

of the the larger caliber flak ammunition projectiles was to grove the inside of the shells that exploded into larger pieces of about 3 1/2 inches long by 3/4 of an inch long. Towards the end of the war incendiary shells (Brandschrapnel) that burst into 51 small incendiary pellets (88mm shell) and 99 pellets in the 12. 8 cm round. When the shell reached its set altitude, a charge exploded sending the pellets up and away igniting either in the air or when they hit the bomber. After testing, the Luftwaffe judged the controlled bursting shell more effective than its predecessor of small fragmentation, and the incendiary shell the most effective of all.

The standard fire control predictor was the Kommondogeret 36, a long tube range-finder of about 4 meters in length. As long as the operator of the predictor could keep his sight on the target a continual stream of information was sent to the gun crews consisting of gun bearing, elevation and time fuse setting. The instrument was effective on the slow moving bomber formations that maintained straight and level flight. The later model Kommando-geret 40 could cope with a formation in a steady turn and also receive information sent from nearby radars. From the foregoing it can be seen that evasive action on the part of the bomber pilots could reduce the chances of being shot down.

Flak towers were often constructed in pairs in the large cities such as Vienna, Berlin, and Hamburg, one serving as an elevated gun platform, the other as mounting for the radar and range-finding equipment. Generally the gun tower supported four large caliber guns either in single or dual mounts. 2mm light flak weapons were mounted in half round abutments situated at the corners of the tower for defense of low flying aircraft These towers served also as bomb shelters, ammunition storage and for use by civil defense authorities. Flak guns of light and heavy caliber mounted on railway flat cars (Eisenbahnflak) were used to move guns to defend expected targets. They carried their own fire control predictors and could be fired directly from the flat cars where they were placed at sidings or marshalling yards. Because the Italian based bombers of the 15th Air Force timed attacks around the noon hour or earlier depending on weather, it was easy to hide the railway guns inside tunnels to avoid detection by reconnaissance aircraft during the hours when air attacks were not anticipated.

As enemy aircraft could approach the target from any compass point, the flak batteries were laid out so that engagement could take place just as the formation reached the bomb release point. Assuming the maximum speed of the bomber formation would be about 265 miles per hour at a height of 20,000 feet, the bombs would carry forward from the release point for 2- 1/2 miles. Flak positions were laid out so that the bombers could be attacked for most or all of the time until the aircraft reached the bomb release line. In less than a minute a bomber flying at a ground speed of 265 miles per hour can cover a distance of about 3 -3/4 miles. Within this circle of 3 -3/4 miles from the center of the target, was the most effective zone for anti-aircraft engagement. Beyond this circle was the tracking area where the predictors and connecting radars prepared the data that was sent by wire to the gun locations ideally placed within this defending circle. The predictors would sight on the leading aircraft of the bomber stream unless other battery was already sighting this same formation. In this case a second aircraft in the lead group would be sighted on. As the bombers crossed the bomb release line the battery commander



**Flak tower in Vienna near the Slifln Barracks. It was called the "Sliflnbunker." It was equipped with double mount 12.8 CM cannons on top of the main platform and 2.7CM and 3.7CM cannons mounted on the outer ring of the tower.**

could order sighting on the following aircraft as they approached the flak engagement circle. The fire control command center consisted of a command post, twin predictors, twin radars, and supporting equipment. This allowed orders for two separate engagements to be issued. It allowed smooth transition when more than one bomb group was in the attack force. All of the guns controlled by the battery commander were fired in salvo for the first round. Additional rounds were fired as fast as they could be loaded.

The Luftwaffe employed other flak defenses using smaller caliber guns against bombers and fighters flying at lower altitudes.

The Allied bombing attacks on the axis powers during World War II in addition to its primary role of reducing the enemies ability to wage war, tied down by the end of the war over 1,250,000 flak troops that were sorely needed in both the eastern and western fronts. The war was shortened considerably by the loss of these troops.

The 88mm flak cannon was a formidable weapon and inflicted heavy losses on the allied bomber formations. But as good as the weapon was it could not prevent the bombers from coming through.

The End

**Bibliography** 1) Illustrated Encyclopedia of Artillery, by Ivan Hogg, 2) Artillery, Big Guns Go to War by Curt Johnson, 3) The Luftwaffe Handbook by Alfred Price, and 4) Kit MM117A Tamiya Model Rectifier Corp, 88mm Flak 36/37.