

Pre-war experience had shown that under good conditions and within certain ranges sound-locators could pick up and follow single slow-flying targets and that, by making due allowance for the fact that sound travels comparatively slowly, searchlights could be directed at the actual position of the target.

47. The use of sound-locators with the guns involved the additional complication that the guns had to be directed not at the actual position but at that position where the aircraft might be expected to be by the time the shell burst in the sky. What had to be done, therefore, was to track the target by sound-locator for some time in order to establish its course, then to pass information to the guns on which a future position could be calculated, take the necessary steps to aim the guns and set the fuzes. In all, this meant allowing an interval of anything up to a full minute between the calculation of the target's future position by a sound-locator and the arrival of the shell at its destination. During this interval the aircraft might be expected to fly between four and six miles.

Moreover, in calculating the future position, it had to be assumed that the aircraft would continue to fly on a constant course at a constant height and at a constant speed, the likelihood of which was small after the first signs of interference by the ground defences.

48. The plan which was evolved for the defence of London was known as the Fixed Azimuth System. Two lines of sound-locators spaced at 2-mile intervals were sited at right-angles to the Thames Estuary on the eastern flanks of London and another similar system was laid out on the western side.

Each sound-locator was directly linked to the London Gun Operations Room and it was expected that the two nearest locators in the outer line would on the approach of an enemy aircraft be able almost simultaneously to report a bearing and an angle of sight from which the Operations Room could determine the position and height of the plane by calculating the intersection. Similar information from two locators in the inner line would supply direction and speed.

The Operations Room could then fix a "future position" at which the target would be engaged. This position would be passed in code back to the guns who would make the necessary adjustments to suit their own situation and fire on a given order.

49. In the cities of the provinces the problem was less acute because the smaller size of the target limited the area in the sky in which the enemy could operate successfully. Consequently in many places it was possible to work out geographical barrages which could be fired on an order from the local Gun Operations Room and guns were sited accordingly.

50. Sporadic night raids against this country began during the Summer of 1940. In early August they began to intensify and on 8th/9th August provincial cities were attacked by raiders endeavouring to make precision attacks on certain factories. The emphasis was on the Midlands and the West, but the enemy's effort

was scattered and no real test of the defences occurred; a few planes were shot down and others damaged in widely divergent areas.

51. Between 25th/26th August, 1940, and 6th/7th September, 1940, there was noticeable a somewhat greater degree of concentration in the enemy's attacks, though it was still in the Midlands and the West that the main attack fell, over 100 planes attacking Liverpool on four nights in succession.

Forty-eight planes were destroyed by gunfire during this period.

A few aircraft had flown over London by night during this period, but it was on the night of 7th/8th September, 1940, following the first heavy raid by day, that London was first singled out as a major objective and one which was thereafter to be continuously attacked.

52. The Fixed Azimuth System broke down completely. The enemy was now operating at greater heights and sound-locators could not always detect the aircraft; at other times more than one plane was operating between two locators and there was no certainty that both equipments were tracking the same aircraft; the assumption that the main approach to the Capital would be up the Estuary was not always fulfilled (probably owing to the new German navigational aids) and many planes passed outside the flanks of the sound-locator layout; finally, faults developed in the communication system and large sections of the front were put out of action for long periods. In consequence, few of the 92 available guns received data on which they could fire.

53. I realised that the mere introduction of more guns would not alone solve the problem, although within 48 hours the number had been increased to 203. I therefore decided, on 11th September, 1940, that guns which were unable to fire on the Fixed Azimuth System should be given a free hand to use any method of control they liked.

54. The volume of fire which resulted, and which was publicized as a "barrage", was in fact largely wild and uncontrolled shooting. There were, however, two valuable results from it: the volume of fire had a deterrent effect upon at least some of the German aircrews, so that, though it cannot be proved by records, I have every reason to believe that one third failed to reach their objective; there was also a marked improvement in civilian morale. Against this there was an expenditure of ammunition which, besides being far greater than was justified by the results achieved, could not be maintained indefinitely without seriously depleting the ammunition reserves.

55. There was a strong suspicion at this time that the German raiders were using two prominent landmarks—the Isle of Dogs and Hyde Park—over which they turned to their various objectives. Two geographical barrages, designed to explode over these two points, were, therefore, worked out and were fired for the first time on the night 26th/27th September, 1940. There was no marked improvement in the number of raiders destroyed but the plan had the advantage of controlling the ammunition expenditure.