

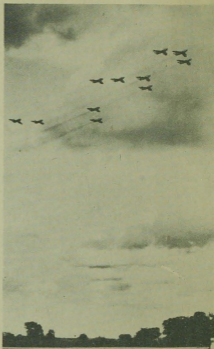
FUTURE ANTIAIRCRAFT EMPLOYMENT

Major R. Elsmie



HERE is a great body of opinion at large today that condemns the antiaircraft gun saying it is outdated and useless against the modern high-speed aircraft. Murmurs about guided missiles are heard and the view is often expressed that they are the only sure defense for the future.

The general principles of antiaircraft defense as practiced today follow a very rigid set of rules. The Royal Air Force finds, by means of long-range radars, all airborne targets. The position of these targets is reported to various Royal Air Force centers where the raids or plots are identified as being "friendly" or "hostile." This information is then extracted and passed to the gun positions to assist them in identifying targets located by their own local radars. The Royal Air Force is then empowered to restrict the fire of the guns depending on the position of any friendly aircraft. It can, and often does, impose restrictions on firing that make it virtually impossible for the guns to fire at all. This process takes a considerable amount



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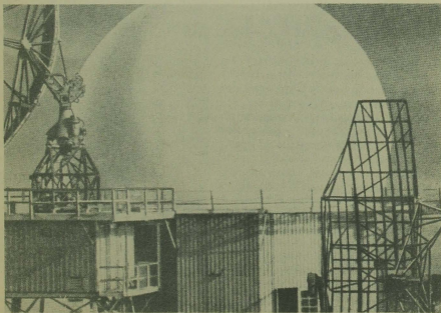
In all modern engagements against air targets **time** is the key factor. It is time that is needed to find an enemy bomber by radar so that our own fighters, guided missiles, or guns can be directed onto their targets. All these countermeasures against an attacking bomber take time to get underway and with bombers flying at ever increasing speeds this much needed time is becoming less and less.

It is a well-known fact that modern radar aids can only operate on the line of sight — in straight lines— and that an aircraft flying below the horizon cannot be detected. It follows then that the higher an aircraft flies the sooner it will be seen over the horizon and that a very low flying aircraft at sea level will give very little warning of its approach.

It can be said that time is available in direct proportion to the height at which the attacking aircraft is flying. The higher it flies the more time there is available to locate it and to set countermeasures in action.

Radar is, therefore, the key to the

problem. In the first place it locates and secondly plays a very active part in the interception of the bomber. If the enemy aircraft is flying at 40,000 feet, it can be located by radar a good 200 miles away, but one at sea level may not be seen until it has almost arrived and quite often may not be seen at all by radar. Radar at low angles is difficult to use for two main reasons. The first is that the warning it can give is very short and very often no warning at all is given. The second is that working at low angles radars pick up echos from the ground itself which makes the tracking of targets very difficult and most



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unreliable.

It is now possible to see that the sky above us can be divided into bands:

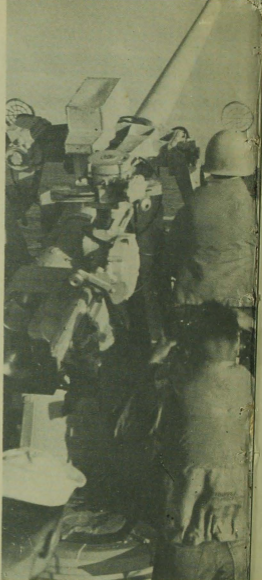
1. **High band** — in which all flying objects can be located without difficulty and in ample time for countermeasures to be put into operation.

2. **Medium band** — in which flying objects can be located without difficulty but without sufficient time for countermeasures to be put into operation by airborne pilots or guided missiles.

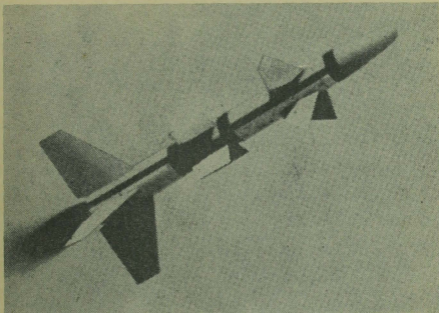
3. **Low band** — in which flying objects may be located by radar but are more likely only to be spotted by human eyes and also in which radar is ineffective for directing interceptions.

The exact determination of where the various bands begin and end will depend entirely on the expected speed of an attacking force. The greater the speed the sooner the radars have to locate them and the higher the band will have to be. The dividing lines between bands can be given in heights quite easily based on the known performance of enemy aircraft.

The only form of enemy bomber that cannot be classified as flying in a height band is the V-2 type of bomb. These are fired from ground level and rise to a great height and then descend onto their targets. It is not proposed to discuss the destruction of these weapons but they can be tracked by radar and they should be taken on by guided missiles and destroyed at great heights where their explosion will have no effect on the ground.



