

## **APPENDIX B**

### **RANGE INFORMATION/DESCRIPTIONS/CELLS**

## APPENDIX B

### RANGE INFORMATION / DESCRIPTIONS / CELLS

*Range cells* included in this appendix were created, which included *historical* regulations, manuals, photos, drawings, and documents. They represent typical (general) layouts, which include firing lines, target areas, target berms, and danger areas (aka SDZ). Each cell is a two-dimensional model, which does not take into account (during time of use) terrain, boundaries, or local requirements and/or restrictions.

As stated in an obsolete Army Regulation, AR 750-10, *Range Regulations for Firing Ammunition in Time of Peace*, dated May 22, 1939, "It is obviously impossible for any general range regulation to cover each local situation completely. Such additional regulations as may be necessary to meet local condition will therefore, be prepared and enforced by the post, camp, or station commander."

When the ranges were established, regulations such as AR 750-10 (now obsolete), along with others, such as TM 9-855, *Targets, Target Material, and Training Course Lay-Outs*, dated August 17, 1944 (now obsolete) would have been referenced. These guidelines would have been applied to the local environment at the time of construction.

Where applicable, right and left firing limits and down-range limits were required and set based on the local conditions. Taking in-to account the scores of ranges and the lack of first-hand knowledge, many ranges were estimated using the best available resources. Topographic maps were analyzed to determine if terrain features could be used to limit the extent of the range.

For most sites it's likely to locate numerous historical maps displaying firing ranges drawn in a various configurations, but not necessarily with a true representation. For instance, they may show the range as nothing more than a dot, a box, circles, or a V-shaped fan. However, in rare cases, a range map displays what appears to be a true fan with a calculated danger area. In these cases, the range fans may be a true representation of the actual range boundaries, and therefore be considered for use instead of the general *Range Cells*. An example where this applies is shown below:

A historical range map found for Fort Custer, Michigan identified numerous ranges, all having range fans drawn. The fans displayed on this map appear to be proportioned, and closely represent correct angles and distances according to regulations. It is believed this map was done with a high degree of accuracy; therefore the range fans were used instead of the general *Range Cells*. Also recovered, was a document referring to the artillery range. It explained the necessity to discontinue firing of artillery on this facility because of the inconvenience of reducing the propelling charges

on 155mm Artillery Shells. The rationale behind this reduced charge was to minimize the down-range distance the projectile would travel. At charge 7 (max), a 155mm projectile had a maximum range of approximately 17,400 yards. In addition to this distance, regulations required a mandatory 1,000-yard buffer zone beyond the max range. If the max charge had been used to calculate the danger area, the downrange distance for this artillery range would have extended more than 6-miles beyond the installation boundary. Maximum distance on artillery munitions can be calculated using appropriate Ammunition Firing Tables.

Unfortunately, this detailed information is seldom available. Other options to consider are included in the following example where the use of topographic maps and site inspections were used to determine the boundaries of Spencer Mountain Rifle Range in North Carolina.

The only available map displayed the range as a small rectangular box. Documents recovered stated that the range was positioned at the base of the mountain in order to reduce the danger area. The *range cell* for a rifle range was designed to include 50 firing positions, which calculates to a width of 400 yards. However, during the site inspection, the actual width of the range was determined to be no more than 150 feet. By reducing the width of the *range cell*, and using contour lines on a topographic map the delineated boundaries was realistically reduced from the standard 1259 acres down to 72 acres.

As indicated, there are many variables to account for when developing range boundaries, and it is unlikely that all of the data used when the range was originally laid out will be available. Therefore, the historical data found during research (maps, aerial photos, documentation, etc.) was utilized to represent the range as accurately as possible. In most cases, the only option was to use the general *Range Cell*.

Each range description contains a list of Ammunition Data sheets. The intention of this list is to provide a general idea of the ordnance that could have been used on the range. It is not intended to be all-inclusive and by no-means is an indication that these munitions are actually present.

A significant number of manuals, drawings, letters, instructions, reports, and miscellaneous documents were referenced in order to calculate the *Range Cells*. The following non-inclusive list are published Range Manuals that were referenced to create the range cells.

