are built entirely of wood and are 35 feet deep by 50 feet wide. At the open end they are 14 feet high, with doors 10 feet high. The roofs slope back to the rear wall of the hangar, which is 11 feet high. These hangars are collapsible and can be taken down or erected in a very short time. A good idea of the method of construction will be gained from the attached photographs (Nos. 8.B.334 and 338).

No. 8.B.334.

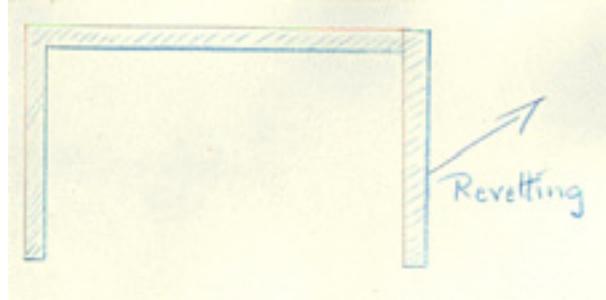


No. 8.B.338



In the centre of each hangar a pit had been dug about 9 feet wide and sloping from the front edge to a depth of about 3 feet. The total length of the pit is about 20 feet.

These hangars are all protected with a revetment varying from 6 - 8 feet in height, and 2 feet in breadth. The revetting is found sometimes outside, sometimes inside, the hangars, and at MORHANGE aerodrome the revetting in the case of some hangars was found to be alternately inside and outside.



(See photographs, Nos. 8.B.334 and 338, above).

This revetting, both inside and outside, consists of a wood sheeting behind which earth, and in some cases road metal and stones, were placed.

These hangars have been camouflaged by means of tarred felt nailed on to the top and sides. They were fitted up with electric light. It was possible to house three Scouts within these hangars, but more often they housed two. This form of hangar was chiefly used for the temporary type of aerodrome, possibly owing to the advantages of its superior mobility, but towards the end of hostilities it made its appearance on back area aerodromes also.

Hangars of this type were found on MORHANGE, BUHL, MONTOY, FOLPERSWEILER (SARREGUEMINES), and HAGENAU aerodromes.

b). This was a large type of hangar and was capable of housing 6-8 machines, and various types of material were used in its construction.

This type was like a house with roofs sloping from the centre down to the side walls. (See photographs, Nos. 8.B.314, 317, 319 and 335. For Nos. 314 and 319 see pages Nos. 9 and 3 respectively).

No. 8.B.317.





The structure was 60 feet square, with walls 15 feet high, and 18 - 20 feet high in the centre. The entrance was approximately 13 feet high with folding or open doors. In some cases the doors were opened outwards and downwards.

The construction of these hangars varied in few details. Some were found to be constructed entirely of wood, others had wooden roofs and doors, with plaster and cement walls.

The attached photographs will show the method of construction of the hangars.

The lighting of the hangars was provided by glass windows situated in the centre of the front and the rear of the hangar about 1 foot from the apex of the roof. In others, windows were found in the sides of the hangar, and in others the roof itself was partially made of glass and wood. One hangar was found at SPEYERDORF half as large again as the ordinary large hangar (see photograph No. 8.B.320) magnificently fitted up, and with workshops attached to it.



No hangar of this kind was found to be revetted either outside or inside.

At SPEYERDORF and GERMERSHEIM this type of hangar had concrete floors, but those nearer the front had not been treated in this manner. The heating of the hangars was effected by means of fires located in a small building adjacent to and touching the hangar, from which pipes radiated and kept the hangar at a convenient temperature. This, again, was only true of aerodromes in far back areas.

They were evidently of a mobile type and could be erected or pulled down within a short time.

In some cases, particularly at SPEYERDORF, the roofs were covered all over with tarred felt.

No attempt was made to camouflage these hangars except, in some cases, by branches or trees.

In each hangar was a small office which, in the case of schools at SPEYERDORF and GERMERSHEIM, was used by the instructors. At MORHANGE, these rooms were used by the mechanics.

Hangars of this kind were found at MORHANGE, DESTRY, SAARBRUCKEN (See photo. No. 8.B.293), MAYENCE, SPEYERDORF and GERMERSHEIM.

No. 8.B.293.



They were not always for the housing of machines; some were used for stores and spare parts. On aerodromes near the front it was unusual to find more than two hangars of this nature. (MORHANGE, 2.). It must be admitted that they were remarkably well erected and fitted up with all necessary appliances.

c). This type of hangar was generally of a very permanent nature. It had a brick foundation standing 6 feet above the ground, which carried walls of plaster intermingled with cement. The roofs were supported on steel and appeared to be made of concrete or thick corrugated iron. In some cases the walls and roofs were made of wood and steel, but cases of this were rare. The floors are concrete throughout. The large doors on the front of the sheds were steel and in some cases collapsed sideways in a combined folding and sliding fashion; in other

cases they opened downwards and outwards. Lighting was provided in large glass windows in the front and rear of the hangars which ran continuously throughout its length. (See photos. Nos. 8.B.275, 316, 282).

No. 8.B.275.