The problem of the anti-aircraft gunner in the medium band stripped of all technicalities is to locate his target, determine its course, and fire a shell to intercept the target as shown in photo above.



Talos, new surface-to-air guided missile.

The division of responsibility for the bands in space must now be discussed. The high band should be handed over to the human pilots and guided missiles. In this band they can operate with the maximum efficiency with ample warning of the approach of any enemy and with all the interception aids working at maximum efficiency. The Royal Air Force is in its own element and obviously must command all other friendly forces operating in the same area, hence its command of guided missiles. This band is also well out of range of any gun.

The medium band is the one where time is short and the Royal Air Force countermeasures cannot operate effi-

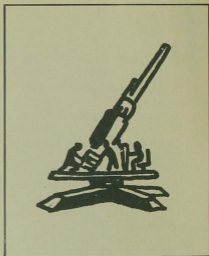
ciently. It is in this band, say below 20,000 feet, that guns and projectiles are the most efficient weapons. Some assert that the gun is already out of date but few appreciate the fact that projectiles have been passing through the sound barrier for many, many years. In fact a high velocity projectile traveling at more than twice the speed of sound is in effect a missile put onto its target by radar and steered to its interception by the gun. It is a small guided missile which differs only from a true guided missile in that once it leaves the barrel of the gun its course cannot be altered. On the other hand its time of flight to a limited height of 20,000 feet is very short. It takes

far less time to guide onto its target than an aircraft flying at half the speed and with a rate of climb that bears no comparison to that of the projectile. The gun in the medium band with less time available is still the most efficient weapon.

In the low band, where radar is so uncertain, the human eye and quickness of hand of the light anti-aircraft weapons gunner can still compete with the high-speed aircraft. This is more than proved by the figures of the United Nations air losses at low level in Korea even at the hand of the Chinese.

The problem of the anti-aircraft gunner in the medium band stripped of all technicalities is to locate his target, determine its course, and fire a shell to intercept the target. As every one knows it is easy to hit a stationary object or a slow moving one. In fact, it is so easy that it is considered unsporting to hit a "sitting bird." A bird moving slowly can usually be brought down by firing only one barrel of a 12-bore while a faster moving bird may be missed with the first barrel and a second attempt must be made with the second barrel.

The modern anti-aircraft problem is the same. To hit a very much faster moving bird the rate of fire must be multiplied so as to increase the probability of a hit. The required rate of fire has been achieved in the modern anti-aircraft gun. There remains the effectiveness of the burst of the shell and the distance from the target at which disablement is possible. Here the now possible atomic shell should be of inestim-



able value. It would disable an aircraft at distances far exceeding the present high explosive shell and, exploded at a height, would have no ill effects upon objects or persons on the ground.

The anti-aircraft gunner's chief enemy in the modern battle is still time. The gunner works at relatively short ranges and time is, therefore, short and every fraction of a second is vital to him. At the moment, as outlined earlier, the target goes through a complicated screening to ensure it is not a friendly one. The process may take up to 2 minutes by the time the gunner knows whether or not he may open fire. This delay, where seconds count, is completely unacceptable if the gun is to be given a fair chance of a kill. Since fighter aircraft are inefficient at low heights, they should be banned from operating in them so as to allow an uninterrupted en-

agement of a target by those better suited to take it on. Safeguards, of course, will have to be introduced near airports and for pilots in difficulties on their way home, but these problems are not insoluble.

The anti-aircraft problems of the present day and of the future are based on time. If an enemy can be located in time, he can be dealt with. There is a height below which time is too short to employ human pilots or guided missiles against an enemy and it is at this height and below that anti-aircraft guns are still the most flexible and efficient weapons that can be used. To assist them in

their task it is essential to remove the time-wasting procedure now in force for identification, and guns must be given a free hand in their sphere with planes avoiding the area in their own interests.

The air battle can only be won by using the most efficient weapon in the right place. Aircraft are not efficient at interception at low heights and the gun is extremely inefficient at great heights. Each should be employed to maximum intensity in the spheres where they work at their greatest efficiency and one should not be permitted to interfere with the other.

Translated and digested by the MILITARY REVIEW from an article by Major R. Elsmie in "The Journal of the Royal Artillery" (Great Britain).

MILITARY DISCIPLINE

Military discipline is that mental attitude and state of training which renders obedience and proper conduct instinctive under all conditions. It is founded upon respect for, and loyalty to properly constituted authority. While it is developed primarily by military drill, every feature in military life has its effect in Military discipline. It is generally indicated in an individual or unit by smartness of appearance and action; by cleanliness of dress, equipment, or quarters; by respect for seniors; and by prompt and cheerful execution by subordinates of both the letter and spirit of legal orders of their lawful superiors.