- TR 140-5, *Range Regulations for Firing Ammunition in Time of Peace*, dated November 1931
- AR 750-10, *Range Regulations for Firing Ammunition in Time of Peace*, dated May 1939

- AAF Manual 85-0.1, *Army Air Forces Gunnery and Bombardment Ranges*, dated June 1945
- AD-A954 905, *Training in the Ground Army 1942-1945, Study No. 11*, dated May 1948
- *Second Air Force Ground Gunnery Range*, dated July 24, 1943
- TM 9-855, *Targets, Target Material, and Training Course Lay-Outs*, dated August 1944
- TM 9-855, *Targets, Target Material, and Training Course Lay-Outs*, dated November 1951
- AFM No. 66, *Poorman Flexible Gunnery Trainer*, dated March 1945
- TC 25-1, *Training Land*, dated August 1978
- TC 25-8, *Training Ranges*, dated February 1992
- AFI 13-212, Vols 1,2,3, *Space, Missile, Command, and Control, Weapons Ranges*, dated July 1994
- AR 210-21, *Army Ranges and Training Land Programs*, dated May 1997
- AR 385-62, *Regulation for Firing Guided Missiles and Heavy Rockets for Training, Target Practice, and Combat*, dated June 1983
- AR 385-63, *Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat*, dated November 1983

**HISTORIC USE: BOMBING**

**BOMBING TARGET, LIVE (aka: PBR, Precision Bombing Target, Bombing Range)**

Range Type: Bombing

Cell Name(s): BOMB

The Purpose of the range for use with tactical bombs is to familiarize students of handling and releasing combat ammunition.

The range area, adequate for use with 100-lb. demolition bombs below 15,000', will be a minimum of One and one-half miles square with the target located centrally. The target is a cross-shaped ground area scraped free from vegetation and whitewashed. A night target is not used on this type range.

Although OE will be concentrated around the target, evidence of bombing is almost always found beyond the scoring arcs. OE debris is typically found throughout the entire property and occasionally beyond the property boundaries. The range cell area was calculated to extend beyond the target center 3000 feet, for a total of 649 acres. Many factors, all of which are unknown, such as altitude and flight speed, affect targeting accuracy. From studies completed in WWII, 99 percent of the bombs should be found within 3,000 feet for bombers flying at 25,000 feet or below and at speeds up to 250 mph. The same study implied a 2,000-foot radius should include 95 percent of the bombs under the same conditions.

Ammunition (probable)