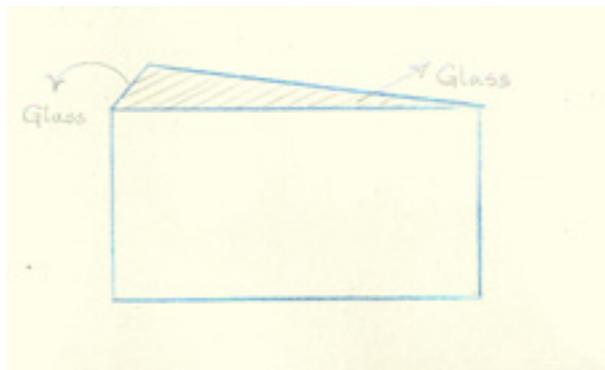
No. 8.B.316.



No. 8.B.282.



In other cases hangars had one large and ten small windows alike in the front and rear wall of the hangar. (SPEYERDORF. See photo, No. 8.B.316). The roofs were ingeniously designed to provide for this light as shown in the sketch :-



Besides these windows, there were several large windows in the back walls of the hangars (see photo.). The glass in some cases was wired and very strong.

At BUHL the large hangar was lighted by means of windows in the roof as well as the sides. (See photo. No. 8.B.266).

No. 8.B.266.



Artificial light was provided by a very complete electrical installation.

Arrangements were made for heating the sheds by a central heating plant consisting of combined steam and hot air systems.

For heating of the hangars, large pipes with funnelled branches were provided for dispersing hot air. These pipes were carried in roof trussing. (See photo. No. 8.B.327).

No. 8.B.327.



The dimensions of these hangars were 69 to 70 feet long, and 23 to 25 feet broad, and they accommodated 15 to 20 machines.

A very comprehensive idea of their construction can be got from the plans and photographs attached.

Hangars of this description were seen at FRESCATY, BUHL, HAGENAU, BITCHE and SPEYERDORF aerodromes. When commencing a new aerodrome, this type of invariably erected first, others of a more "shoddy" type being put up at a later date.

d). This type of hangar appears to have been used on aerodromes intended for the use of bombing machines, and was only found at BOULAY and THIONVILLE. (See photos. Nos. 8.B.361, 359, 358).

No. 8.B.361.



No. 8.B.359.



No. 8.B.358.



The aerodromes which were not visited, VILLIERS LA CHEVRE and COSNES, are known to have been similarly equipped. In shape the hangar somewhat resembles a capital 'T'. Its approximate dimensions are as shown in the sketch :-

(See photos. Nos. 8.B.376, 372.)

No. 8.B.376.



No. 8.B.372.



One hangar at BOULAY was larger than any others seen there or elsewhere, being 90 feet wide at the entrance and 45 feet wide at the rear wall. But those of ordinary size were evidently meant to house one large night bombing machine each, or possibly two if wings could be flooded.

The height of these hangars was about 35 feet, the roofs being covered with tarred felt. The framework, roof and sides, as may be seen from the photographs, were entirely of wood, cut in beams and strips and fitted together by means of bolts and screws. (See photos. Nos. 8.B.374, 285, 283).

No. 8.B.374.



No. 8.B.285.



No. 8.B.283



The hangars thus could be rapidly erected or dismantled at will, and with spares available could be very quickly erected.

The internal equipment also pointed to mobility being a special feature of this type of hangar. The floor was not boarded or dug in any way, and no attempts at revetting or heating appear to have been made. Electric lamps were the main source of light. No small offices within the hangars were found. Details of construction may be obtained from the attached photographs. (See above).

e). Hangars of this type were not so common, and were seen only at MORHANGE and MONTROY aerodromes. (See photos. Nos. 8.B.330, 333).

No. 8.B.330.



No 8.B.333.



They consisted of wood throughout and varied in length from 30 to 60 feet, being 10 to 15 feet broad, and 18 feet high in front, with a sloping roof to the back wall which was 10 feet high.

There were no compartments, and the hangars were capable of housing from 10 - 15 machines, but it is thought that they may have been used for lorries.

The floors were of wood and the doors opened outwards and downwards. No lighting of any kind was found other than that provided by the entrance.

These hangars were of a mobile type put hastily together by means of strips of woodwork each fitted to its neighbouring strip by means of bolts. They were not heated in any way. By way of revetting, they had a double back wall, and the intervening space was filled with stones. This was not visible from the outside.

This type of hangar did not appear to have been much used.

f). This species of hangar was only found at SAARBRUCKEN aerodrome and, as will be seen from the photograph (No. 8.B.294) was of a permanent type.

8.B.294.



It was most solid in its construction, and had a floor of concrete and was very well fitted up, lighted and heated.

Only curtains were used to cover the entrance of this hangar, although it was originally fitted to take sliding corrugated iron doors. Its housing capacity was 10 machines.

g). This hangar was also peculiar to SAARBRUCKEN aerodrome. (See photo. No 8.B.292).

No. 8.B.292.



It was capable of accommodating 30 machines, was well lighted and heated, and the internal installations were good. The floor was of concrete.

The method of closing the doors of the hangar is interesting. They consisted of corrugated iron strips, all joined and hinged together, which, when opened up, assumed a concertina shape.

Further reference to this hangar seems unnecessary, all details being clearly visible from the photograph.

h). The eighth type of hangar to be noticed is as shown on the attached photograph. (No. 8.B.267).

No. 8.B.267.



FOLPERSWEILER aerodrome provided the only sample met with. It will be seen to consist of two hangars joined together. They were made of wood with corrugated iron roofing and doors, had concrete flooring, and workshops were attached to either side of the hangar in lean-to sheds.

