



**US Army Corps  
of Engineers**®  
St Louis District

**FINAL**

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Archive Search Report  
On the Use of  
**CARTRIDGE, 20MM SPOTTING M101  
FOR**



**DAVY CROCKETT LIGHT WEAPON M28**

Schofield Barracks and Associated Training Areas  
Islands of Oahu and Hawaii

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May 2007

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## EXECUTIVE SUMMARY

In November of 2006, the U.S. Army Joint Munitions Command (JMC) Safety / Radiation Waste Team tasked the U.S. Army Corps of Engineers (USACE), St. Louis District with this project. The project consisted of an archive search effort to collect data and information concerning the use of the Davy Crockett Light Weapon M28 on ranges at Schofield Barracks and associated training areas. This weapon system engaged the use of a 20mm cartridge for spotting of the training round. This Cartridge, 20mm Spotting M101 consisted of a body constructed of D-38 Uranium alloy (Uranium-238 Depleted Uranium).

The total rounds of Cartridge, 20mm Spotting M101 manufactured at Lake City Ordnance Plant (Lake City Army Ammunition Plant) was 75,318. The first lot of this ammunition was accepted 23 June 1961. The final lot manufactured was accepted 19 September 1963. Total rounds verified shipped to Oahu from Lake City Ordnance Plant were 714 rounds on 27 April 1962.

Fifteen of the Davy Crockett Light Weapons M28 and seven of the Davy Crockett Heavy Weapons M29 were allocated to the U.S. Army Hawaii. This gave the 25<sup>th</sup> Infantry Division at Schofield Barracks the potential of seven Davy Crockett sections, three squads in each section. The primary armament of a section consisted of two squads armed with the Davy Crockett Light Weapon M28 and one squad armed with the Davy Crockett Heavy Weapon M29. Of these potential seven Davy Crockett sections, fourteen squads would fire the Davy Crockett Light Weapon M28.

Due to the number of weapons, it is highly probable that additional stocks besides the original shipment (714 each) of the Cartridge, 20mm Spotting M101 were fired. These additional stocks could have been requisitioned from one of the Ordnance Depots (Letterkenny or Pueblo) during the six active years of the Davy Crockett Weapon System in Hawaii (1962 – 1968). Shipping records from ammunition depots are not permanent records, so this can not be verified.

Analysis of the information gathered during this archive search identified a confirmed area on Schofield Barracks and several potential areas at Makua Military Reservation and Pohakuloa Training Area for the use of Cartridge, 20mm Spotting M101. The Schofield Barracks' range was confirmed by visual evidence remaining on the target area. This evidence consists of range scrap and residue from the 20mm spotting and 279mm practice round. A launching piston was also located in the area of this target. The potential areas on Makua Military Reservation and Pohakuloa Training Area are based on range type and use, historic range maps and range regulations and common practice for the time period of the fielded Davy Crockett Weapon System (1961 through 1968). A visual sweep of these potential targets areas for evidence will confirm or deny the use of Cartridge, 20mm

Spotting M101. These target areas are identified on Plate No. 3, Plate No. 4 and Plate No. 6 in the report.



## **1.0 INTRODUCTION**

### **1.1 SUBJECT**

**Schofield Barracks** is a United States Army installation located in the county of Honolulu and in the Wahiawa District of the island of Oahu, Hawaii. Schofield Barrack occupies some 17,725 acres in central Oahu, of which approximately 2,800 acres are dedicated ranges with an impact area. Schofield Barracks, since 1941, is the home of the 25<sup>th</sup> Infantry Division (Tropic Lightning Division). See Vicinity **Plate No. 1**.

The **Makua Military Reservation**, also known as (AKA) **Makua Training Area** is also an Army training area complex of interest. This installation encompasses 4,190.47 acres on the western shore of Oahu. See Vicinity **Plate No. 1**.

The third area of interest is the **Pohakuloa Training Area (PTA)** on the island of Hawaii. The PTA is a major training area for U.S. Army Pacific, U.S. Pacific Command and Reserve forces in the Pacific. The PTA is a large area comprised of approximately 108,792 acres. See Vicinity **Plate No. 5**.

### **1.2 AUTHORITY**

In November of 2006, the U.S. Army Joint Munitions Command (JMC) Safety / Radiation Waste Team tasked the U.S. Army Corps of Engineers (USACE), St. Louis District with this project. The project consisted of an archive search effort to collect data and information concerning the use of the Davy Crockett Light Weapon M28 on ranges at Schofield Barracks and associated training areas. This weapon system engaged the use of a 20mm cartridge for spotting of the training round. This Cartridge, 20mm Spotting M101 consisted of a body constructed of D-38 Uranium alloy (Uranium-238 Depleted Uranium).<sup>1</sup>

### **1.3 PURPOSE AND SCOPE**

The purpose of this report is to present and analyze the collected data during the archive search. This investigation focuses on confirmed and potential use of Cartridge, 20mm Spotting M101 on Schofield Barracks and associated training sites of Makua Military Reservation and Pohakuloa Training Area. This report presents the following:

- A review of related site investigations
  - A review of historical manuals, regulations and documents associated with the Davy Crockett Light Weapon M28
  - A map analysis of the sites with regards to potential range use of the Davy Crockett Light Weapon M28
  - Identification of confirmed and potential areas of contamination
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- General technical data on ammunition associated with the Davy Crockett Light Weapon M28

## **2.0 PREVIOUS INVESTIGATIONS**

### **2.1 REPORTS**

Range Operations Report No. 9 *Davy Crockett Weapon System Range*, dated January 2006, U.S. Army Corps of Engineers (USACE), St. Louis District.

USACE St. Louis District performed an investigation for the USACE Omaha, Nebraska Hazardous, Toxic and Radiological Waste (HTRW) Center of Expertise. This investigation involved common range operations for different ranges in support of the Formerly Used Defense Site (FUDS) program. The purpose of the report was to support decisions regarding potential releases to the environment as a result of DOD operations at FUDS. The report contains information from applicable regulations on the weapons, ammunition, ranges, and training of the Davy Crockett Weapon System. This report can be view and downloaded from the Engineering Knowledge Online (EKO) web site:

<https://eko.usace.army.mil/>

Once at the web site's home page, go to the USACE CoPs Home to log on to the site using your Army Knowledge Online (AKO) user name and password. The reports are listed under Environmental, Point at E CoP Library and FUDS. This report is listed under the Common Range Operations.

### **3.0 GENERAL HISTORY**

#### **3.1 SCHOFIELD BARRACKS GENERAL SITE HISTORY**

The military reservation of Schofield Barracks, Island of Oahu, was originally a part of the public domain that was set apart for military purposes. It was declared a military reservation by Executive Order dated July 20, 1899, amended by Executive Order dated November 15, 1909, and enlarged by Executive Order dated August 23, 1910.<sup>2</sup>

In 1907, Schofield Barracks was a small cavalry post “under canvas”. This post was named Schofield Barracks in honor of Lieutenant General John McAllister Schofield. Schofield commanded the XXIII Corps in Sherman’s Georgia campaign of the Civil War. In 1910 the War Department committed itself to the policy of making Schofield Barracks the largest and most strongly garrisoned post of the Army. The period of greatest expansion started in 1915. Congress appropriated large sums for the construction of what is now the lower post.

The Hawaiian Division came into being on March 1, 1921. It consisted of a division headquarters and special troops including an attached gas company. The primary local mission of the garrison was that of readiness for the defense of the Hawaiian Islands.

The mild weather conditions permit outdoor field training year round. Tactical training in the field receives an unusual amount of time and attention throughout the year on the Schofield ranges.<sup>3</sup>

#### **3.2 DAVY CROCKETT WEAPON SYSTEM**

##### **3.2.1 Development of the Davy Crockett Light Weapon M28**

The Davy Crockett Light Weapon M28 was one of a series of two recoilless rifles of different calibers and ranges for offensive and defensive operations. It would fire a low-yield atomic shell and give close tactical support by rapid and accurate employment against targets of opportunity. Emplaced on the ground or mounted on a jeep, the manually transportable M28 system was capable of direct or indirect fire. The M28 had a minimum range of about 555 meters and a maximum range of about 2,000 meters.<sup>4</sup>





The M28 and its heavier companion system, the M29, both had the popular name of Davy Crockett.<sup>a</sup> The development of the Davy Crockett Weapon System stemmed from a requirement of the Combat Development Objectives Guide that called for a battle group weapon system with a maximum range of 2,000 and 4,000 meters (approximately 1 ¼ and 2 ½ miles). Picatinny Arsenal was the research and development manager for the Davy

Crockett Weapon System. Their development began in March of 1958.

Each system fired a piston-launched projectile from a full caliber recoilless gun. Design studies and experimental firings in 1958 led to the selection of a 120mm recoilless gun for the short range M28, and a 155mm gun for the long range M29. Each system fired the same atomic and practice 279mm projectile.

The idea of a piston launched projectile was not new. In World War II such projectiles were successfully used for anti-tank shells by the Germans and for clearing mine fields by the United States. For the Davy Crockett Weapon System, the fin stabilized projectile was assembled to a long hollow piston before firing. The piston was then muzzle loaded into the tube of the weapon. The projectile, which was much larger than the bore of the gun tube, remained outside the muzzle. Upon firing, the piston separates from the projectile a short distance in front of the gun, and the projectile continues its flight to the target.

Military characteristics established for the light weapon system stipulated that the M28 system be light enough to be manually transported by its crew when the weapon was used with a ground mount. The projectile was light enough to be carried by one man. Its preparation for firing was two men not to take more than a minute in daylight or

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<sup>a</sup> Newly fielded weapons and ammunition often carried an X letter in the model designation for experimental (XM28). The X designators were eventually dropped from the Davy Crockett weapons and ammunition items after they were fielded. Therefore the model numbers of weapons and ammunition will be referred to without the X designator in this report.

darkness. The time between the acquisition of a target and the burst of the projectile on a target could not exceed four minutes.

The portability of the M28 system by individual soldiers was possible by limiting the length of the gun and fabricating its tube, chamber and nozzle from high strength titanium, building the mount of aluminum, employing a light weight sight unit, and utilizing a single shot spotting rifle instead of a repeating model with semiautomatic action. As a result, the entire system could be carried by three men.

The 120mm recoilless gun is an open breech smoothbore weapon. It had no breech mechanism because the propellant and the piston were muzzle loaded into the gun. There also was no firing mechanism in the gun. The firing mechanism was separate and connected to the propellant cartridge. An orifice in the nozzle of the gun controlled the force of recoil produced by the propellant gases escaping to the rear. An aiming device was also mounted on the weapon for setting azimuth and elevation. A spotting rifle was provided for ranging.

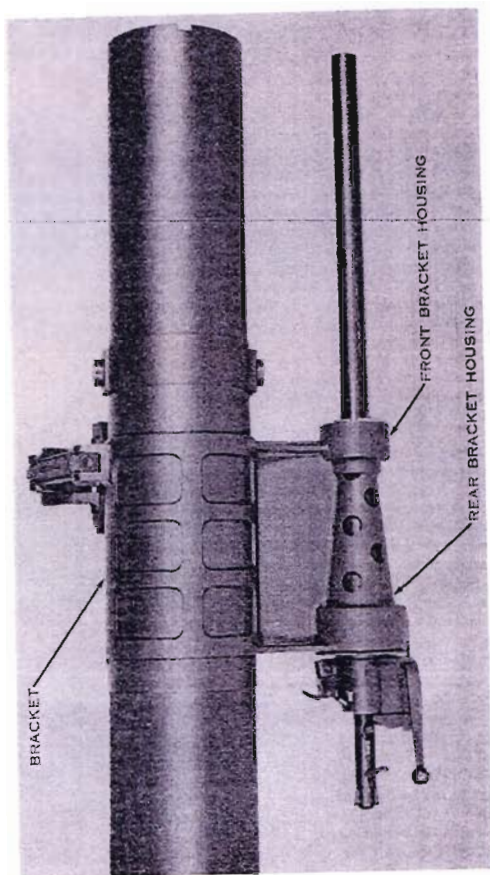


Figure 1. Mount, rifle, spotting, XM58.

For verification of range estimates the M28 system employed the M69 20mm spotting rifle as shown in the illustration. This was a single shot bolt action model that weighed seven pounds and was 2 feet 4 inches long. A single shot design was chosen due to the low muzzle velocity of the spotting cartridge. This would give enough time between the firings of rounds to make the use of a repeating semiautomatic rifle unnecessary.

When the M28 system was carried manually, it was broken down into three loads each transported by a soldier. Load A was the projectile clamped to a portable backpack. Load B was the M63 gun with its spotting rifle bracket in a portable backpack. Load C carried

the tripod mount, the sighting unit, the propellant cartridge, the spotting rifle, and five 20mm spotting rounds.

A special vehicular mount was used when the M28 system was employed with a ¼ ton utility truck. The vehicular mount allowed the gunner, who is also the driver, to operate the gun while standing on the ground. It also allowed a traverse of about 90 degrees and a gun elevation of 25 degrees. Although capable of firing from the ¼ ton truck, without

the approval of the Chief of Ordnance this was not practiced in field training. The majority, if not all of the training likely consisted of fire from the tripod mount.

