To cause the bomb to explode it is merely necessary to bring the separate pieces together rapidly. As soon as this happens a chain reaction sets in. Successive generations of neutrons follow each other in periods measured in millionths of a second. Each neutron that cannot escape from the mass of the fissionable material causes the release of a number more and so on; and each fission of uranium or plutonium atoms contributes energy in the form of heat or gamma and other rays. The whole process, involving billions upon billions of atoms, is complete in an exceedingly brief instant and the release of energy is incredibly large and violent.

There is no known way by which fissionable material in less than critical size can be made to explode -- there is likewise no known way by which amounts in greater than critical size can be prevented from exploding. The facts of the situation are clear and well understood, and there is little possibility that they will be changed by new knowledge coming from further scientific research and development. There is thus no way, and no likelihood of one being found, by which an atomic bomb might be neutralized. It is not against the bomb, therefore, but against its carrier that we must look for forms of defence which might prove effective.

The carriers which might be used for atomic bombs are:-

(a) the long range guided missile, whether it be rocket or crewless aircraft;

(b) manned aircraft of the large bomber class;

(c) submarines and other carriers or saboteurs who would place the bombs with delay fuses in position by stealth.

Of these, guided missiles have today a reliable range of perhaps two or three hundred miles. Unmanned aircraft will travel well above supersonic speed and rockets may have velocities of five thousand or six thousand feet per second which is more than four times that of sound at sea level.

It is likely therefore that these missiles, because of their great speed, will be almost immune to enemy interference. Their accuracy is of the order of a couple of percent of range -- that is, even now they can be placed with certainty within the limits of a large target, such as a city, which is the only kind of target they would be used against in any event. Nothing less than a few million people and their goods and chattels would be counted as a worth while target until all such remunerative objectives had ceased to exist.

There is thus very little hope of effective defence against the guided missile once it has been launched. The only prospect is to deal with the ship, or other platform from which it is to be launched, to hold it out of range or at least to prevent it from launching its missile at short range where the accuracy would be higher. Thus, as matters stand at the moment, there is a sort of defence to be found in distance but this is not very comforting as ranges for guided missiles certainly show every indication of great increase, perhaps even to the extent of substituting thousands of miles of range for the present hundreds within a few decades. However, these futuristic conditions are not here yet, and most fortunately we are a long way from the push button type of warfare described in the sensational magazines.

Manned aircraft in the large bomber class which have been specially designed have today a radius of action of about five