These hangars did not, as a general rule, house machines, as it was here that a large proportion of the repairs was carried out. There was no revetment of any kind, but heating was provided. Natural lighting was not so good as in other hangars visited, but electric light had been installed and was being used by the French when the aerodrome was visited.

It must be admitted that the German hangers were in every way good. The construction and solidity of the buildings were excellent. No attempt, however, was made to protect the machines in hangars except at MORHANGE. The enemy evidently concluded that our bombing squadrons were engaged on the bombing of railways, blast furnaces and factories, and it does not appear to have been occurred to him that his aerodrome would not be systematically bombed. Even when this did take place his first thought was for his personnel, and he has been prompt in the construction of good deep dugouts.

The presence of heating installations in aerodromes both of the temporary and of the permanent type is worthy of note, and the strength of the roofs of hangars, other than those of wood, is also interesting.

One cannot refrain from remarking that his installations were in every way as good as those of the Allies, and in some respects infinitely better.

It must not, however, be forgotten that the enemy was in his own country, and sites for most of these aerodromes were selected prior to the declaration of war. Although no confirmation has been received, hangars of type 'C' are thought to be old pre-war type drill sheds which were altered to meet requirements as they arose.

Little need be said of the enemy's housing installations. From the attached photographs it will be seen that they were of solid construction. Photograph No. 8.B.332, shows the living quarters of the officers at MORHANGE.

No. 8.B.332.



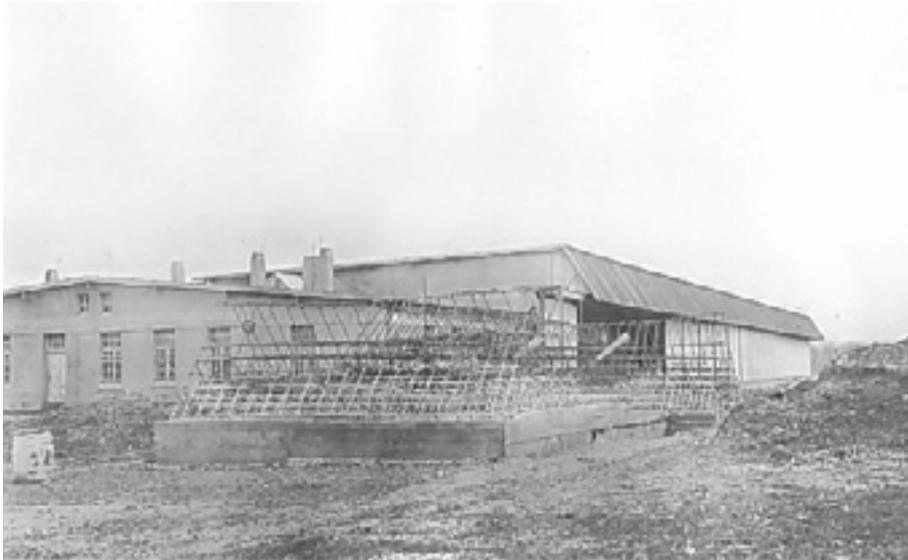
Each hut has four rooms and a washing room, and is well fitted up. Photograph, No. 8.B.312, shows the officers' mess, and living quarters of the 7th Bavarian Military Flying School.

No. 8.B.312.



Photograph, No. 8.B.352, shows the Squadron office at BUHL aerodrome, near the large uncompleted dugout.

No. 8.B.352.



In most cases officers and living quarters were constructed of plaster and cement and wood, and were well fitted up and were very comfortable. Where aerodromes existed close to villages, more than often both officers and men were billeted. This practice became more common towards the end of the war, undoubtedly owing to bombing and lack of material. From the plans of HAGENAU, GERMERSHEIM and SPEYERDORF, it will be seen where these buildings were located in relation to the hangers.

Photograph, No. 8.B.329, shows the control platform at MORHANGE aerodrome.

No. 8.B.329.



Photograph, No. 8.B.351, shows the Training School, still in the course of construction at BOULAY.

No. 8.B.351.



Photographs, Nos. 8.B.375 and 377, show types of bombs used by squadrons operating from BOULAY.

No. 8.B.375.





BOMBING ATTACKS ON AERODROMES AND THEIR RESULTS.

a). List of aerodromes giving number of times attacked by day and night

	Day	Night	Total
BOULAY	3	45	48
BUHL	25	16	41
MORHANGE	7	25	32
HAGENAU	5	-	5
FOLPERSWEILER	-	3	3
SAARBRUCKEN	-	-	-
MONTOY	1	-	1
FRESCATY	6	14	20

b). Reasons for attacks on aerodromes

The Object of attacking hostile aerodromes was two-fold :-

a). The presence of British Bombing Squadrons soon became known to our enemy and the probability of an offensive action against our aerodromes on his part was foreseen. It, therefore, became necessary to forestall his offensive by forcing him to adopt a defensive policy. As no enemy day-bombers were located in German Lorraine, attacks could only be looked for from his night bombing machines. By means of photography, and agents, and prisoners reports, the whereabouts of the hostile night bombers were determined. Accordingly attacks on his night aerodromes commenced in June 1918, and were actively carried on until the cessation of hostilities. This policy was certainly justified, the result being that our night and day bombing aerodromes were left practically unmolested. Instead of an offensive action, the enemy was forced on the defensive, the results of which will be dealt with in detail later in this report.

b). In 1918, the activities of our day bombers became more and more marked, and to combat this the enemy increased his scouts, until our machines could seldom bomb an objective and return without serious fighting. New aerodromes sprang up, while those already existing were enlarged. The enemy was determined to prevent our day bombing by a vigorous defensive policy to be carried out by his scout machines.