In September 1959, before being subjected to engineering and service tests, the two Davy Crockett weapons were authorized for issue on a limited production basis. This limited production status was extended to December 1962. Schofield Barracks received their first weapon systems in the spring of 1962.<sup>5</sup>

### 3.2.2 Development of the Davy Crockett Heavy Weapon M29

The development of the Davy Crockett Heavy Weapon M29 produced a 155mm gun for the longer range. Both weapons functioned in the same manner and fired the same major caliber ammunition. The M29 was the heavier weapon and had twice the maximum range of the lighter M28 companion system. Emplaced on the ground with a tripod mount, mounted on a vehicle (airborne battle group) or stowed in a M113 armored personnel carrier (armored cavalry squadron), the M29 would fire the same low yield atomic shell to a maximum range of 4,000 meters (approximately 2 ½ mile). The minimum range for this weapon was about 545 meters (3/4 mile).<sup>6</sup>

The principal differences between the two were the size and weight of the barrel, the range of the weapon, and the manner of adjustment of fire on a target. Fire adjustment with the M28 light weapon was made by an attached 20mm spotting rifle. Fire adjustments with the M29 heavy weapon were made by using the 279mm practice projectile. Later the M77 37mm spotting rifle and the M415 and M446 spotting cartridges were developed.

This investigation focuses on the Davy Crockett Light Weapon M28 and not the heavy weapon. The light weapon fired the 20mm cartridge of concern. The M415 and M446 37mm spotting cartridges did not contain any depleted uranium alloy.<sup>7</sup>

### 3.2.3 Mission and Organization

The mission of the Davy Crockett section was to provide direct or indirect organic nuclear fire support for the parent unit. The organization of a Davy Crockett section could have included a three man section, or more often an augmented section of twelve men. The organization in Infantry Units was assigned to:

- Combat Support Company
- Infantry Division Battle Group
- Mortar Battery of the Airborne Division Battle Group

The organization in Armor Units was assigned to:



- Headquarters and Headquarters Company, Armored Division Infantry Battalion
- Headquarters and Headquarters Company, Armored Division Armor Battalion 90mm
- Headquarters and Headquarters Company, Armor Battalion 90mm
- Headquarters and Headquarters Troop, Armored Division Cavalry Squadron  
Headquarters and Headquarters Troop, Armored Cavalry Squadron, Armored Cavalry Regiment
- Headquarters and Headquarters Company, Infantry Division Armor Battalion 90mm
- Headquarters and Headquarters Troop, Infantry Division Cavalry Squadron

Later in the final Reorganization Objective Army Division (ROAD) Table of Organization and Equipment (TOE) for organization in Armor Units, there was a 12 man Davy Crockett section augmentation in the headquarters company by special authorization from the Department of the Army.

The sections consisted of three squads, two armed with the Davy Crockett Light Weapon M28 and one armed with the Davy Crockett Heavy Weapon M29. Each light weapon was mounted on a ¼ ton truck towing a ¼ ton trailer. The heavy weapon was stowed in the Armored Personnel Carrier in infantry units and mounted on the ¼ ton truck in airborne units with ¼ ton trailer. Each squad was usually augmented with additional men that were required to be trained on the Davy Crockett. The Davy Crockett section was dependent upon the heavy mortar platoon for forward observers during indirect fire and normal administrative, supply and training functions.<sup>8</sup>



## 4.0 DAVY CROCKETT AMMUNITION

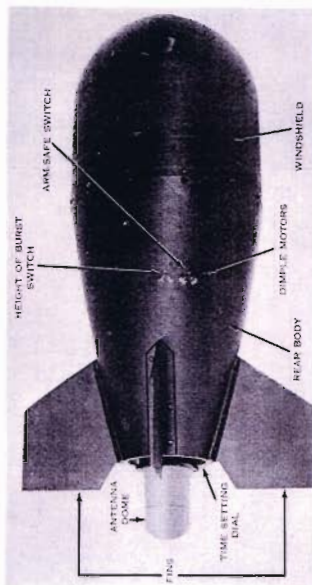
Ammunition for the Davy Crockett included the following:

- Projectile, Atomic Supercaliber 279mm M388
- Projectile, Atomic Supercaliber 279mm Dummy M421
- Projectile, Atomic Supercaliber 279mm Practice M390
- Charge, Propelling M75, M76, M77 and M95
- Cartridge, 20mm Spotting M101
- Cartridge, 20mm Target Practice M106
- Cartridge, 37mm Spotting M415 and M466

### 4.1 PROJECTILE, ATOMIC SUPERCALIBER 279MM M388

All three of the Davy Crockett 279mm projectiles were alike in shape, size, and weight. All projectiles were used with both the M28 and the M29 systems. They were shaped like thickened teardrops with wide tail fins.

The atomic projectile had a windshield, a rear body, four finds and a warhead. The body was high strength aluminum. The fins and windshield were plastic. It was a fin stabilized, low drag projectile with an atomic warhead. The height of burst could be adjusted to a medium height and a near surface burst. Due to classification considerations, a more detailed discussion of this projectile is not given in this report.



### 4.2 PROJECTILE, ATOMIC SUPERCALIBER 279MM DUMMY M421

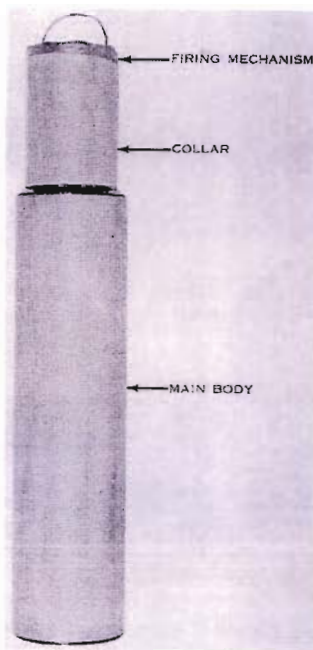
This dummy or drill projectile was for practice in loading only. It duplicated the weight and center of gravity of the M388. It also contained mock switches and a time setting dial so actual prefire settings could be made during drill. This round was not fired.

### 4.3 PROJECTILE, ATOMIC SUPERCALIBER 279MM PRACTICE M390

A third projectile, the practice was loaded with high explosive that was detonated by an impact fuze. It was intended primarily as a practice round for both weapon systems. The M390 also served as a spotting projectile for the M29 system until a suitable spotting rifle (37mm) was developed for the higher caliber system. The projectile consisted of the following components:

- Body – thin walled shell 14.84 inches long and from 11.03 to 3.4 inches in diameter
- Antenna – a dummy antenna that also forms a part of the gas seal to keep propellant gases from entering the rear body
- Support Casing – used to mount the HE warhead
- Windshield – plastic
- Fins - plastic
- Warhead Assembly – a pearlitic malleable iron ball with 8.96 inch outside diameter. Each warhead was loaded with 16.33 pounds of composition B explosive.

The warhead was located within the windshield section and contained 16 pounds of composition B high explosive. The M1117 fuze detonated the projectile. This was an electromechanical impact fuze containing a pull wire for safe handling. The projectile was designed to be an exact ballistic match with the nuclear projectile M388.



#### 4.4 CHARGE, PROPELLING M75, M76, M77 AND M95

Four different types of fixed propellants, all designed specifically for the Davy Crockett Weapon System, were used to propel the major caliber projectile to the target. For the M28 light weapon system propellant M75 and M92 were used. For the M29 heavy weapon propellant M76 and M77 were used. The propelling charges contained M5 MP Propellant and were loaded in an elongated cylindrical container. The charges also included black powder and an M47 primer.

The M75 propellant charge for the M28 light weapon system provided a maximum range of 1,800 meters. The container was paperbound phenolic and moisture proof. It was frangible, but strong enough to withstand normal handling and loading operations. This charge was phased out in favor for the M92 charge. The M92 propelling charge was used only with the M5 piston. The M92 was identical to the M75 except it had an additional pound of propellant powder. This increased the maximum range to 2,000 meters.

Propellants M76 and M77 were used with the heavy weapon. They were similar to the M75 used with the light system. The major differences were the diameter and amount of powder. Zone I propellant M76 weighed 11 pounds and was used for ranges up to 1,900 meters. Zone II M77 propellant weighed 19 pounds and was used for ranges between 1,700 to 4,000 meters.

The propellants had a unique firing method. One end of a low energy detonating cord (LEDC) was attached to the propellant. This cord, which was 75 feet long, had a

detonator and a firing mechanism fastened to its loose end. The coiled cord with the firing mechanism was stored in a small rear projection of the container. When the weapon was to be fired, the detonating cord and firing mechanism were removed by reaching inside the breech of the gun and pulling the cord that was wound on a spool. The gunner would position to a 90 degree angle to the right or left of the gun to be safe from back blast and flying debris. The round was fired by removing the safety pin from the firing mechanism and then pulling out the fire ring.

#### 4.5 CARTRIDGE, 20MM SPOTTING M101

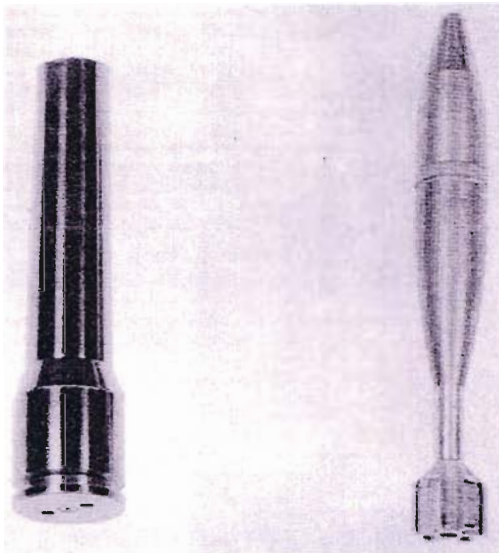
The main focus of this investigation is the Cartridge, 20mm Spotting M101 for use in conjunction with the Davy Crockett Light Weapon M28. The Cartridge, 20mm Spotting M101 was a low velocity cartridge used to determine impact point for the 279mm



projectile fired from the weapon. Upon impact, the M101 projectile emitted a puff of white smoke two to three meters in diameter and two to five meters in height. This display was visible for several seconds. This method of determining point of impact insured a high probability of a first round hit for the major caliber projectile.

The cartridge was stabilized in flight by bore size fins. Rifling in the barrel spin stabilized the projectile during first stage of flight. The cartridge was approximately 7 ½ inches long and weighed about a pound. The 20mm projectile consisted of the following components.

- Cartridge Case (steel or aluminum)
- Projectile Body (D-38 uranium alloy (depleted uranium))
- Fuze (Point Detonating)
- Rotating Band (Plastic)



The first picture shows the complete round and the second picture to the left shows the cartridge case and projectile assembly separately.

In order to achieve the desired range, accuracy and ballistic efficiency in the 20mm spotting cartridge a dense material was required for the shell body. The initial material selected was basically a tungsten alloy. This material, while meeting the military requirements, was considered exceedingly costly and difficult to machine. In 1959, a study indicated that depleted uranium with approximately 8 percent molybdenum (D-38 Uranium Alloy) could be used as an alternative. The density of the uranium is greater than the tungsten



and also more than 50 percent lower in cost. The specification used was MIL-U-46045. The depleted unclassified uranium was obtained from the Atomic Energy Commission. Ballistic tests in 1960 indicated the uranium projectile behaved satisfactorily under ballistic conditions. Each depleted uranium projectile body weighed  $3,180 \pm 25$  grains (approximately 6.7 ounces).

The Lake City plant manufactured, assembled, loaded and packed Cartridge, 20mm Spotting M101 except for the fuze. Preparation for manufacture of this cartridge began in the fourth quarter 1960 at the Lake City Ordnance Plant (Lake City Army Ammunition Plant). The first lot was accepted 23 June 1961. The final lot produced at the plant was accepted 19 September 1963. Total production accepted by the government of this round was 75,318. **Appendix E** contains Ammunition Drawings of Cartridge, 20mm Spotting M101 and its components.

#### 4.6 CARTRIDGE, 20MM TARGET PRACTICE M106

One other cartridge used the same D-38 Uranium Alloy (Depleted Uranium) body as the M101 Spotting round. This was a 20mm Target Practice (TP) round. A search of records from the Lake City Ordnance Plant of Ammunition Data Cards (ADC) and other lot records recovered only one lot of this item manufactured. This was a one time produced "special" lot, LC-Special-7, of 52 rounds. The round was identical to the spotting round except there was no fuze and only a dummy smoke capsule. This round was not a fielded item.<sup>9 10</sup>

#### 4.7 CARTRIDGE, 37MM SPOTTING M415 AND M466

Development of a 37mm rifle with M415 and M446 spotting cartridges was begun in the spring of 1962. This 37mm round was for the adjustment of fire for the Davy Crockett Heavy Weapon M29. Until the rifle and ammunition was fielded, the Projectile, 279mm Practice M390 was used. The body of these 37mm cartridges was not made of the D-38 Uranium Alloy. Due to this, little research effort was directed toward this item.