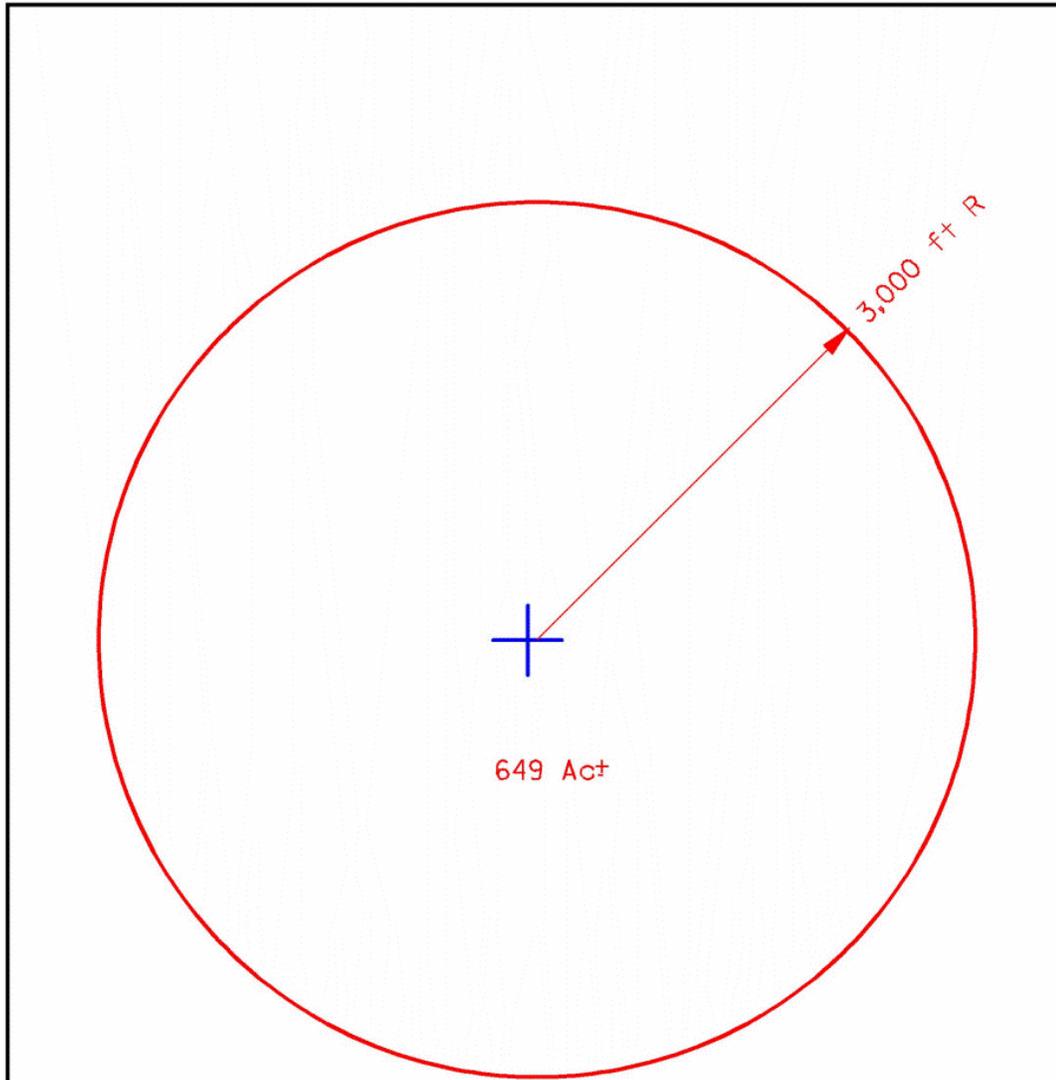
Bomb, High Explosive

Data sheet(s):

When selecting datasheets, it is important to consider the time frame the range was used. Possibilities include:

CTT05      Bomb, General Purpose, Old Style  
              AN-M30, General Purpose Bomb, 100-lbs  
              AN-M57 & AN-M57A1, GP, 250-lbs

Reference(s): *AR 750-10, Range Regulations for Firing Ammunition in Time of Peace*, May 1939 – January 1944; *AAF Manual 85-0-1, Army Air Forces Gunnery and Bombardment Ranges*, June 1945; *Army Air Corps Studies and Reports on Bombing Analysis and Bombing Accuracy*, 1942



**BOMBING**



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**BOMBING TARGET (LIVE)**

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**CELL NAME**

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**BOMB**

**BOMBING TARGET, PRACTICE (aka: PBR, Precision Bombing Target, Bombing Range)**

Range Type: Bombing

Cell Name(s): BOMB (same as Bombing Target, Live)

The range area should be sufficiently large so that the center of any target placed on it will be a minimum of 2500' from the range boundary. For bombing from 25,000' and above, a 5000' radius is advisable.

The typical and widely used target design consists of a series of concentric circles with four legs indicating N/S and E/W in True direction. Four reference squares were placed along each leg at 100' intervals to facilitate scoring. For the purpose of indicating True North, the north leg is extended within the 100' circle towards the target center a distance of 40'. At the extreme end of the north leg, a numeral (75' to 150' in size) is set with its base towards the center of the target. While the 100' circle is an essential feature of the target, the 200' and 500' circles should be described, whenever possible, to facilitate scoring. For bombing above 15,000', it is recommended that only the 200' and 500' circles be described. The legs and circles of the target were constructed of crushed rock or dirt sprayed with white paint, whitewash, or with a contrasting color to the surrounding soil. In the center of the target circle, a pyramid, 12' high with a base approximately 30'x30', is constructed of native earth, or wood, and is whitewashed.

Target lighting was provided by mounting light bulbs on 8' poles, at 22½ feet intervals around the circle. Lights were also mounted at each of the four legs intersecting the 100' circle. Numerals were also illuminated with light bulbs.

Although OE will be concentrated around the target, evidence of bombing is almost always found beyond the scoring arcs. OE debris is typically found throughout the entire property and occasionally beyond the property boundaries. The range cell area was calculated to extend beyond the target center 3000 feet, for a total of 649 acres. Many factors, all of which are unknown, such as altitude and flight speed, affect targeting accuracy. From studies completed in WWII, 99 percent of the bombs should be found within 3,000 feet for bombers flying at 25,000 feet or below and at speeds up to 250 mph. The same study implied a 2,000-foot radius should include 95 percent of the bombs under the same conditions.

Ammunition (probable)

Bomb, Practice

Data sheet(s):

When selecting datasheets, it is important to consider the time frame the range was used. Possibilities include:

CTT07      AN-Mk 5, AN-Mk 23, AN-Mk 43, Prac  
              M38A2 Practice Bomb, 100-lbs  
              M85 Practice Bomb, 100-lbs  
              Mk 15 Mod 3, Practice Bomb, 100 lbs  
              Mk 15 series, Practice Bomb, 100 lbs  
              Mk 5, Mk 15, Mk21, Prac., 500lbs  
              Spotting Charge, M1A1

Reference(s): *AR 750-10, Range Regulations for Firing Ammunition in Time of Peace*, May 1939 – January 1944; *AAF Manual 85-0-1, Army Air Forces Gunnery and Bombardment Ranges*, June 1945; *Army Air Corps Studies and Reports on Bombing Analysis and Bombing Accuracy*, 1942

## **DEMONSTRATION BOMBING TARGET, (PRACTICE)**

Range Type: Bombing

Cell Name(s): DEMBMB

Demonstration bombing targets were typically utilized for competition and/or public demonstrations. Typically, targets were located adjacent to runways and observation points. Under normal circumstances one can expect bombs to have been released from a relatively low altitude with substantial accuracy. Although OE will be concentrated around the target, evidence of bombing is almost always found beyond the scoring arcs. The Characterization Acreage for this type of bombing target is calculated to extend beyond the target center 1,000 feet, for a total of 72 acres