As a result of this, a portion of our day and night bombers were detailed to attack the principal enemy scout aerodromes situated close to and distant from the front line.

This had as its object, in the first place, the destruction of his machines or, failing this, to prevent them from getting off the ground. This policy was first begun in July 1918, and was actively pursued until the Armistice was signed. As will be shown later, this policy was only partially successful, its complete realisation being impracticable owing to the insufficiency of the forces available.

RESULTING GENERAL MATERIAL AND MORAL EFFECT OF BOMBING HOSTILE AERODROMES AND INSTANCES OF SERIOUS MATERIAL DAMAGE

Unfortunately, the aerodromes situated in reconquered Lorraine had been almost entirely dismantled by the resident civilians, and therefore little material damage was visible.

Civilian reports, however, gave a fairly comprehensive idea as to the results of our bombing.

On the whole one is forced to believe that, except on rare occasions, the actual destruction of hangars and installations has been moderate. But on the other hand, the material damage to the actual machines has been great. This was particularly noticeable in the case of wooden hangars at MORHANGE and BOULAY which have been pierced by numerous splinters and which the enemy did not find it worth while to repair.

Little or no damage has been done to the hangers of the types (see above) unless a direct hit on the roof has been obtained. The only case visible was at FRESCATY. One of the long hangars E. of the Zeppelin Shed was pierced by a bomb which has exploded on the concrete floor. The size of the crater is negligible, but the walls and roof are bespattered with holes from splinters. Any machines which were in this hangar at the time must have been riddled.

Judging from conversations with civilians, BOULAY

suffered considerably. Almost every hangar had received a direct hit. Even if hangars were not hit, and bombs exploded outside, the splinters seriously damaged the machines and rendered them useless for any flying until repaired. The effect of splinters on machines may be judged from the attached photographs (Nos. 8.B.101, 362, 360, 355).

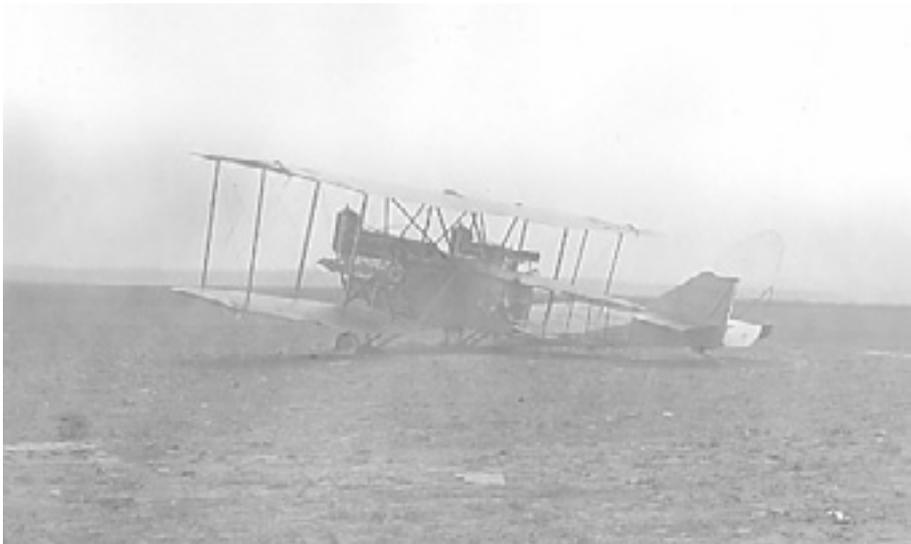
No. 8.B.101.

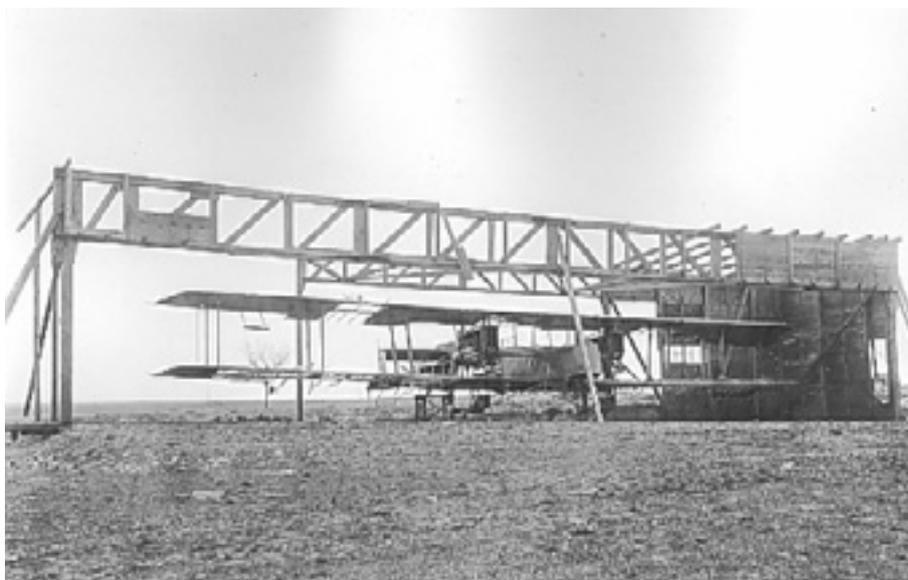


No. 8.B.362



No. 8.B.360.