#### 4.8 LAUNCHING PISTONS

The M1 and M5 launching pistons were for use with the Davy Crockett Light Weapon M28. The pistons were made of titanium and the obturator of copper and steel. The components consisted of:

- Adapter
- Main cylinder
- Cap end
- Strainer
- Obturator



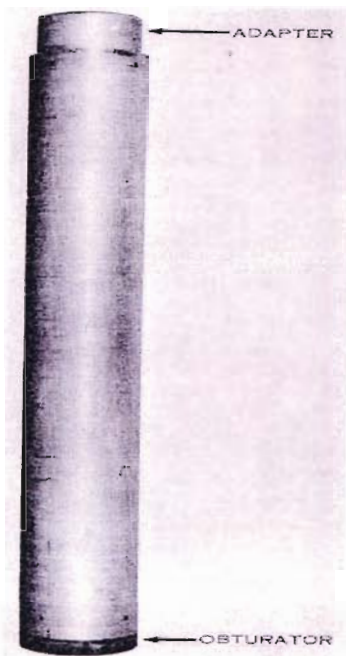


Figure 33. Piston, launching, XM1, XM2, or XM3.

The adapter was smaller in diameter than the main body of the piston to permit insertion into the rear well of the projectile. It was open in the center to allow rear projection of the major caliber projectile to recede into the piston. The main cylinder's outside diameter was slightly less than 120mm preventing binding of the piston in the barrel.

The M1 piston was used with the M75 propelling charge. When this charge phased out, the M5 piston replaced the M1 for the M92 charge.

Of special interest concerning pistons is that the area forward of the firing position provided for impact. The Surface Danger Area Diagram (SDAD) for the Davy Crockett Range includes an area 600 meters in length and 400 meters on either side of the line of fire. This area provided for the minimum range to target and

piston impact.<sup>11</sup>

#### 4.9 AMMUNITION EVIDENCE ON SCHOFIELD RANGE

Evidence of Davy Crockett ammunition is left on a target impact area at Schofield Barracks. The impact area appears to be at the 600-800 meter range. The ammunition item of most interest on the range is the Cartridge, 20mm Spotting M101. Upon impact, the electric point detonating fuze starts the firing train to rupture the capsule of pyrotechnic in the body. This in turn fragments the body. Fragmentation pieces of the uranium alloy body have oxidized to a vivid bright yellow, quite noticeable on the ground as observed on the Schofield Barracks range. Also upon impact, the tail assembly often remains in tact.

Evidence also remains on the range of fragmented pieces of the rear body and windshield of the Projectile, Atomic Supercaliber 279mm Practice M390. The rear body piece is unique and recognizable, and the windshield scrap can often fragment in pieces of four inch squares and smaller.

Lastly and the most obvious evidence is the launching pistons. The Davy Crockett SDAD allows a distance of up to 600 meters from the firing line for the impact of the launching piston.

Other historic unexploded ordnance (UXO) and range scrap found in this impact area included 40mm rifle grenades, 81mm mortars, 106mm recoilless rifle projectiles and 3.5

inch rockets. Photographs of this evidence are shown in **Appendix F**.

## **5.0 HISTORIC ARMY TRAINING REGULATIONS**

### **5.1 ARMY DIVISION TRAINING FACILITIES 1964**

AR 210-21 *Installations Training Areas and Facilities for Ground Troops* dated 18 December 1964 discusses guidance at training facilities for the Army division.<sup>12</sup> In the layout of firing ranges, the figure on the next page was used as a guide for altering or extending existing division installations. This layout is recommended to be used to the fullest extent practicable. This regulation states:

“If the firing of mortars, the M79 grenade launchers, and Davy Crockett is not feasible from artillery firing positions, separate ranges must be provided. In the case of the M79 grenade launcher and Davy Crockett, separate ranges usually are necessary due to the requirement for a secure impact area.”

The 40mm ammunition for the M79 grenade launcher and the Projectile, Atomic Supercaliber 279mm M388 in the 1960s were sensitive and classified items. AR 210-21 stipulated a secure impact area for these items as required by Table I of the regulation.

This regulation also recommends two ranges with three positions, points, or lanes per range. The regulation also stipulates that these may be modified in number and type as necessitated by local conditions and variations in organization and armament. The layout diagram and table are shown on the next pages.



AR 210-21

Table 1. Firing ranges—Continued

Item No.	Type of range	OCE Folio No. 1, 1 Sep 1962 Drawing No.	References (FM unless otherwise marked)	Ranges	Positions, points, or lanes per range <sup>1</sup>	Remarks
1	2	3	4	5	6	7
37	Rifle squad attack course (live fire).	28-13-99	21-75.....	2	-----	Accommodate infantry, airborne infantry or mechanized infantry squad.
38	Rifle platoon attack course (live fire).	-----	21-75.....	1	-----	Accommodate infantry, airborne infantry or mechanized infantry platoon.
39	Field target course.....	28-13-18	23-5.....	1	-----	Technique of fire-squad firing.
40	Night firing.....	-----	23-5.....	1	-----	Individual and squad firing.
41	Landscape firing.....	28-13-06, 07	23-5, 23-55 <sup>2</sup> .....	1	-----	May be superimposed on 25-meter range, item No. 6.
42	Tank-Infantry platoon attack course (live fire).	-----	21-75.....	1	-----	
43	Mine-booby trap demolition area.	28-13-36	5-31.....	1	-----	
44	Davy Crockett.....	-----	23-20.....	2	3	Separate range required because of secure impact area requirements.
45	Anti-tank guided missile ENTAC.	-----	TC 23-2..... TC 23-6.....	1	3	
46	Aerial gunnery.....	-----	TB NOM 55-1520-20- 208-20 TB 55-1520-204- 10/1 and 20/1. TB 2.75 Rocket System H-34 and HU-1B.	-----	-----	Machine gun, rocket, and SS11 ATGM firing from helicopter and light fixed wing aircraft.

<sup>1</sup> Indicates number of positions, points, or lanes per range or facility.

<sup>2</sup> A requirement for a limited number of known-distance firing points exists under the TRAINFIRE concept, to support the competitive marksmanship program, automatic rifle marksmanship, and advanced rifle marksmanship. For a division, a minimum of 50 KD firing points are required at ranges of 300, 500, and 800 meters.

<sup>3</sup> See TM 9-853.

<sup>4</sup> Where conditions dictate, moving target ranges may be superimposed on other ranges.

<sup>5</sup> The tank, service firing ranges, tables IV and V, FM 17-12, the tank crew field firing ranges, tables VII and VIII and battalion combat firing ranges (with maximum 15° elevation) are essential facilities and a training requirement for infantry, mechanized, and armored divisions, except at those stations where the availability and proximity of an established tank-firing center will permit such firing to be accomplished away from the home station.

## 5.2 ARMY DIVISION TRAINING FACILITIES 1968

AR 210-21 *Installations Training Areas and Facilities for Ground Troops* dated 18 November 1968 supersedes the 1964 manual. This regulation four years later makes no mention of ranges for the Davy Crockett Weapon System.<sup>13</sup> The same figure no longer discusses the weapon, and only the 40mm M79 grenade launcher requires a secure impact area. Also of consequence during this time is that all tactical Davy Crockett warheads are out of the system by July 1968. This figure is shown on the following page.



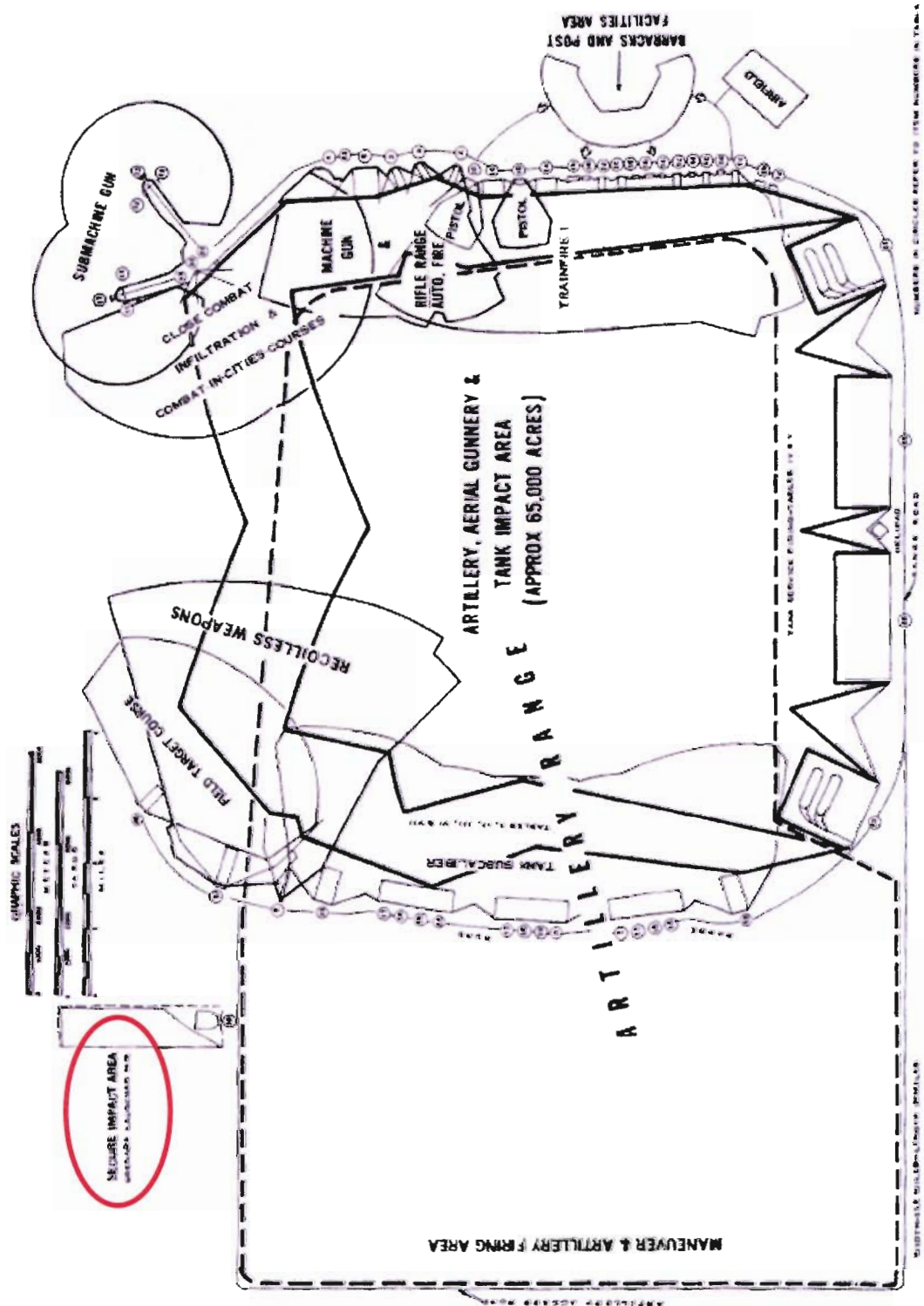


Figure 2-1

### 5.3 SDAD FOR DAVY CROCKETT RANGE

Army Regulation AR 385-63 *Safety Regulations for Firing Ammunition for Training, Target Practice, and Combat* dated 17 June 1968 contains the Surface Danger Area Diagram (SDAD) for the Davy Crockett Range. The figure below represents the SDAD for both the M28 and M29 weapons. The following explanation of the zones is provided:

14

AR 385-63

17 June 1968

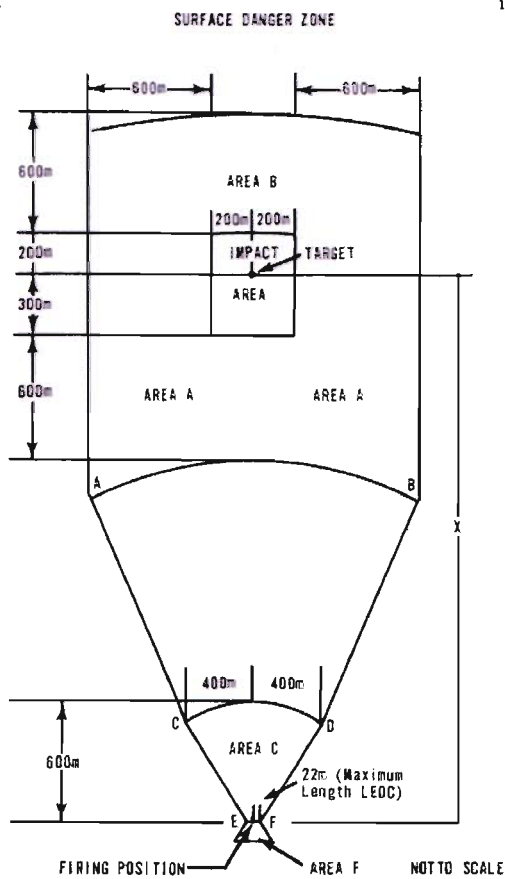


Figure 11-3. For M28 and M29 systems (Davy Crockett).

