233. We relied on daytime interception methods, and on the Searchlights to illuminate and hold the Bombers. If they were capable of doing this, all would be well, since the distance at which an illuminated Bomber can be seen by night is comparable with the range of visibility by daylight.

234. The first night attack worthy of the name was made early in June and the results were encouraging. Aircraft were well picked up and held by the Searchlights and 6 were shot down. The attack was, however, made at comparatively low altitudes (8,000-12,000 ft.) and the Germans, profiting by this lesson, resorted thereafter to greater heights at which the Searchlights were practically ineffective. In close consultation with myself, General Pile tried every conceivable method of operation, but without material success.

235. About this time Radio Location instruments were fitted in Blenheims and it became necessary to develop at high pressure a system of operation which should enable Night Fighters to make interceptions even against unilluminated targets.

236. The difficulty of this task will be realised when it is considered that it became necessary to put the Fighter within one or two hundred yards of the Enemy, and on the same course, instead of the four or five miles which were adequate against an illuminated target.

237. It may be asked why the Searchlights were so comparatively impotent when they had afforded an accessory to successful defence at the end of the last war. The answer lies partly in the height factor already discussed, and partly in the greatly increased speed of the Bomber, which was about three times that obtaining in 1914. The sound locator, on which Searchlights mainly relied at this time, naturally registered the apparent position of the source of sound and lagged behind the target to the extent of the time taken by sound to travel from the target to the Sound Locator. When the speed of the target is low it is comparatively easy to allow for this lag, but at the speeds of modern bombers the angular distance which must be allowed for in searching is so great that the Searchlights were generally defeated.

238. The first thing which appeared obvious to me was that a "sound Plot" track transmitted from the Observer Corps with a variable and unpredictable "lag" was good enough only for Air Raid Warning purposes and was much too inaccurate to be of use for controlled interception at night: height indications also were little better than guesswork. The Radio Location apparatus (known as A.I.) fitted in twin-engined fighters had a maximum range of 2 or 3 miles, but it was limited by the height at which the Fighter was flying. If, for instance, the Fighter was flying at 10,000 feet, ground echoes were reflected from all ranges greater than this, and an aircraft echo from 10,500 feet would be indistinguishable among the ground echoes.

239. The minimum range of the A.I. was also restricted at this time to about 1,000 feet. Below this distance the aircraft echo was swamped by instrumental disturbance. Continuous and intensive development work was in progress to minimise these limitations.

240. No Radio Location apparatus was available at this time for inland tracking, and I turned for help to the Army, which had developed for use with guns a Radio Location apparatus known as the G.L. Set. Within a limited range (about 40,000 feet) this set could give very accurate position plots, and, moreover, could read height to within plus or minus 1,000 feet at average ranges.

241. Although these sets were few in number and were urgently required for their original purpose of gun control, General Pile realised the urgency of our need and made available about 10 sets for an experiment in the Kenley Sector on the usual line of approach of London Raiders, which commonly made their landfall near Beachy Head.

242. The G.L. sets were installed at Searchlight Posts, and direct telephone communication was arranged with the Kenley Sector Operations Room. Here a large blackboard was installed, and the G.L. plots were shown at intervals of about 30 seconds and with a greater accuracy in height than had before been possible by any means.

243. The track of the pursuing fighter was determined by means of the R/T Direction Finding Stations.

244. Major A. B. Russell, O.B.E., T.A.R.O., co-operated in the development of this system in the Kenley Sector. His practical knowledge and tireless enthusiasm were of the greatest value.

245. Promising results were obtained almost from the first and numerous instances occurred where echoes were obtained on the A.I. sets in the aircraft. Practical results were, however, disappointing, partly because the A.I. apparatus proved to be unexpectedly capricious in azimuth, and partly because the Blenheim was slower than many of the German Bombers and was deficient in fire-power. Many Germans escaped after an initial A.I. "pick-up" and even after visual contact had been effected.

246. The A.I. apparatus was then fitted into the Beaufighters, which were just beginning to appear in Service. The machines and their engines suffered from "teething trouble" to an unusual degree, and the adaption of A.I. to a new type was accompanied by certain difficulties. In addition, they were operating from a wet aerodrome at Redhill, and the development of delicate electrical apparatus, combined with a new type of aircraft and engine, with rudimentary maintenance facilities, was a matter of the greatest difficulty. In nine cases out of ten something would go wrong with the aeroplane or with the A.I. set or with the R/T Direction Finding apparatus or with the Communication system before an interception could be made. No. 219 Squadron, under Squadron Leader J. H. Little, were engaged in this work and operated with great energy and enthusiasm under extremely adverse and difficult conditions.

247. It would, of course, have been desirable to carry out all this development work by day when faults would have been much more easily detected and remedied, but the low rate of Aircraft Serviceability precluded Day-and-Night work, and London was being bombed almost every night, so that I could not afford to neglect the chance of getting practical results.