From another source it appears that on average two machines were damaged as a result of each raid.

MORHANGE has also suffered, but not to the same extent as BOULAY; one long and three small hangars, all of which contained machines at the time, have been burnt down and replaced. Apart from this no other serious damage appears to have been done.

At BUHL, unfortunately, more damage had been done to unoccupied sheds. It appears that only the Northern portion of the aerodrome had been occupied, and that the Southern portion was still under construction when the Armistice was signed. At the time the aerodrome was visited all the small hangars had been removed.

Several bombs had fallen in front of the large hangar at BUHL, but there was no sign of any direct hit having been secured. The workshops at BUHL had been damaged from time to time, signs of which are still visible. (See photographs, No. 8.B.353).



The aerodrome at FOLPERSWEILER, which was occupied by the 19th German Army Aircraft Park, had been seriously damaged on one occasion. The damage caused by bombing, so far as could be seen, had been confined to the triangle at the S.W. corner of the aerodrome. The repairs affected were, unfortunately, successful in concealing most of the material damage.

All the aerodromes attacked, with the exception of HAGENAU, were very full of bomb depressions. Many more were found than those visible on photographs. Some very large craters were found on the landing grounds, some of which had never been filled in. In some cases, this form of material damage had caused the enemy grater loss in material the actual destruction of hangars and installations themselves. This was particularly noticeable at BUHL, which had been well covered with craters, and it was difficult to see how machines managed to leave the ground at times until these craters had been filled in.

At BOULAY, there were still signs of craters on the part of the aerodrome used, which comprised not more than half of the area available, as may be seen from the attached photograph (No. 8.B.406 - page 5). The remaining half had not even been levelled, and was certainly not fit for machines to land on. Judging from the number of craters on the finished portion, it would appear that the enemy must have been seriously handicapped when "taking off" or landing. This is borne out by civilians who state that during raids landings had frequently to be made on ground which had just been cut about by bombs, and, as a result, crashes had been more than usually frequent.

In view of the above, it can be safely stated that while the damage to aerodromes from a destructive point of view was moderate, the effects of the bombs themselves were much more far reaching, the efficient working of squadrons located at certain aerodromes being hampered by constant attacks both by day and night. For even if machines were not destroyed or seriously damaged, they were at any rate prevented from "taking off" to come and attack our own aerodromes.

The moral effect of our bombing was great. Civilians confirmed this and stated that the personnel had been very depressed with the constant bombing of their aerodromes. The inability to "strike back", more particularly in the case of the squadron at BOULAY, appeared to have lowered their morale. Their machines had been constantly damaged and, in consequence, little flying had taken place, the personnel remaining for days without getting off the ground.

At BUHL and BOULAY, it was found necessary to remove the personnel into the adjacent village to enable them to get a good night's sleep, but even here they had not been immune from the activities of our night squadrons, who dropped bombs on both these villages on occasions.

The moral effect produced by bombing scout aerodromes was also very marked. Civilians stated that flying decreased, and as soon as an alarm or raid took place, officers would at once take to the air and fly off to some other aerodrome, sometimes not returning for several days.

Furthermore, the bombing must have had a serious moral effect, if one may judge by the time, labour and material expended in the hasty construction of deep elaborate dugouts, which were not commenced until our bombing began.

INSTANCES OF SERIOUS DAMAGE

BOULAY.

On the night of 25/26th June, 1918, (first raid on the aerodrome) bombs were dropped by No. 100 Squadron. Civilians stated that considerable damage was done. Four hangers at the E. end of the aerodrome containing aeroplane stores were burnt down. All four hangars had to be rebuilt.

(There were originally 25 hangars on this aerodrome. They did not all contain machines. Civilians stated that only 15 hangars were occupied by Friedrichshafen machines. Three hangars were used for two-seaters, and the remaining nine were unoccupied or contained stores).

On the night of 15/16th September, 1918, a most successful raid appears to have taken place. One hangar was burnt out and another seriously damaged. This raid, apart from causing damage, finally decided the enemy to abandon the idea of using BOULAY any longer as an aerodrome from which to operate. In consequence, machines which had to carry out raids at nights were flown in the early afternoon to RUPLINGEN (N. of BOULAY).

(The above information was given by a photographer in BOULAY village).

MORHANGE

On the 16/17th August, 1918, a very successful raid was carried out on MORHANGE aerodrome. As a result, a long hangar (then thought to contain machines, but probably contained lorries), was hit several times and burnt to the ground. Other bombs destroyed by fire two hangars which at the time contained two scout machines each. A third hangar of similar type was riddled with splinters (still visible), and the machines were rendered unserviceable. One bomb struck the N. side of the southernmost large hangar and destroyed a machine. In addition, several bombs fell in front of these hangars on the aerodrome itself.

The above is of interest and is confirmed by aerial photography. (See photo. No. 8.B.414).

No. 8.B.414.



The same individual stated that about one month later a great deal of damage was done by a night raid, but he could give no details other than that two hangars had been destroyed. The raid referred to was probably that of 15/16th September, 1918.