- X - Range to target distance is shown as distance X (550 meters minimum to 2,000 meters maximum for M28).
- Area C - The impact area of the launching piston and the minimum range to target (600 meters). The minimum lateral dimension of this area is 400 meters on either side of the line of fire.
- Max length LEOC - Lateral width of 22 meters from weapon that corresponds to the maximum length of the low energy detonating cord (LEDC) for the propellant charge. This provided safety for the gun crew from the blast of the recoilless weapon.
- Area E and F - This area has a base of 200 meters and a height of 100 meters for back blast.
- Impact Area - The target area shown is 400 meters by 500 meters

This regulation states that when range to target is more than 2,100 meters, arcs AB and

CD are laid out as shown. When range to target is less than 2,100 meters, arc CD is not used. Point E and F are directly connected to the full arc width of AB. The light weapon system M28 used Cartridge, 20mm Spotting M101 with a maximum range of 2,000 meter. Therefore the SDAD used on the plates does not include arc C and D.



#### 5.4 SAFETY IN TRAINING WITH THE DAVY CROCKETT WEAPON SYSTEM

Due to the danger to personnel, certain precautions were emphasized during training. They included:

- All personnel stay clear of the back blast danger area - A danger area from the back blast was a triangular shape with the apex at the breech of the weapon. This danger area extended 100 meters to the rear with the base of the triangle 200 meters wide.
- The weapon should never be fire from confined spaces like dugouts or rooms.
- To use an emplacement, the Davy Crockett Weapon System require a special type constructed to expose rear of gun with no obstruction behind breech. Most conventional type weapons emplacements are unsuitable.
- Personnel should protect their ears from concussions when weapon is fired.
- All personnel must be located at least 22 meters to the flank of the weapon when the major caliber is fired.
- Overhead firing specifically prohibited with this weapon.

#### 5.5 1961 HEALTH PHYSICS STUDY OF CARTRIDGE, 20MM SPOTTING M101

The following paragraphs summarize a health physics study from 1962 on the conclusion of the health risks associated with the Cartridge, 20mm Spotting M101. This study is included for historic background knowledge only.

Health Physics studies were conducted on the tactical use of the Cartridge, 20mm Spotting M101. Limits were delineated by the Atomic Energy Commission in the Federal Register, 10 CFR, Part 20.

Wipe tests were performed on the projectile of the cartridge to evaluate what could be picked up in handling. These tests showed only extremely minute amounts of radioactive material could be wiped off. The data fell well below the minimum permissible tolerances. The wipe test indicated that handling of the projectiles did not created airborne particles. The conclusion reached was there was no health hazard involved in the handling of the depleted uranium components in the tactical use of the round.

Wipe tests were also made on the bore surface of the gun barrel after firing of one round and after firing four consecutive rounds. One cleaning (wipe) removed all traces of radioactivity after firing one round, and two cleanings (wipe passes) were required to remove all traces of radioactivity after firing four rounds.

The Watertown Arsenal Laboratory also experimentally measured the amount of radiation resulting from particles of uranium given off during actual firing. The experiment demonstrated that the amount of radiation and the amount of uranium

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particles given off were negligible. In four out of ten samples no uranium dust was measured with sensitive instruments.

Earth samples were taken from Lake City Ordnance Plant and Aberdeen Proving Ground where testing of the Cartridge, 20mm Spotting M101 was performed. The earth samples were leached of their uranium with nitric acid solution and evaluated fluorometrically. All concentrations did not vary significantly from what would be expected anywhere on the earth's crust (3 to 9 micrograms of uranium per gram of soil.) At the time of these tests, the Federal Register 10 CFR Part 20 did not have a limit for ground contamination. It was suggested that the spotting rounds be left in the impact area and that the impact area not be considered a radiation area.

The results of this evaluated 1962 test data concluded that no epidemiological hazard exists in the use of the depleted uranium cartridge. It was suggested that standard operating procedures, as exercised in the use any conventional weapon, would be adequate.<sup>15</sup>

## 6.0 CONFIRMED DAVY CROCKETT RANGE

The research did not discover any historic documentation of training records pertaining to requests for Davy Crockett sections to use range facilities on Schofield. These types of records are not long term or permanent, and most likely no longer exist. Research also did not locate any 1960s time frame maps with a Davy Crockett Range specifically delineated on it.

### 6.1 SCHOFIELD BARRACKS' RANGES

Although no written documentation was found, visual evidence remains on Schofield Barracks Ranges in the southwestern area. This evidence consists of range scrap and residue from the 20mm spotting and 279mm practice round. A launching piston was also located in the area of this range scrap.

### 6.2 HISTORIC RANGE REGULATIONS AND MAP ANALYSIS

This records search located several site-specific layout plans for ranges at Schofield Barracks. **Plate No. 2** reflects ranges from the 1950s, 1960s, and early 1970s in the southwest area of Schofield Range. Only one range map from the time frame of the Davy Crockett Weapon System (1961 through 1968) was located. This map was of limited use and did not delineate a Davy Crockett Range. Therefore, maps from the 1950s and early 1970s maps were used to fill in gaps for a more thorough overview.

In addition to the site-specific layout plans, these ranges were analyzed using the textual historic Schofield Range Regulations. Unfortunately, the range regulations do not cover the time frame of the Davy Crockett Weapon System. The recovered regulations are dated 1955, 1957, 1959 and 1971. The date behind the range name either came from the map on which the range first appears, or the date of the range regulation in which the range is discussed. These dates do not necessarily reflect when the range was first in service. <sup>16 17 18</sup>  
<sup>19</sup>

The paragraphs below discuss the relevant information retrieved from the reviewed maps. All these historical maps and site plans are contained in **Appendix G** as 11 x 17 inch reproduction. The underlined map titles are hyperlinked to JPEG (\*.JPG) full size compliant images of the subject maps on the digital version of this report. The maps are discussed in order of creation or final revision.

1955

US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, Map entitled *Schofield Barracks & East Range Showing Impact Areas, Training Areas & Artillery Firing Positions* dated 1955, DPW-031207-002.

Appendix G-1

This map coincides with the 1955 range regulations. The WC, WF and WH ranges are subdivided into WC-1, WC-2, WF-1, WF-2, WH-1 and WH-3. There is dual purpose on the WC ranges. The WF divides into two versus one Carbine range. The WH range also divides into WH-1 and WH-3 with a dual purpose. A new range WH-2 appears as a Flame Thrower Range. Range WI has moved southwest from its position on earlier maps and is now a mortar range.

This southwest group of ranges is now designed for firing:

- 1) Small Arms (rifle, carbine and machine gun)
- 2) 3.5 Inch Rockets (Practice and High Explosive (HE))
- 3) Hand Grenades (Practice and HE)
- 4) Rifle Grenades (Practice and HE)
- 5) 81mm and 4.2 Inch Mortars

The Range Regulation describes the ranges as follows from south to north:

- **WA Rocket Launcher and Rifle Grenades (1955)**
- **WB Hand and Rifle Grenade and Rocket Launcher Range (1955)**
- **WC-1 Sub Machine Gun Range (1955) AKA WC-2 Close Combat Range (1955)**
- **WD Machine Gun Demonstration and Familiarization Range (1955)**
- **WE BAR Transition (1955)**
- **WF-1 and WF-2 Carbine Transition Range (1955)**
- **WG 500 Inch and 1,000 Inch General Purpose Tanks (1955)**
- **WH-1 BAR Transition (1955) AKA WH-3 Tank Gunnery Range – Moving Targets, Sub Caliber (1955)**
- **WH-2 Flame Thrower Range (1955)**
- **WI Mortar Field Target Firing Range (1955)**
- **WJ M1 Rifle, Carbine and BAR Known Distance Range (1955)**
- **WK M1 Rifle, Carbine and BAR Known Distance Range (1955)**
- **WL M1 Rifle, Carbine and BAR Known Distance Range (1955)**
- **WM M1 Rifle, Carbine and BAR Known Distance Range (1955)**

1959

US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, An Interim Range Map of Schofield Barracks & East Range entitled *Schofield Barracks Military Reservation*, dated 1 October 1959, DPW- 022607-028.

Appendix G-2

This late 1959 range map again remains basically unchanged from the 1955 map. The ranges follow the descriptions in the 1957 and 1959 range regulations. A minor adjustment is the addition of a 500 Inch Range to the 1,000 Inch Range at WG. Also the WH-3 Tank Gunnery Range – Moving Target Sub Caliber is no longer showing. Lastly, the WJ Known Distance range is divided into two ranges with the same purpose. The ammunition used and range names remain basically the same.

1969

US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, Map from Headquarters, United States Army, Pacific Office of the Signal Office entitled *Key Sheet Post Cable Map Target Range Area Schofield Barracks*, dated 9 April 1969, DPW-031207-001.

Appendix G-3

This is the only range map from the 1960s discovered during the historic map search. There is no legend with the map, although it shows the same basic layout as the earlier 1959 map. No Davy Crockett Range is delineated. A few incidental changes have occurred such as the WI range has been slightly reconfigured and is divided. The WH-2 Flamethrower Range is no longer delineated.

1973

US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, Map Edition 2-USARPAC Schofield Barracks Range entitled *Schofield Barracks and Vicinity*, dated 1 September 1973, DPW-022607-059.

Appendix G-4

This range map shows renaming of all of the ranges from the “W” series to the following symbols:

- |                     |                                 |
|---------------------|---------------------------------|
| • KR-1 through KR-8 | Kolekole Road Ranges            |
| • TR-1 through TR-5 | Trimble Road Ranges             |
| • CR-1 through CR-7 | Central Ranges                  |
| • MF-2 through MF-7 | McCarthy Flats Ranges           |
| • SR-1 through SR-5 | South Ranges                    |
| • PR-1 through PR-3 | Pistol Ranges at Waikoloa Gulch |

Although this is the first map found that shows the new range names, they are discussed in the 1971 range regulations with the new names. Six new ranges appear on this map including SR-5, TR-3, TR-5, CR-1, CR-1A and CR-2A. The ranges are renamed as follows, going south to north:

- **KR-1 Hand Grenade, 3.5 Inch Rocket Launcher, M72 LAW, 40mm Launcher M203 Inert Only (1971) AKA WA Rocket Launcher and Rifle Grenades (1955)**
- **KR-2 Live Hand Grenade Range (1971) AKA WB Hand and Rifle Grenade and Rocket Launcher Range (1955)**
- **KR-3 40mm Launcher M203, M72 LAW (1971) AKA WC-1 Sub Machine Gun Range (1955)**
- **KR-4 90mm Recoilless Rifle, 106mm Recoilless Rifle, M72 LAW, .50 Caliber Machine Gun (1971) AKA WC-2 Close Combat Range (1955)**
- **KR-5 General Purpose Weapons Fire and Demonstration Range – Small Arms (1971) AKA WD Machine Gun Demonstration and Familiarization Range (1955)**
- **KR-6 Squad and Platoon in the Attack – Live Fire (1973) AKA WE BAR Transition (1955)**
- **KR-7 Small Arms Night Firing and Daylight Shotgun Firing (1971) AKA WF-1 and WF-2 Carbine Transition Range (1955)**
- **KR-8 Sub-Caliber Firing 90mm Recoilless Rifle, 106mm Recoilless Rifle (1971) AKA WG 500 Inch and 1,000 Inch General Purpose Tanks (1955)**
- **TR-1 M60 Machine Gun Zero, Familiarization and Qualification (1971) AKA WH-1 BAR Transition (1955) AKA WH-3 Tank Gunnery Range – Moving Targets, Sub –Caliber (1955)**
- **TR-2 M60 Machine Gun Assault Firing (1971) AKA WI Mortar Field Target Firing Range (1955)**
- **TR-3 Flamethrower (1971)**
- **TR-5 Trainfire Target Detection (1971)**
- **CR-1 1,000 Yard Known Distance Range (1971)**
- **CR-1A M60 Machine Gun Field Firing Range (1971)**
- **CR-2 Known Distance Range for Rifle (1971) AKA WJ M1 Rifle, Carbine and BAR Known Distance Range (1955)**
- **CR-2A 90mm Recoilless Rifle, 106mm Recoilless Rifle (1971)**
- **CR-3 Trainfire Record Range (1971) AKA WK M1 Rifle, Carbine and BAR Known Distance Range (1955)**
- **CR-4 Trainfire Field Firing Range (1971) AKA WL M1 Rifle, Carbine and BAR Known Distance Range (1955)**
- **CR-5 25 Meter Trainfire Zero Range (1971) AKA WM M1 Rifle, Carbine and BAR Known Distance Range (1955)**

#### 6.2.1 Plate No. 2 – Schofield Barracks Oahu, Hawaii

**Plate No. 2** is an overview of Schofield ranges from the maps discussed above. Only the southwest ranges are delineated. The ranges are overlaid on a 1965 aerial photograph. Although only the southwest ranges are outlined, footprints of the northern ranges are noticeable in the photograph. The Davy Crockett Range confirmed target area is north of Features 2, 13, and 3.