Ammunition (probable)

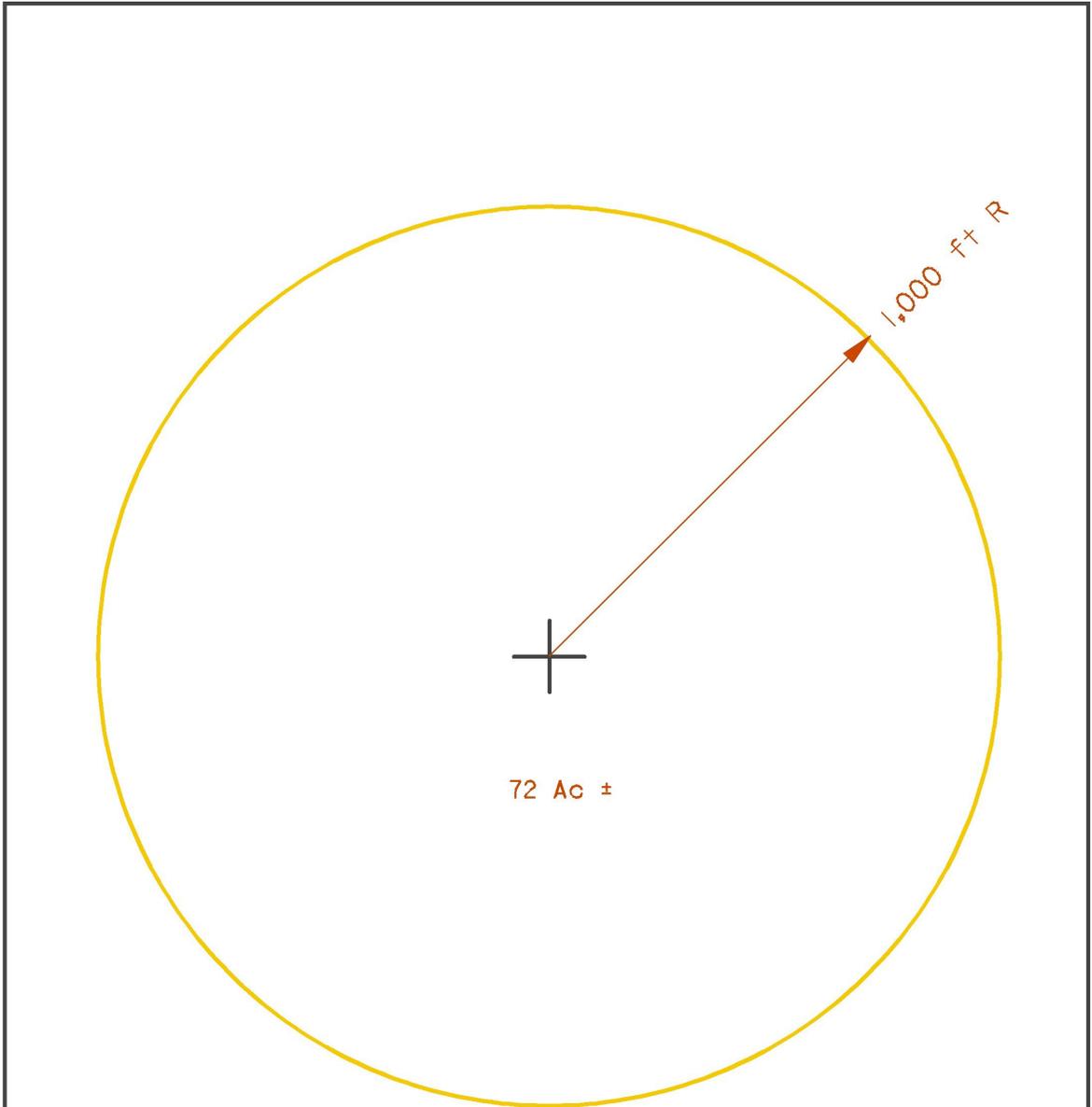
Bomb, Practice

Data sheet(s):

When selecting datasheets, it is important to consider the time frame the range was used. Possibilities include:

CTT07      AN-Mk 5, AN-Mk 23, AN-Mk 43, Prac  
              M38A2 Practice Bomb, 100 lbs  
              M85 Practice Bomb, 100 lbs  
              Mk 15 Mod 3, Practice Bomb, 100 lbs  
              Mk 15 series, Practice Bomb, 100 lbs  
              Spotting Charge, M1A1

Reference(s): *AR 750-10, Range Regulations for Firing Ammunition in Time of Peace,*  
May 1939 – January 1944



**BOMBING**



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**DEMONSTRATION BOMBING TARGET**

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**DEMBMB**