FOLPERSWEILER

This aerodrome was only bombed once. The aerodrome was the 19th Aircraft Park of the German Army. Judging by the number of machines left behind by the Germans, there must have been at least 150 located here.

On the night of 22/23rd August, 1918, hostile machines bombed the aerodrome and caused an enormous fire which could be seen for miles. This fire appears to have resulted from the ignition of a large petrol dump situated in the small triangular wood to the S.W. corner of the aerodrome. The locality where this petrol was stored is about 50^x by 15^x and even now a gap about double this size is to be seen, with two fair sized holes in it. (See photo. No. 8.B.68.)

No. 8.B.68.



North of this wood and in the triangle is a long military loading platform near the railway. On this there were some munitions (bombs ?) and bombs appear to have struck this and exploded it. The result was that 100 feet of this platform ceased to exist. (See photo. No. 8.B.400).



One long shed containing workshops and two small living huts were completely destroyed, according to local reports. The fire appears to have spread to the triangle as all the buildings are now brand new and some have not been completely rebuilt. The civilians did not know whether any machines had been damaged. They stated that several casualties had been caused. No attempt was made to extinguish the fire which lasted well into the next day.

The civilians were very enthusiastic over this raid, and said that they had hoped an attack would be made on the living quarters of the officers and men located in the wood N.W. of the triangle. There were over 20 huts here with accommodation for 300 men. Some of these buildings were of brick and very substantial. In the compound was a large messing and recreational hut about 100' by 40'. Dugouts were also found.

Only a very small portion of this camp is visible on the photograph and it provides the one and only example met with of successful aerodrome damage. (See photo No. 8.B.267).



BUHL.

Unfortunately the civilians knew nothing about the damage done to the aerodrome installations. The strictest secrecy was kept, and only when bombs were dropped in the village did they get to know the result. On the 10th November, most of the bombs dropped were about 50^x to the N.E. of the BRUDERDORF - SAARBRUCK road. Some damage was done to the workshops at the N. corner of the aerodrome, but details are lacking. Serious damage was done to four houses in the village of BUHL on the night of 20th September. The houses were burnt out, which caused a very large conflagration. No casualties.

Towards the end, the civilians and military appeared to have adopted the procedure of evacuating the village as soon as the alarm was given.

HAGENAU

The French and civilians think there was little damage done to the aerodrome. The bomb which on one raid was thought to have hit the large hangar burst just N. of it, and was said to have rendered one machine unserviceable. Another bomb fell on the living quarters in the wood and completely destroyed a hut. There were no casualties.

FRESCATY

On the night of 26/27th February, 1918, bombs were dropped on FRESCATY aerodrome. These bombs set light to the large rear hangar, 100 yards long by 20 yards broad. All the machines inside were burnt. (See photos. Nos. 8.B.270, 401).

No. 8.B.270.





September 20/21st, 1918, 9.15 p.m. to 2.30 a.m., 13 bombs reported. One bomb hit the building containing the offices of FRESCATY aerodrome, and destroyed it. One bomb fell in front of the above building. A British aeroplane was shot down by A.A. fire over FRESCATY and its bombs exploded on contact with the ground.

RAPID REPLACEMENT OF DESTROYED INSTALLATIONS.

From visits to aerodromes, it can now be understood how the enemy was able to replace his hangars with so little difficulty.

No case of a large hangar of a permanent type (see above) having been burnt out, could be traced. But all wooden hangars were replaced with the greatest of ease, since, being made almost entirely of wooden strips, they were very simple to put together. Spare portions were kept on aerodromes attacked, e.g., BOULAY, MORHANGE. Where hangars were partially burnt they were not completely taken down but repaired by means of these spare portions. Moreover, the enemy found that he had placed his hangars far too close together, and a process of thinning out was commenced about the end of September after his aerodromes at BUHL and MORHANGE had been heavily attacked. Some of these hangars so removed were kept on the aerodrome as spares, others were transported to the landing grounds which had been hastily improvised as the result of our bombing.

Although the enemy hastily repaired his hangars where possible, the replacement of machines was by no means so rapid. Flights were often reduced to two machines. A flying officer at SAARBRUCKEN, who had been an instructor at the Bavarian School at SPEYERDORF, stated that he had heard that the scout squadrons had suffered appreciably losses, and that, in urgent cases, machines had been taken from the establishment at SPEYERDORF to replace casualties. The losses of the flight at SAARBRUCKEN had apparently been heavy.

COUNTER MEASURES TAKEN BY THE ENEMY FOR THE PROTECTION OF
MACHINES AND PERSONNEL.

1). Alternative Landing Grounds.

One of the indirect results of our bombing of enemy aerodromes, is that it appears to have forced him constantly to look for alternative landing grounds. This was borne out by the statements of civilians who had lived near the aerodromes throughout the war.

The case of BOULAY is particularly interesting. Here it appeared that the object of the enemy, in keeping emergency grounds available, was the provision not only of a safe place to which his machines could go to avoid bombing, but also of one from which he could carry out his operations unmolested. Thus as far back as July (BOULAY was bombed in June), he equipped FREISDORF aerodrome as an alternative landing ground, this measure being entirely due to British attacks.

He was bombed here, and as a result of this and the wet nature of the ground he abandoned this aerodrome. He then chose LELLINGEN aerodrome, and, as could be seen from aerial photographs, this time took the precaution of scattering his hangars. Here also he was found and again bombed. The soil was of a very wet nature, and he finally decided to leave it. RUPLINGEN aerodrome was his last choice but no hangars were erected. (See photograph, No. 8.B.118).