#### 6.2.2 Plate No. 3 – Schofield Barracks Oahu, Hawaii

**Plate No. 3** is a closer view of two likely firing lines for the Davy Crockett Range. Survey points from Range Safety and USACE St. Louis District show where range scrap and elevated meter readings were found. The firing lines are based on the minimum target range of the weapon at 555 - 600 meters. The range debris found on Schofield includes a launching piston that had a maximum distance of 600 meters. Moving the firing lines any further south involved interference from range buildings in the Surface Danger Area Diagram (SDAD), rougher terrain and heavily vegetated areas with no trails or paths.

This Davy Crockett target area also lies in the same impact area as the M79 grenade launcher (40mm rifle grenade) from Feature 2. This reflects AR 210-21 dated 1964 that states in the case of the M79 grenade launcher (40mm rifle grenade) and Davy Crockett Weapon System, a separate range usually is necessary due to the requirement for a secure impact area.

A SDAD for the Davy Crockett Range from AR 385-63 dated 1968 (see paragraph 5.3) is laid over the 1964 Aerial Photograph on each firing line. The hatched area between the 600 meter target center line and the 2,000 meter target center line represents suspect areas for contamination from Cartridge, 20mm Spotting M101. A visual surface sweep of the suspect area is needed for verification of a target closer to the 2,000 meter range. A coordinate for the center of the 600 and 2,000 meter line is shown in Section 9.0.



## **7.0 POTENTIAL DAVY CROCKETT RANGES**

Evidence from range scrap proves that Davy Crockett weapons were fired along with Cartridge, 20mm Spotting M101 on the Schofield Range. From this fact the question arose of the possibility of Davy Crockett Ranges on the Makua Military Reservation and Pohakuloa Training Area (PTA). Historically and currently these two training areas are used in conjunction with the Schofield ranges for training by the U.S. Army Hawaii.

The research did not discover any documentation of training records pertaining to requests for Davy Crockett sections to use range facilities on Makua Military Reservation or Pohakuloa Training Area. These types of records are not long term or permanent, and most likely no longer exist. Research also did not locate any 1960s time frame maps with a Davy Crockett Range specifically delineated on it. However, from a review of site specific maps and range regulations, areas for potential Davy Crockett Ranges were located.

### **7.1 MAKUA MILITARY RESERVATION**

The Makua Military Reservation AKA Makua Training Area primarily focused on tank gun and recoilless rifle firing along with receiving fire from sea. The majority of the site, including the entire southeastern area, is marked as an Impact Area. A strip approximately 1,000 yards wide along the shore and Farrington Highway is required to be kept clear of duds at all times.

### **7.2 HISTORIC RANGE REGULATIONS AND MAP ANALYSIS**

The records search located several site-specific layout plans for Makua Military Reservation. The paragraphs below discuss the relevant information retrieved from the reviewed maps that are included in **Appendix G**. All historical maps and site plans contained in **Appendix G** are 11 x 17 inch reproduction. The underlined map titles are hyperlinked to JPEG (\*.JPG) full size compliant images of the subject maps on the digital version of this report. The maps are discussed in order of creation or final revision.

In addition to the site-specific layout plans, these areas were also analyzed using textual historic range regulations documents. The range regulations applicable for Makua Military Reservation were also the main Schofield Barracks regulations used in Section 6.0. These regulation included instructions for all ranges and conduct of training at Schofield Barracks and outlying areas for artillery and mortar firing on the island of Oahu. As mentioned before, the range regulations do not cover the time frame of the Davy Crockett Weapon System (1961 through 1968). These recovered regulations are dated 1955, 1957, 1959 and 1971.

1954

US Army Garrison Schofield, Honolulu, HI (SCH), Map developed by M & I Engineering Division HUSAEPAAC showing *Kaena Point Military Reservation, Mokuleia Training Area and Makua Training Area*, dated 1 August 1954, Department of Public Works, DPW-022607-004.

Appendix G-5

Although this map precedes the Davy Crockett Weapon System, it depicts the impact and clear area that have remained unchanged. Notes pertaining to Makua also allow firing from the sea into the impact area.

1964

US Army Garrison Schofield, Honolulu, HI (SCH), Map Edition 2-DMATC Series W833 Sheet 5321 entitled *Kaena*, dated circa 1964, Department of Public Works, DPW-022607-032.

Appendix G-6

The map shows a basic outline of the reservation only. Although this map coincides with the time frame of the Davy Crockett Weapon System, it delineates no impact area or range activities.

By the 1960s the area is divided into two sections: a training area primarily used for bivouacs, tactical problems and communication sites and an impact area used for live firing with all weapons. Small arms firing problems could be conducted in the training area if a SDAD was furnished and all rounds impacted into the Danger Area. A range was also available at grid 80728132 in the impact area for the destruction of unserviceable ammunition by Explosive Ordnance Disposal (EOD) teams.

7.2.1 Plate No. 4 – Makua Military Reservation Oahu, Hawaii

**Plate No. 4** reflects Makua Military Reservation from the 1964 map. Other earlier and later maps of this area do not reflect fixed range fans, SDAD or firing lines of interest.

Search of records neither confirmed nor denied the firing of Davy Crockett weapons at Makua Military Reservation. However, in the 1971 range regulations the statement is made concerning the Makua Military Reservation:

“All other firing such as 81mm mortar, 106mm recoilless rifle, tank weapons, demolition demonstrations and **special weapons** must be conducted from the established firing line between grid coordinates 809814 and 809813 on Hill 210. In all cases a SDAD must be furnished.”

The 1959 range regulation (prior to the Davy Crockett Weapon System) also mentions this firing line, but references the use of it only for tanks. This limits the potential area for a Davy Crockett Range. **Plate No. 4** shows a 1964 map of Makua Military Reservation with this approved firing line and a Davy Crockett Range SDAD. The hatched area between the 600 meter target center line and the 2,000 meter target center line represents a suspect area for contamination from Cartridge, 20mm Spotting M101. Coordinate for the center of the 600 and 2,000 meter lines are shown in Section 9.0. This plate represents only a potential Davy Crockett Range. A visual surface sweep of the range is needed to confirm or deny this.

### 7.3 POHAKULOA TRAINING AREA

The Pohakuloa Training Area (PTA) is a training area on the island of Hawaii acquired by the United States from the State of Hawaii and private landowners. The facility is used by the United States Army Hawaii, the United States Marine Corps, and the Hawaii Army National Guard (HARNG).

The PTA is located centrally within the island of Hawaii approximately 40 miles west of Hilo and 40 miles east of Kawaihae, Hawaii. A public highway, known as Saddle Road, traverses the northern portion of the area and serves as a major land route.

PTA consists of a cantonment area, a maneuver area, an impact area and a safety buffer zone. The cantonment area or Base Camp consists of administrative and logistical buildings, troop billets, Bradshaw Airfield and the ammunition storage area. The Maneuver Area consists of limited road net and prominent terrain features. The Pohakuloa Impact Area is an area generally bounded on the north by Lava Road, on the east by Redleg Road, on the south by Kon-Hilo Trail and on the west by Bobcat Trail.

### 7.4 HISTORIC RANGE REGULATIONS AND MAP ANALYSIS

The records search located several site-specific layout plans for Pohakuloa Training Area. The paragraphs below discuss the relevant information retrieved from the reviewed maps, included in **Appendix G**. All historical maps and site plans contained in **Appendix G** are 11 x 17 inch reproductions. The underlined map titles are hyperlinked to JPEG (\*.JPG) full size compliant images of the subject maps on the digital version of this report. The date behind the range name either came from the map on which the range first appears, or the date of the Range Regulation in which the range is discussed if earlier than the map date. These dates do not necessarily reflect when the range was first in service. The maps are discussed in order of creation or final revision.

In addition to the site-specific layout plans, these areas were also analyzed using textual historic range regulations documents. The range regulations applicable for Pohakuloa Training Area were separate regulations for only this area. As with the Schofield and

Makua range regulations, they do not cover the time frame of the Davy Crockett Weapon System from 1961 through 1968. These recovered regulations are dated 1970, 1971 and 1974.<sup>20 21 22</sup>

The following site-specific layout plans for Pohakuloa Training Area from the 1960s and 1970s were copied from various sources for range information. These ranges were analyzed for the best potential ranges for use with the Davy Crockett Weapon System.

#### 1963

US Army Garrison Schofield Honolulu, HI, Map Sheet 1 Series W833S entitled *Pohakuloa Training Area* dated 1 February 1963, Department of Public Works, DPW-022607-012.

#### Appendix G-7

This earliest map from 1963 shows only one range in the northern half of PTA. This is the **Moving Target Range (1963)**. All of the range regulations discuss this range. The moving target range provided a minimum of four moving targets traveling at 10 miles per hour on a rhombic type track. The firing of solid projectiles at the target was permitted, but any ammunition containing an explosive element was not. Also delineated is the Pohakuloa Danger Area that was designated as an impact area all weapons. This range was not a suitable Davy Crockett Range.

Unfortunately, the map is sheet 1 of 2 and only shows the northern half of the PTA. Sheet 2 of 2 showing the southern half was not recovered. In conclusion, the only range shown on the 1963 map is:

- **Moving Target Range (1963)**

#### 1965

US Army Garrison Schofield, Honolulu, HI, U.S. Army Mapping Center entitled *Island of Hawaii Pohakuloa Training Area* dated 1 February 1965, Department of Public Works, DPW-022607-015.

#### Appendix G-8

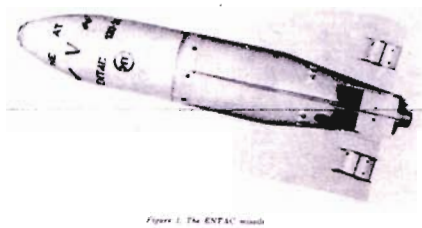
This full map of PTA shows seven ranges, one mortar and artillery firing point's area, and again delineates the impact area as "No High Explosive Impact Outside of Red Border". The first three of these ranges are not discussed in the range regulations.

Going from the north to the south, the first new range is the **3.5 Practice Range (1965)**. This range is located in the basic camp versus along the perimeter to the impact area. The range use most likely consisted of training with the practice version of the Rocket, 3.5 Inch Practice M29 series. The next range south is the **3.5 Rifle Grenade Range (1965)**. The title for this range is confusing as it refers to two different weapons and

ammunition types. The range may have been dual purpose for the use of 3.5 inch rockets and 40mm rifle grenades.

Continuing south on Lava Road is the **Flamethrower Range (1965)**. The next range south was shown on the 1963 map and now is name the **“A” Firing Line (1965) AKA Moving Target Range (1963)**. The **“B” Firing Line AKA Menehune Tank Range** is delineated next on Lava Road. The range operation for this range is discussed in the 1970, 1971 and 1974 range regulations. The range confined firing of tank rounds within the firing line and range fan with the use of high explosive (HE) rounds with super quick fuzes only. Further south is a range named **3.5 Range (1965)**, most likely a 3.5 Inch Rocket Range. Up towards the Base Camp area is the **4.2 & Arty Firing Points (1965)** section delineated as a rectangle. This is located north of Kaena Trail Road. These obviously are the firing points for large mortar and artillery.

Lastly the most interesting of all ranges appears. This range is named **ENTAC Range (1965)**. The ENTAC (Engin Teleguide Anti-Char) missile was French manufactured. It



was a light, no roll stabilized, remote controlled, wire guided missile intended for use against ground targets. It was primarily an antitank weapon, but could be used effectively against gun emplacements, roadblocks, and fortifications. The range is of the correct size for the firing of the Davy Crockett weapons. This range is more remote and easy to

secure. To get to this range, one would go south off of the main Lava Road to Engineer Road, left on Redleg Trail. A picture of the ENTAC missile is shown.<sup>23</sup>

In review, the following new and old ranges are shown on this 1965 map:

- **3.5 Practice Range (1965)**
- **3.5 Rifle Grenade Range (1965)**
- **Flamethrower Range (1965)**
- **“A” Firing Line (1965) AKA Moving Target Range (1963)**
- **“B” Firing Line AKA Menehune Tank Range**
- **3.5 Range (1965)**
- **4.2 & Arty Firing Points (1965)**
- **ENTAC Range (1965)**

#### 1976

US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, Map Sheet 2 Series W833S entitled *Pohakuloa Training Area*, dated 1 November 1976, DPW-022607-013.

