

a shelter trench. The trenches commonly in use were lined with concrete and were roofed and covered with earth; but they gave no protection against a direct hit, and, in the nature of things, they had to be within a short distance of the hangars and offices.

140. Only non-essential personnel took cover; aircraft crews and the staff of the Operations Room remained at their posts. The morale of the men and women of ground crews and staffs was high and remained so throughout.

141. At Kenley and at Biggin Hill direct hits were sustained on shelter trenches, at the latter place by a bomb of 500 kilog. or more. The trench and its 40 occupants were annihilated.

142. Wooden hangars were generally set on fire by a bombing attack, and everything in them destroyed.

143. Steel, brick and concrete hangars, on the other hand, stood up well against attack, though, of course, acres of glass were broken. Hangars were generally empty or nearly so, and those aircraft which were destroyed in hangars were generally under repair or major inspection which made it necessary to work under cover.

144. It must, nevertheless, be definitely recorded that the damage done to Fighter aerodromes, and to their communications and ground organisation, was serious, and has been generally under-estimated. Luckily, the Germans did not realise the success of their efforts, and shifted their objectives before the cumulative effect of the damage had become apparent to them.

145. Damage to aerodrome surface was not a major difficulty. It was possible for the Germans to put one or two aerodromes like Manston and Hawkinge out of action for a time, but we had so many satellite aerodromes and landing grounds available that it was quite impossible for the Germans to damage seriously a number of aerodromes sufficient to cause more than temporary inconvenience.

146. This is an important point, because, in mobile warfare, Fighter aerodromes cannot be hastily improvised in broken country, and the number of aerodromes actually or potentially available is a primary factor in the "Appreciation of a Situation."

147. Sector Operations Rooms were protected by high earth embankments, so that they were immune from everything except a direct hit, and, as a matter of fact, no direct hit by a heavy bomb was obtained on any Operations Room. Communications were, however, considerably interrupted, and I must here pay a tribute to the foresight of Air Vice-Marshal E. L. Gossage, C.B., C.V.O., D.S.O., M.C., who commanded No. 11 Group during the first eight months of the war. At his suggestion "Stand-by" Operations Rooms were constructed at a distance of two or three miles from Sector Headquarters, and a move was made to these when serious attacks on Fighter Aerodromes began. They were somewhat inconvenient make-shifts, and some loss of efficiency in Interception resulted from their use. Work was put in hand immediately on more permanent and fully-equipped Operations Rooms conveniently remote from Sector Headquarters; these though in no way bomb-proof, were

outside the radius of anything aimed at the Sector Aerodrome, and owed their immunity to inconspicuousness. Most of these were finished by October 1940.

148. Aerodrome Defence against parachute troops, or threat of more serious ground attack, was an important and a difficult problem, because Home Defence troops were few and were needed on the Beaches, and the majority of troops rescued from Dunkerque were disorganised and unarmed. The Commander-in-Chief, Home Forces, did, however, make troops available in small numbers for the more important aerodromes and armoured vehicles were extemporised. The difficulty was enhanced by a comparatively recent decision of the Air Ministry to disarm the rank and file of the Royal Air Force. The decision was reversed, but it was some time before rifles could be provided and men trained in their use.

149. The slender resources of the Anti-Aircraft Command were strained to provide guns for the defence of the most important Fighter and Bomber Aerodromes. High Altitude and Bofors guns were provided up to the limit considered practicable, and the effort was reinforced by the use of Royal Air Force detachments with Lewis guns and some hundreds of 20-mm. Cannon which were not immediately required for use in Aircraft

150. A type of small Rocket was also installed at many aerodromes. These were arranged in lines along the perimeter, and could be fired up to a height of something under 1,000 feet in the face of low-flying attack. They carried a small bomb on the end of a wire. Some limited success was claimed during a low-flying attack at Kenley, and they probably had some moral effect when their existence became known to the Enemy. They were, of course, capable of physical effect only against very low horizontal attacks.

151. The main safeguard for Aircraft against air attack was Dispersal. Some experiments on Salisbury Plain in the Summer of 1938 had shown that dispersal alone, without any form of splinter-proof protection, afforded a reasonable safeguard against the forms of attack practised by our own Bomber Command at the time. Thirty unserviceable Fighters were disposed in a rough ring of about 1,000 yards diameter, and the Bomber Command attacked them for the inside of a week with every missile between a 500-pound bomb and an incendiary bullet, and without any kind of opposition. The result was substantially:—3 destroyed, 1 damaged beyond repair, 11 seriously damaged but repairable, and the rest slightly damaged or untouched.

152. I therefore asked that small splinter-proof pens for single aircraft should be provided at all Fighter Aerodromes. This was not approved, but I was offered pens for groups of three. I had to agree to this, because it was linked up with the provision of all-weather runways which I had been insistently demanding for two years, and it was imperatively necessary that work on the runways should not be held up by further discussion about pens. I think that the 3-aircraft pens were too big. They had a large open face to the front and a concrete area, of the size of two tennis courts, which made an ideal surface for the bursting of direct-action bombs. Eventually, splinter-proof partitions were made inside the