No. 8.B.118.



This emergency landing ground was not a success, the site being bad, and, as a result, crashes frequent. (See photo. No. 8.B.142).

No. 8.B.142.



It had not yet been abandoned at the time of the Armistice.

This result of our bombing itself constituted a great moral and material success. Great dislocation took place in the operations of the formation. The crashes which ensued, and the fact that they were continuously on the move, at times far distant from their base at BOULAY, did not improve the morale of the personnel of the squadron.

The necessity for alternative landing grounds was not limited to the night flying squadron at BOULAY. Both the scout aerodromes at MORHANGE (1. Kampfeinsitzerstaffel and 1 Jagdstaffel) were similarly affected.

It will be remembered that in September and October several new aerodromes were found to be under construction within the area SAARBURG - St.AVOLD. It is not suggested that all these aerodromes were for the sole use of MORHANGE and BUHL, but, whatever may have been the original intention, the enemy used them in fact as emergency landing grounds for his scouts.

Civilians stated that, as soon as an alarm was given by day, orders were that all machines not on patrol, that were capable of "getting off", were to leave the aerodrome and make for landing grounds such as DIEFFENBACH and GROS-TENQUIN, the

Surfaces of which were far from ideal. The result of this was that the enemy had to expend men and material in endeavouring to render these aerodromes serviceable, while, at the same time, the whole organisation of the squadrons was upset, with the natural chaotic results.

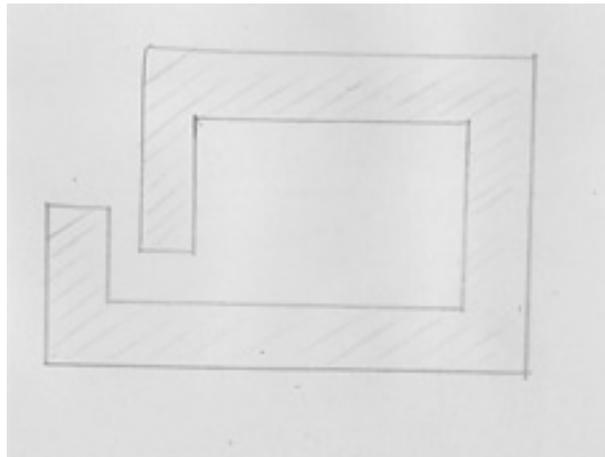
In conclusion, it may be said that attacks on the enemy's aerodromes achieved considerable results both directly and indirectly, and may be stated to have been entirely justified by results.

2). Dugouts.

Dugouts were found only where aerodromes had been bombed.

BOULAY.

Protective measures at this aerodrome were not found to be in an advanced state. The dugouts were poorly constructed and were more in the form of "above ground shelters" than dugouts. Three of these peculiar structures were located close together where two lines of hangars converge. They were built of concrete with walls 18" thick and 7' high. Only 1' 6" of these walls was sunk below the ground level. Their construction and shape are roughly as shown :-



There were no signs of overhead cover of any description having existed. From the photograph (No. 8.B.408 - see page 6) it will be seen that they were situated close to such living huts as did exist. It is possible that this was considered by the enemy to be sufficient protection for the small number of men left on the aerodrome at night.

BUHL.

At this aerodrome most elaborate dugouts have been constructed. (See photographs, Nos. 8.B.289, 350, 354).

No. 8.B.289.



No. 8.B.350.





Only one shed had been completed, the other two had only been started shortly before the Armistice. Their location can be seen from the attached photograph. (No. 8.B.406).

They were very large and substantially built of reinforced concrete. They were well designed and were sunk below the ground.

MORHANGE.

There were two different types of dugout at this aerodrome. It must be remembered that the hangars at this aerodrome were revetted but the living quarters were not. One dugout, which had been built some considerable time ago, was found at the Southern end of the aerodrome near the railway. This is clearly visible on the photographs, and is 200 feet long by 20 feet broad, being sunk to just below the level of the ground and with earth piled on the roof. The inside was propped with wooden struts, and consisted of several small rooms, all of which were connected by one long passage. There were openings and several windows well below the level of the ground (see photos. Nos. 8.B.331, 337).

No. 8.B.331.



No. 8.B.337.



This dugout had been hit and penetrated by what appeared to have been a 112 lb. bomb.

Of the other type there were three, all of concrete structure with one opening on to the aerodrome and one away from the aerodrome. When visited, these dugouts were full of water. They appeared to be sunk well into the ground, with about 6 feet of concrete above the level of the ground.



OUR KNOWLEDGE OF THE ENEMY'S INSTALLATIONS.

Generally speaking, our knowledge of the enemy's aerodrome installations was, with few exceptions, remarkably accurate, and the capacity, type and construction of the hangars correctly judged from aeroplane photographs. Observations now prove, however, that the Intelligence Dept. was inclined to be over-hopeful in the interpretation of results from the bursts show on the photographs.

They have certainly been puzzled by several types of installations, and have erred on the pessimistic side in assuming that every building housed machines of some kind. This was particularly true in the case of MORHANGE aerodrome. On this ground there are buildings which, from an aerial photograph, looked as if they were intended to house machines. These buildings turned out to be living quarters.