#### [Appendix G-9](#)

This 1976 map is a reprint of a 1970 map from the Office of the Engineer USAPAC. Sheet 1 of this same year map was not recovered during the research. This is the first we see **Range No. 5 M72 Rifle Grenade M67 Recoilless Rifle (1970)** although the range is discussed in the oldest recovered range regulation (1970). The range title is confusing, as the M72 is the Light Antitank Weapon (LAW) rocket not a rifle grenade launcher. The Range Regulation states the range was used for firing the Rocket, 66mm HEAT M72 (LAW), Cartridge 90mm HEAT for the M67 recoilless rifle and Cartridge, 106mm Heat for the M40 recoilless rifle. This range is also the appropriate size for the firing of the Davy Crockett Weapon System. Although the range is first discussed in the 1970 range regulations, it most likely was in use prior to this date.

In conclusion, the following range is introduced on this map:

- **Range No. 5 M72 Rifle Grenade M67 Recoilless Rifle (1970)**

1979

US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, Map Sheet 1 Series W833S entitled *Pohakuloa Training Area*, dated 1 April 1979, DPW-022607-014.

Appendix G-10

This 1979 map is reprinted from the 1973 version by the 662<sup>nd</sup> Engineering Battalion. This is sheet 1 of 2 showing the northern half of PTA. The map shows three new ranges in the area south on Redleg Trail and three ranges previously delineated on earlier maps.

The three new ranges are **Range No. 2 Flamethrower (1970)**, **Range No. 3 M79 Grenade Launcher Practice Rounds (1970)**, and **Range No. 4 M79 Grenade Launcher (1970)**. Although these ranges are finally showing on this 1979 map, the range regulations in 1970 discuss these ranges. The instructions for operations on Range No. 2 Flamethrower specified the use of Flamethrowers only. Range No. 3 M79 Grenade Launcher Practice Rounds (1971) instructions for operations specified that only 40mm practice ammunition for the M79 grenade launcher is fired on this range. Range No. 4 M79 Grenade Launcher is the only range authorized for Cartridge, 40mm HE ammunition for the M79 grenade launcher.

Three previously delineated ranges also appear. The northern half of **Range No. 5 M72 Rifle Grenade and M67 Recoilless Rifle (1970)** is shown along with the **Moving Target Range (1970) AKA "A" Firing Line (1965) AKA Moving Target Range (1963)**. The third range we see again is the **M67 and M72 Rocket Range Puu Ahi (1970) AKA 3.5 Rifle Grenade Range (1965)**. The range fan for this range has increased in size to accommodate the weapons now being fired on it. The 1970 Range Regulation states the Rocket, 66mm HEAT M72 (LAW), Cartridge, 90mm HEAT and

Cartridge 106mm HEAT for recoilless rifle were used on this range. This range is also now large enough to accommodate the Davy Crockett Weapon System (2,000 meters).

In conclusion the following ranges are delineated on this map:

- **Range No. 2 Flamethrower (1970)**
- **Range No. 3 M79 Grenade Launcher Practice Rounds (1970)**
- **Range No. 4 M79 Grenade Launcher (1970)**
- **Range No. 5 M72 Rifle Grenade and M67 Recoilless Rifle (1970)**
- **M67 and M72 Rocket Range Puu Ahi (1971) AKA 3.5 Rifle Grenade Range (1965)**
- **Moving Target Range (1971) AKA “A” Firing Line (1965) AKA Moving Target Range (1963)**

#### 7.4.1 Plate No. 6 - Pohakuloa Training Area Hilo, Hawaii

The range regulations state that all weapons of the infantry division could be fired at Pohakuloa Training Area (PTA). Prior to using the PTA, a SDAD for live fire problems was required to be submitted to Range Central. Units could not conduct live firing in any area until this diagram was approved. The SDAD was required to conform to AR 385-63.

**Plate No. 6** shows four ranges at Pohakuloa Training Area as potential Davy Crockett Ranges. These four ranges are:

- Feature 4 - M67 and M72 Rocket Range Puu Ahi (1970)
- Feature 10 - ENTAC Range (1965)
- Feature 13 – Range No. 4 M79 Grenade Launcher (1970)
- Feature 14 - Range No. 5 M72 Rifle Grenade and M67 Recoilless Rifle (1970)

Of the four ranges, the M67 and M72 Rocket Range Puu Ahi (Feature 4) range is the **least likely** candidate. This range served as a M67 (recoilless rifle) and M72 (LAW) rocket range. The range size is sufficient, although the location is not the most conducive for a “secured impact area” as required by AR 210-21.

The ENTAC Range (Feature 10) was established and in use at the same time as the Davy Crockett Weapon System. The range size is appropriate as is the location. The road into this range could be secured satisfying the “secure impact area” requirement.

Range 4 (Feature 13) is another potential range for Davy Crockett firing. Range 4 is for M79 grenade launchers (40mm rifle grenades). The 40mm rifle grenade launched from the M79 also required a secure impact area. Regulations recommended that the Davy



Crockett Range and 40mm rifle grenade range be one and the same and share the secure impact area. The range size and location again are appropriate for a Davy Crockett Range. Egress into and out of the range area could be secured and controlled, again satisfying the requirement.

Range No. 5 (Feature 14) is also the appropriate size for Davy Crockett Range. The range is the last in the line going south, appropriate for the secure impact area. This range could easily have shared an expanded impact area with Range No. 4.

A SDAD for the Davy Crockett Range from AR-385-63 dated 1968 (see paragraph 5.3) is laid over each of these four ranges. The hatched area between the 600 meter target center line and the 2,000 target center line represents suspect areas for contamination from Cartridge, 20mm Spotting M101. Coordinates for the center of the 600 and 2,000 meter lines are shown in Section 9.0. This plate represents only a potential Davy Crockett Range. A visual surface sweep of the range is needed for verification.

## **8.0 SITE USE OF CARTRIDGE, 20MM SPOTTING M101**

### **8.1 POTENTIAL QUANTITIES USED FOR TRAINING**

The spotting cartridge was packed 80 rounds per T46 wooden box (sometimes called a chest). The 80 rounds were inner packed in 16 web pouches of five rounds each. For a squad of the Davy Crockett Light Weapon M28, the Assistant Gunner carried five spotting cartridges in a web pouch. One of the duties of the Assistant Gunner was to load and fire the spotting rifle.<sup>24</sup>

A historic document from the spring of 1962 states that the U.S. Army Hawaii received one Davy Crockett Light Weapon M28 and two Davy Crockett Heavy Weapons M29 to the Ordnance School for training purposes. By the 4<sup>th</sup> quarter of 1962 the balance of the systems and ancillary equipment were due in and included:<sup>25</sup>

- |                              |    |
|------------------------------|----|
| • Light Weapons M28          | 14 |
| • Heavy Weapons M29          | 6  |
| • Truck ¼ Ton M38A1D for M28 | 14 |
| • APC M113 for M29           | 7  |

A total of fifteen M28 weapons and seven M29 weapons were allocated to the U.S. Army Hawaii. The primary armament of a Davy Crockett section consisted of three squads, two armed with the Davy Crockett Light Weapon M28 and one armed with the Davy Crockett Heavy Weapon M29. This gave the 25<sup>th</sup> Infantry Division the potential at most of seven Davy Crockett sections, three squads in each section. Of these Davy Crockett sections, fourteen squads would fire the Davy Crockett Light Weapon M28.<sup>26</sup>

FM 23-20 and the firing tables describe two types of fire missions: indirect and direct. Each section was required to qualify annually on their weapons. Besides crew drills, it is reasonable to assume that each team could conduct two training fire missions for each the indirect and direct qualification firing.<sup>27</sup>

All tactical Davy Crockett warheads are out of the system by July 1968. This allows approximately six years of training with the weapons at Schofield Barracks & associated training areas.

The “worse case scenario” based on all five spotting rounds fired during an assumed number of training exercises or qualifications do not take in consideration another unknown variable. Speed along with precision and team work was the main goal of the Davy Crockett section. Corrections were made until fire was adjusted on target with the spotting round. If target acquisition was accomplished with two spotting rounds, only two rounds were used.

## 8.2 VERIFIED QUANTITIES SHIPPED TO OAHU

The total rounds manufactured and verified from Ordnance Corps Ammunition Data Cards (ADC) from Lake City Ordnance Plant was 75,318. The first lot was accepted 23 June 1961. The final lot manufactured was accepted 19 September 1963. An analysis of all the lots manufactured is shown in a spreadsheet in **Appendix C**. Copies of the original ADC are scanned in the backup files.<sup>28</sup>

Other original documents located for Cartridge, 20mm Spotting M101 were DD Form 550. This was an Ordnance Corp Ammunition Lot Record. When the entire lot was shipped off and the lot became “zeroed out”, the form was pulled and filed. The form was annotated with carriers, transportation control numbers, and destinations. An analysis of each destination with quantities is shown in a spreadsheet in **Appendix C**. Copies of the original DD Form 550 are scanned in the backup files.<sup>29</sup> By comparing the two spreadsheets, it is shown that the quantities shipped match the quantities manufactured.

Total rounds verified shipped to Oahu from Lake City Ordnance Plant were 714 rounds on 27 April 1962. Notice this date coincides with the first weapons arriving at Oahu in the spring of 1962. This shipping quantity averages 8.5 rounds fired per year per weapon. It is highly probable that additional stocks of the Cartridge, 20mm Spotting M101 were order from one of the Ordnance Depots (Letterkenny or Pueblo) during the six active years of the Davy Crockett Weapon System in Hawaii. Shipping records from ammunition depots are not permanent records, so this can not be verified.<sup>30</sup>

## 9.0 CONCLUSIONS

### 9.1 CONFIRMED AND POTENTIAL CONTAMINATION

Analysis of the information gathered during this archive search identifies a confirmed area on Schofield Barrack and several potential areas at Makua Military Reservation and Pohakuloa Training Area for the use of Cartridge, 20mm Spotting M101. The potential areas are based on range type and use, historic range maps and range regulations and common practice for the time period of the Davy Crockett Weapon System (1961 through 1968).

The following chart gives the center coordinates for the 600 meter line and the 2,000 meter line in the suspected target areas as shown on **Plate No. 3**, **Plate No. 4** and **Plate No. 6**. To confirm contamination on the potential targets, a site inspection of the impact area is required. To search for evidence of this cartridge and other Davy Crockett ammunition requires the ground be fairly visible and clear of thick brush and long grasses. As on the confirmed area at Schofield, several indicators may be present. This would include aluminum shrapnel from the rear body assembly and plastic fiberglass pieces from the fins and windshield of the Projectile, Atomic Supercaliber 279mm Practice M390, aluminum fin assemblies and projectile body pieces from the Cartridge, 20mm Spotting M101 and pistons from either the light or heavy weapon. Pictures of these items are shown in **Appendix E** and **Appendix F**.

PLATE No.	SITE	LOCATION	Center of 600 Meter Target Line	Center of 2,000 Meter Target Line
Plate No. 3	Schofield Barracks	First SDAD	21° 29' 30.67"N 158° 06' 54.26"W	21° 30' 10.07"N 158° 07' 18.61"W
Plate No. 3	Schofield Barracks	Second SDAD	21° 29' 30.87"N 158° 06' 56.47"W	21° 30' 15.39"N 158° 07' 06.62"W
Plate No. 4	Makua Military Reservation	SDAD	21° 31' 59.82"N 158° 12' 46.48"W	21° 31' 59.89"N 158° 11' 57.83"W
Plate No. 6	Pohakuloa Training Area	Feature 4 SDAD	19° 44' 30.63"N 155° 35' 52.74"W	19° 43' 47.85"N 155° 36' 09.16"W
Plate No. 6	Pohakuloa Training Area	Feature 10 SDAD	19° 42' 25.91"N 155° 33' 09.20"W	19° 41' 55.43"N 155° 33' 44.91"W
Plate No. 6	Pohakuloa Training	Feature 13	19° 41' 38.92"N	19° 41' 41.29"N

<b>PLATE No.</b>	<b>SITE</b>	<b>LOCATION</b>	<b>Center of 600 Meter Target Line</b>	<b>Center of 2,000 Meter Target Line</b>
	Area	SDAD	155° 33' 22.62"W	155° 34' 10.64"W
Plate No. 6	Pohakuloa Training Area	Feature 14	19° 41' 24.75"N	19° 41' 24.73"N
		SDAD	155° 33' 23.77"W	155° 34' 11.84"W



# **APPENDIX A**

## **END NOTE REFERENCES**

*The following list of references only represents the items cited in preparation of this report, and do not illustrate all the documents copied and reviewed for the backup files. **Appendix B** Records Review Index lists all documents and maps copied and reviewed for this report and in the backup files. The documents and maps listed in **Appendix B** are available digitally on the backup files disc.*

*Hard copies of the cited references are included in **Appendix C**, as well as being hyperlinked to scanned images on the digital version of this report. For large manuals and regulations, only the pages with pertinent information are scanned in the report scanned images file. The complete manual or regulation is available in the backup files disc.*

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<sup>1</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Ammunition Data, dated circa 1960, MVS-020707-002, Appendix C-1.

<sup>2</sup> NARA II College Park, Maryland (CP), Memorandum from HQ Hawaiian Dept, Honolulu, H.T., Subject: *Acquisition of land at Schofield Barracks and at Fort Shafter, Territory of Hawaii*, dated 19-Nov-19, RG 407, Records of the Adjutant General's Office 1917-, Entry 37A Project Files 1917-1925, Box 1239, CP-121306-009, Appendix C-2.

<sup>3</sup> Military History Institute Carlisle Barracks, Pennsylvania (MHEC), Article from the Infantry Journal, Vol XXI, No. 5, *Schofield Barracks and the Hawaiian Division*, dated November 1927, MHEC-120307-001, Appendix C-3.

<sup>4</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Memorandum from Headquarters Department of the Army, Office of the Adjutant General, Subject: *Safety Rules for Peacetime Operations with the Davy Crockett / MK 54 Mod 2 Atomic Weapon System*, dated 1 November 1961, MVS-020107-001, Appendix C-4.

<sup>5</sup> Defense Technical Information Center (DTIC), Report entitled *Development of Light Battle Group Weapon System, M28, Davy Crockett*, AD351142, dated 1 March 1962, DTIC-011607-001, Appendix C-5.

<sup>6</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Memorandum from Headquarters Department of the Army, Office of the Adjutant General, Subject: *Safety Rules for Peacetime Operations with the Davy Crockett / MK 54 Mod 2 Atomic Weapon System*, dated 1 November 1961, MVS-020107-001, Appendix C-4.

<sup>7</sup> Defense Technical Information Center (DTIC), Report entitled *Development of Light Battle Group Weapon System, M28, Davy Crockett*, AD351142, dated 1 March 1962, DTIC-011607-001, Appendix C-5.

<sup>8</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Department of the Army Field Manual *FM 23-20 Davy Crockett Weapons System in Infantry and Armor Units*, dated 18 December 1961, MVS-012307-001, Appendix C-6.

<sup>9</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Ammunition Data Cards dated circa 1960, MVS-020707-002, Appendix C-1.

<sup>10</sup> Lake City Army Ammunition Plant, Independence, Missouri (LC), Ammunition Data Card for Ctg, 20mm TP M106, dated 10 April 1963, Records Holding Area QA Files, Accession A-148, Box 1409-08, LC-031507-001, Appendix C-7.

<sup>11</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Army Regulation AR 385-63 *Safety Regulations for Firing Ammunition for Training, Target Practice, and Combat*, with change 1 dated 17 June 1968, MVS-012307-002, Appendix C-8.

<sup>12</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Headquarters Department of the Army Regulation AR 210-21 entitled *Installations Training Areas and Facilities for Ground Troops*, dated 18 December 1964, Ordnance and Technical Services Historic Manuals Library, MVS-031907-002, Appendix C-9.

<sup>13</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Headquarters Department of the Army Regulation AR 210-21 entitled *Installations Training Areas and Facilities for Ground Troops*, dated 18 November 1968, Ordnance and Technical Services Historic Manuals Library, MVS-031907-003, Appendix C-10.

<sup>14</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Army Regulation AR 385-63 *Safety Regulations for Firing Ammunition for Training, Target Practice, and Combat* with change 1, dated 17 June 1968, MVS-012307-002, Appendix C-8.

<sup>15</sup> Defense Technical Information Center (DTIC), Report entitled *Uranium Alloys for Critical Ordnance Components*, AD609896, dated 23 October 1961, DTIC-011607-003, Appendix C-11.

<sup>16</sup> National Personnel Records Center, St. Louis, MO (NPRC), Regulation prepared by HQ Schofield Barracks entitled *25th Infantry Division Range Regulations*, dated 25 May 1955, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 61L-6091, Box 1, NPRC-020107-002A and NPRC-020107-002B, Appendix C-12.

<sup>17</sup> National Personnel Records Center, St. Louis, MO (NPRC), Regulation prepared by HQ Schofield Barracks entitled *25th Infantry Division Range Regulations*, dated 31 May 1957, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 61L-6091, Box 1, NPRC-013107-001, Appendix C-13.

<sup>18</sup> NARA II College Park, Maryland (CP), Regulation prepared by Headquarters United States Army Hawaii entitled *25th Infantry Division Range Regulations*, dated 15 August 1959, RG 550, Records of U.S. Army, Pacific, Entry 20 Organization Planning Files, Military Historians Files and Regulations of U.S. Army Hawaii 1957-1961, Box 1, CP-010907-006, Appendix C-14.

<sup>19</sup> NARA II College Park, Maryland (CP), Regulation prepared by USAHAW for Schofield Barracks, Hawaii entitled *Range Regulations* dated 10 September 1971, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 401-135 U.S. Army Hawaii 1977, Box 1, CP-120806-011, Appendix C-15.

<sup>20</sup> NARA II College Park, Maryland (CP), Department of the Army, Headquarters United States Army Hawaii, Regulation Number 210-11 entitled *Installations Pohakuloa Training Area Range Regulation*, dated 20 April 1970, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 401-284, Department of the Army HQ USARPAC 1962-1972, Box 1, CP-032207-001, Appendix C-18.

<sup>21</sup> NARA II College Park, Maryland (CP), Department of the Army Headquarters United States Army Support Command, Hawaii Regulation No. 210-11 *Installations Pohakuloa Training Area Range Regulation*, dated 13 December 1971, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 401-135, U.S. Army Hawaii 1977, Box 1, CP-031507-001, Appendix C-16.

<sup>22</sup> NARA II College Park, Maryland (CP), Department of the Army Headquarters, United States Army Support Command, Hawaii Regulation Number 210-11 *Installations Pohakuloa Training Area Range Regulation*, dated 18 March 1974, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 401-75, U.S. Army Hawaii 1968, Box 3, CP-031507-005, Appendix C-17.

<sup>23</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Department of the Army Field Manual FM 23-6 *Antitank Guided Missile (ENTAC)*, dated 13 May 1964, MVS-031907-001, Appendix C-19.

<sup>24</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Department of the Army Field Manual FM 23-20 *Davy Crockett Weapons System in Infantry and Armor Units*, dated 18 December 1961, MVS-012307-001, Appendix C-6.

<sup>25</sup> NARA II College Park, Maryland (CP), Report from HQ, United States Army, Hawaii, APO 957 entitled *Staff Office Report, Office of the Ordnance Officer, January - March 1962*, dated spring 1962, RG 550, Records of the United States Army, Pacific, Entry 17, U.S. Army Hawaii 1959-1963, Box 10, CP-121406-003, Appendix C-20.

<sup>26</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Department of the Army Field Manual *FM 23-20 Davy Crockett Weapons System in Infantry and Armor Units*, dated 18 December 1961, MVS-012307-001, Appendix C-6.

<sup>27</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Firing Tables FT 279-B-4 entitled *Weapon System Battle Group, Light: M28 (Davy Crockett)*, Headquarters Department of the Army, dated 1 July 1964, MVS-020207-001, Appendix C-21.

<sup>28</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Analysis of Ammunition Data Cards (ADC) of Cartridge, 20mm Spotting M101 from document no. LC-031507-004, dated 27 March 2007, MVS-032707-001, Appendix C-22.

<sup>29</sup> USACE St. Louis District, St. Louis, Missouri (MVS), Analysis of DD Form 550 Ordnance Corps Ammunition Lot Record for Cartridge, 20mm Spotting M101 document no. LC-031507-005, dated 27 March 2007, MVS-032707-002, Appendix C-23.

<sup>30</sup> USACE St. Louis District, St. Louis, Missouri (MVS), DD Form 550, Ordnance Corps Ammunition Lot Records for Lot No. LC-2-28 and LC-2-35, dated 26 February 1962, MVS-020807-001, Appendix C-24.

**APPENDIX B**

**REFERENCE SOURCES AND  
RECORDS REVIEWED**



## **APPENDIX B - REFERENCE SOURCES AND RECORDS REVIEWED**

Researchers searched the following locations for records relating to Davy Crockett activities at Schofield Barracks & Associated Training Areas. The research team used finding aids and records managers to assist in locating documents relevant to the research topic. The table in this appendix also lists in detail all documents copied from these repositories. These copied documents are numbered with a document number and scanned on backup disks.

### **TEXTUAL AND CARTOGRAPHIC REPOSITORIES**

Defense Technical Information Center (DTIC)  
8725 John J. Kingman Road Ste. 0944  
Ft. Belvoir, VA 22060-6218

Defense Threat Reduction Information Analysis Center (DTRIAC)  
1680 Texas St. SE Bldg. 20676  
Kirtland AFB, NM 87117-5669  
505-846-9448

Lake City Army Ammunition Plant (LCAAP)  
ATTN: SJMLC-XC  
Junction of HI 7 & 8  
Independence, MO 64051-1000  
816-796-7113

National Archives and Records Center (NARA) II  
Textual References and Still Pictures Branch  
8601 Adelphi Road  
College Park, MD 20740-6001  
(301) 713-6800

National Personnel Records Center (NPRC)

Military Personnel Records  
9700 Page Avenue  
St. Louis, MO 63132-5100  
314- 538-4085

US Army Garrison, Hawaii  
Directorate of Public Works (DPW)  
Bldg 105 WAAF  
572 Santos Dumont Avenue  
Schofield Barracks, HI 96857-05013

United States Army Corps of Engineers (USACE), St. Louis District  
Ordnance and Technical Services Branch  
ATTN: CEMVS-ED-P  
1222 Spruce Avenue  
St. Louis, MO 63103-2833  
314-331-0597

Washington National Records Center (WNRC)  
4205 Suitland Road  
Suitland, MD 20409-0002  
(301) 457-7000

*Schofield Barracks & Associated Training Areas*  
*Archive Search Report*  
*Cartridge, 20mm Spotting M101*

REPOSITORY	STATE	SITE NAME	RG	RG DESCRIPTION	ENTRY NAME	ENTRY DESCRIPTION	BOX	DOCUMENT NO.	DOCUMENT DESCRIPTION	DATE
Defense Technical Information Center (DTIC)	HI	Schofield Barracks			AD351142			DTIC-011607-001	Report entitled <i>Development of Light Battle Group Weapon System, XM28, Davy Crockett</i>	1-Mar-62
Defense Technical Information Center (DTIC)	HI	Schofield Barracks			AD351147			DTIC-011607-002	Report entitled <i>Development of Heavy Battle Group Weapon System, XM29, Davy Crockett</i>	12-Oct-61
Defense Technical Information Center (DTIC)	HI	Schofield Barracks			AD609896			DTIC-011607-003	Report entitled <i>Uranium Alloys for Critical Ordnance Components</i>	23-Oct-61
Defense Technical Information Center (DTIC)	HI	Schofield Barracks			AD316982			DTIC-011607-004	Report entitled <i>Fragmentation of Projectile, Atomic, 276-MM, Practice Spotting, XM390, Composition B Loaded</i>	1-May-60
Defense Technical Information Center (DTIC)	HI	Schofield Barracks			ADB965266			DTIC-012607-001	Report entitled <i>A Human Factors Engineering Evaluation of the Davy Crockett Graphical Firing Scale (FRE 24776)</i>	1-Jul-61
Defense Technical Information Center (DTIC)	HI	Schofield Barracks			AD328042			DTIC-012607-002	Report entitled <i>Test of Fuze, PD, XM538E1 for Cartridge, Spotting, 20-MM, XM101 of XM28 Davy Crockett Weapon System</i>	1-Feb-62
Defense Technical Information Center (DTIC)	HI	Schofield Barracks			AD306997			DTIC-012607-003	Report entitled <i>Human Engineering Battle Group Weapon Systems</i>	1-Feb-59

*Schofield Barracks & Associated Training Areas*  
*Archive Search Report*  
*Cartridge, 20mm Spotting M101*

Defense Technical Information Center (DTIC)	HI	Schofield Barracks			AD305182			DTIC-012607-004	Report entitled <i>Over-all Accuracy of the Davy Crockett Weapon Using a Spotting System</i>	1-Sep-58
Lake City Army Ammunition Plant (LC) Independence, MO	HI	Schofield Barracks				Records Holding Area QA Files	A-148	LC-031507-001	Ammunition Data Card for Ctg, 20mm TP M106	19-Apr-63
Lake City Army Ammunition Plant (LC) Independence, MO	HI	Schofield Barracks				Records Holding Area Ammunition Lot History Files	A-149	LC-031507-002	Ammunition Data Card for Ctg, 20mm Dummy M147	20-Oct-61
Lake City Army Ammunition Plant (LC) Independence, MO	HI	Schofield Barracks				Records Holding Area QA Files	A148	LC-031507-003	Ammunition Data Card for Ctg, 20mm HTP M107	23-Apr-63
Lake City Army Ammunition Plant (LC) Independence, MO	HI	Schofield Barracks				Records Holding Area Ammunition Lot History Files	A-149	LC-031507-004	Ammunition Data Cards for Ctg, 20mm Spotting M101	19-Sep-63
Lake City Army Ammunition Plant (LC) Independence, MO	HI	Schofield Barracks				Records Holding Area 20mm Production Files	D-25	LC-031507-005	Ammunition Lot Record DD Form 550 for all production of Cartridge, 20mm Spotting M101	15-Nov-63
Lake City Army Ammunition Plant (LC) Independence, MO	HI	Schofield Barracks				Records Holding Area Attributes Inspection Files	753	LC-031507-006	Attributes Inspection by lot of Packing of Cartridge, 20mm Spotting M101	15-Nov-63
Lake City Army Ammunition Plant (LC) Independence, MO	HI	Schofield Barracks				Records Holding Area Attributes Inspection Files	753	LC-031507-007	Attributes Inspection by lot of Cartridge, 20mm Spotting M101	15-Nov-63