It is also thought that sufficient allowance was not made for buildings housing the enemy's motor transport, all of which was to be found on the aerodrome. In some cases the enemy housed his lorries in hangars, a policy frequently adopted by the Allies, but these hangars were nearly always counted as containing machines. The result of this was that the enemy's strength in machine was greatly overestimated.

The enemy made great use of hangars as workshops. At almost every aerodrome visited this was found to be the case. At BUHL, for example, in the Northern portion of the aerodrome lies a long shed. This shed was thought to have contained machines. In reality this building consisted of workshops. Emphasis is laid on this point for, should a landing operation

Be planned on a hostile aerodrome with a view to destroying machines, it is of vital importance to know what such and such a building is and what it contains.

It is though that some mention should be made of the correctness or otherwise of agents' reports with regard to aerodromes. In the majority of cases these reports have been grossly exaggerated and incorrect; but as an example of the correctness of agents' reports, that received on SPEYERDORF aerodrome might be mentioned. This report was correct in every detail and filled in the gaps of required information which the aerial photographs could not show.

If an attack in the manner which was contemplated had been carried out on this aerodrome, it is though that the prospects of success would have been very good.

On the whole, the British Bombing Squadrons were very well informed as to what they had to attack and as to the defensive measures they had to contend with.

COMPLETENESS OF PHOTOGRAPHIC RECONNAISSANCES AS REGARDS AERODROMES SITUATED BETWEEN THE MOSELLE AND THE RHINE.

As it was not until shortly before the conclusion of hostilities that British scout machines appeared about to become available for the protection of our bombing machines, and, as their numbers were, even then, too small to permit of their making themselves felt to any great extent, it became necessary for the bombing machines to do something themselves towards keeping down the ever-increasing numbers of enemy home-defence scouts. These were accordingly attacked on the ground with considerable frequency during the Summer and Autumn of 1918, as also were such aerodromes in the area as were accommodating large night machines likely to attack our own grounds.

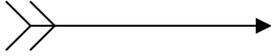
In obtaining reliable information as to the enemy forces to be encountered, and their distribution within the area covered by the British raids, the photographic reconnaissance machines rendered most valuable service, and as a proof of how efficiently the work was carried out in spite of the great altitude at which these machines were obliged to fly, it will suffice to mention that, as far as can be discovered, there were only two aerodromes in the whole district between the MOSELLE and the RHINE valley North of LANDAU which were not discovered and photographed by our reconnaissance machines. (The two exceptions both lie N. of Metz and were quite unimportant aerodromes which probably only existed for a few weeks during the final stages of the war). Photographs thus obtained were in many cases supplemented, and on a few occasions, anticipated by others taken from lower altitudes by bombing machines during the course of the raids.

For the purpose of planning attacks in the first place, and of estimating results after attacks had been carried out, such photographs of aerodromes proved of the utmost value to day and night squadrons alike.

In addition to watching active aerodromes, a large number of unoccupied but potentially active grounds were kept under observation.

All this work was performed with the loss of only one reconnaissance machine, a result which must be considered very satisfactory in view of the information obtained and the period covered.

SIGNS AND SIGNALS.

- | | | | |
|----|---------------------------------------|---------------------|---|
| 1. | <u>Landing Tee</u> | Landing machine |  |
| | | Direction of wind |  |
| 2. | <u>Landing Lights</u> | 'F' signifies flare | |
| | | F. (White). | |
| F. | (red) | 100 - 150 m. | Direction of wind |
| | | 250 - 300 m. |  |
| | | F. (white). | |
| 3. | <u>Very light signals and rockets</u> | | |

1. In case a machine in the air wishes to land, but this for some reason (another machine on the ground, crash, etc.) is impossible, red lights are fired.

As soon as the ground is clear for landing, red-green lights are fired.

2. To help ones own machine and those belonging to other units to find the ground, red-green lights are fired.

(b). By night.

1. In cases of night landings the following rules will be observed. If a machine fires a white star light from the air, two red lights must be fired in reply (to show the pilot where he is).

2. If the machine, in addition to the white star light, fires a red star light, this is a signal that he is about to land. Landing flares to be lighted forthwith.

3. A machine from another aerodrome fires a white star light bursting into green stars. As a token of recognition, three red star lights must be fired if the machine now proceeds to fire a white star light, that is to be taken as a summons to display the landing lights.

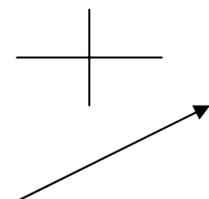
VISUAL SIGNALS.

Orders for the display of visual signals are given by either the O.C. Squadron or by the officer specially charged with this duty, or one acting for him.

The signals must be laid out as rapidly as possible, and as soon as this is done the persons concerned must at once retire to a distance from the sign so that their shadows may not render its reading more difficult.

Colour. - Red during snow: at all other times, white.

1. Signal to land.
2. Direction arrow. To be laid out on Each occasion, in accordance with the Instructions of the competent officer

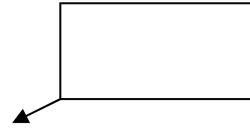


3. Waiting signal.

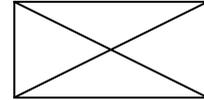
Gain height and wait.



4. Arrow made of four strips affixed to signal (3) indicates the direction to be watched.



5. This signal denotes:
D machines only,
land to fill up with petrol.
C machines to make height.



(Note:- The above was found at MORHANGE aerodrome).