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Military History Institute Carlisle Barracks, Pennsylvania (MHEC)	HI	Schofield Barracks					MHEC-120307-001	Article from the Infantry Journal, Vol XXI, No. 5, <i>Schofield Barracks and the Hawaiian Division</i>	1-Nov-27
NARA II College Park (Cartography), Maryland (CP)	HI	Oahu Island	92	Records of the Office of the Quartermaster General	Blueprint File	Schofield Barracks, HI	CP-110806-001	Department of the Interior U. S. Geological Survey map adapted by Office of the Chief of Engineers, map entitled <i>Topographic Map of the Island of Oahu City and County of Honolulu, Grid System for Military Maps of Island of Oahu</i>	1-Jun-21
NARA II College Park (Cartography), Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	DR:189	Hawaii	CP-111406-002	Compiled from General O. No. 242 Dec 1909 & No. 172 Sep 1910 War Dept, <i>Military Reservation Schofield Barracks</i>	1-Sep-10
NARA II College Park (Cartography), Maryland (CP)	HI	Schofield Barracks	92	Records of the Office of the Quartermaster General	Railroad Blueprint File	Schofield Barracks, HI	CP-111406-004	Plane Table Sketch by 2nd Lt Futoshi Arakawa, 1st Hawaiian Infantry, U.S.A., map entitled <i>The Upper Cantonment, Schofield Barracks, H.T.</i>	1-Mar-19
NARA II College Park (Cartography), Maryland (CP)	HI	Schofield Barracks	92	Records of the Office of the Quartermaster General	Railroad Blueprint File	Schofield Barracks, HI	CP-111406-005	Sketch by Futoshi Arakawa, 2nd Lt, 1st Hawaiian Inf, U.S.A., map entitled <i>The 25th Inf. Cantonment, Schofield Barracks, H.T.</i>	1-Apr-19

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NARA II College Park (Cartography), Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	W833-S	Schofield Barracks Published Quadrangle Maps, 1959-1969		CP-111406- 006	Prepared under direction of the Engineer, USARPAC by Mapping and Intelligence Section, map entitled <i>Schofield Barracks and Vicinity, Oahu, Hawaiian Islands, City and County of Honolulu</i> , Stock No. W833SSBK&VIC*01	1-May-59
NARA II College Park (Still Photos), Maryland (CP)	HI	Schofield Barracks	111	Records of the Office of the Chief Signal Officer	111-SC	World War II, 1941-1954	664	CP-111506- 001	Photos taken at machine gun firing range and .45 caliber pistol range, Schofield Barracks.	11-Dec-47
NARA II College Park (Still Photos), Maryland (CP)	HI	Schofield Barracks	111	Records of the Office of the Chief Signal Officer	111-SC	World War II, 1941-1954	664	CP-111506- 002	Photo No. 317086 showing review of troops at Schofield Barracks.	11-Dec-47
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	392-2	HQ USARPAC Hawaii	2	CP-010907- 001	Regulations Number 350- 10 entitled <i>Nuclear Technical Training (U)</i>	26-May-66
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	66	Department of the Army Hawaii	2	CP-010907- 004	Memorandum from HQ, U.S. Army, Hawaii/25th Inf Div, APO 957, subject: <i>Operational Readiness Report (U)</i>	7-Aug-58
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	66	Department of the Army Hawaii	2	CP-010907- 005	Circular Number 380-12 entitled <i>Physical Security of Atomic Weapons and Atomic Weapons Materiel (U)</i>	16-Oct-58

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	20	Organization Planning Files, Military Historians Files and Regulations of U.S. Army Hawaii, 1957- 1961	1	CP-010907- 006	Regulation prepared by Headquarters United States Army Hawaii entitled <i>25th Infantry Division Range Regulations</i>	15-Aug-59
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	10	G-2 Historical Section; History of the Army Port and Service Commands 1943- 1947	28	CP-011007- 001	<i>History of Army Port and Service Command, United States Army Forces Middle Pacific</i>	1-Dec-46
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	83		874	CP-011007- 002	Circular No. 44 entitled <i>Training Allowances of Chemical Warfare Supplies and Ammunition</i>	6-Oct-45
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	175	Records of the Chemical Warfare Service	3	Records of the Chief "Special File" 1922-1941	52	CP-011007- 003	Memorandum from HQ Hawaiian Div, Office of the CG, subject: <i>Report of Chemical Warfare Activities, November, 1933</i>	4-Dec-33
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	175	Records of the Chemical Warfare Service	3	Records of the Chief "Special File" 1922-1941	52	CP-011007- 004	Memorandum from HQ Hawaiian Div, Office of the CG, subject: Report of Chemical Warfare Activities, December, 1936	8-Jan-36
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	175	Records of the Chemical Warfare Service	3	Records of the Chief "Special File" 1922-1941	52	CP-011007- 005	Memorandum from Hawaiian Chemical Warfare Depot, Schofield Barracks, T.H., subject: <i>Monthly Report of Activities - March, 1939</i>	12-Apr-39



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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	175	Records of the Chemical Warfare Service	3	Records of the Chief "Special File" 1922-1941	51	CP-011007- 006	Memorandum from HQ Hawaiian Div, Office of the Div Chemical Warfare Officer, Schofield Barracks, T.H., subject: <i>Report of Chemical Warfare Activities for the month of August, 1928</i>	1-Sep-28
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	175	Records of the Chemical Warfare Service	3	Records of the Chief "Special File" 1922-1941	51	CP-011007- 007	Memorandum from Hawaiian Chemical Warfare Depot, Schofield Barracks, T.H., subject: Monthly Report of Activities	31-Dec-30
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	175	Records of the Chemical Warfare Service	3	Records of the Chief "Special File" 1922-1941	51	CP-011007- 008	Memorandum from Hawaiian Div Office of the Chemical Officer, subject: <i>Report of chemical Warfare Activities, December, 1931</i>	31-Dec-31
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	175	Records of the Chemical Warfare Service	3	Records of the Chief "Special File" 1922-1941	51	CP-011007- 009	Memorandum from HQ Hawaiian Div Chemical Warfare Officer, Schofield Barracks, T.H., subject: <i>Report of chemical Warfare Activities for the month of November, 1928</i>	1-Dec-28
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	175	Records of the Chemical Warfare Service	3	Records of the Chief "Special File" 1922-1941	51	CP-011007- 010	Memorandum from HQ Hawaiian Department of the Chemical Warfare Officer, Fort Shafter, T.H., subject: <i>Report of chemical Warfare Activities for the month of November, 1928</i>	19-Dec-28

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	83	Adj Gen; Circulars 1945- 1947	877	CP-011107- 001	Circular No. 145 entitled <i>Abandonment of Areas Containing Ammunition or Explosives</i>	13-Apr-46
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	82	Adj Gen; Circulars, 1943- 1947	871	CP-011107- 002	Circular No. 99 entitled <i>Refuse Disposal - Island of Oahu</i>	1-Mar-46
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	82	Adj Gen; Circulars, 1943- 1947	871	CP-011107- 003	Circular No. 44 entitled <i>Identification of Field Artillery Aircraft, Payment of Enlisted Personnel, and Training Allowances of Chemical Warfare Supplies and Ammunition</i>	6-Oct-45
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	36	Department of the Army USARPAC 1964-1974 (76- 1006)	3	CP-012407- 001	Memorandum Number 775-10 entitled <i>USARPAC Responsibilities for Explosive Ordnance Disposal</i>	28-Sep-62
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	24	A-C/S G-3; Map, Journal and Other Records Relating to Maneuvers and Field Exercises, 1939-1943	66	CP-012507- 001	Map entitled <i>Post of Schofield Barracks Oahu T. H. Hawaiian Division Third Engineers</i> , dated 20 June 1930	20-Jun-30
NARA II College Park, Maryland (CP)	HI	Oahu Island	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	9	G-2 Historical Section, Admin History of U.S. Forces, Middle Pacific & Predecessor Commands 1941- 1945	13	CP-012507- 002	Map entitled <i>List of Active Installations</i> for the Island of Oahu	6-Jun-45
NARA II College Park, Maryland (CP)	HI	Oahu Island	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	9	G-2 Historical Section, Admin History of U.S. Forces, Middle Pacific & Predecessor	13	CP-012507- 003	Index Map of the Island of Oahu entitled <i>Training Areas Camps &amp; Centers</i>	7-Jun-45

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						Commands 1941-1945				
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	24	A-C/S G-3; Map, Journal and Other Records Relating to Maneuvers and Field Exercises, 1939-1943	66	CP-012507- 004	Map entitled <i>Post of Schofield and Vicinity Showing the Land Leased To C.P.C.</i>	28-Sep-28
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	24	A-C/S G-3; Map, Journal and Other Records Relating to Maneuvers and Field Exercises, 1939-1943	66	CP-012507- 005	Map entitled <i>North Combat Range Schofield Barracks Oahu T.H.</i>	23-Aug-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	24	A-C/S G-3; Map, Journal and Other Records Relating to Maneuvers and Field Exercises, 1939-1943	66	CP-012507- 006	Map entitled <i>Hawaiian Division Office of A.C. of S, G-s Reconnaissance Sketch of South Combat Range</i>	15-Apr-33
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	184	U.S. Army Pacific 1951-1964	6	CP-012507- 007	Circular Number 49 entitled <i>Disposal of Chemical Corps Materiel Requiring Demilitarization</i>	13-May-55
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	184	U.S. Army Pacific 1951-1964	6	CP-012507- 008	Circular Number 41 entitled <i>Chemical Ammunition Supply</i>	22-Apr-55
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	19	U.S. Army Hawaii, 1957- 1963	1	CP-012507- 009	Regulation Number 75-1 entitled <i>Explosives</i>	16-Apr-63
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	184	U.S. Army Pacific 1951-1964	6	CP-012507- 010	Circular Number 75-1 entitled <i>Explosive Ordnance Disposal</i>	19-Nov-60
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	198		1377	CP-012607- 001	Map entitled <i>Range Map No. 1</i> Traced by 64th Engineers Topography Branch USAFCPBC Drawing No. 7041	1-Dec-44

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	19	U.S. Army Hawaii, 1957- 1963	2	CP-012607- 002	Circular Number 75-1 entitled <i>Explosive Ordnance Disposal</i>	13-May-59
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	19	U.S. Army Hawaii, 1957- 1963	2	CP-012607- 003	Circular Number 710-3 entitled <i>Chemical Ammunition Supply</i>	20-Jun-59
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	19	U.S. Army Hawaii, 1957- 1963	1	CP-012607- 004	Circular Number 75-1 entitled <i>Ammunition Disposal Areas</i>	9-Jul-57
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-020507- 001	Map created by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii map entitled <i>Master Plan Basic Information Maps Reservation Map Main Post dated 25 June 1980</i>	25-Jun-80
NARA II College Park, Maryland (CP)	HI	Pohakuloa Training Area	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	1	CP-031507- 001	Department of the Army Headquarters United States Army Support Command, Hawaii Regulation No. 210-11 <i>Installations Pohakuloa Training Area Range Regulation</i>	13-Dec-71
NARA II College Park, Maryland (CP)	HI	Pohakuloa Training Area	550	Records of the United States Army, Pacific	19	U.S. Army Hawaii, 1957- 1963	2	CP-031507- 002	Headquarters United States Army, Hawaii Circular Number 210-9 <i>Pohakuloa Training Area</i>	2-Sep-61
NARA II College Park, Maryland (CP)	HI	Pohakuloa Training Area	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	1	CP-031507- 003	Department of the Army Headquarters United States Army, Hawaii Regulation Number 210- 10 <i>Installations Operation and Administration of the Pohakuloa Training Area</i>	15-Dec-71

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NARA II College Park, Maryland (CP)	HI	Pohakuloa Training Area	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-75	U.S. Army Hawaii 1968	3	CP-031507- 005	Department of the Army Headquarters United States Army Support Command, Hawaii Regulation Number 210- 11 <i>Installations Pohakuloa Training Area Range Regulation</i>	18-Mar-74
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	2	CP-031507- 006	Department of the Army Headquarters United States Army Support Command, Hawaii Regulation Number 210- 10	27-Mar-75
NARA II College Park, Maryland (CP)	HI	Pohakuloa Training Area	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-284	Department of the Army HQ USARPAC 1962- 1972	1	CP-032207- 001	Department of the Army, Headquarters United States Army Hawaii, Regulation Number 210- 11 entitled <i>Installations Pohakuloa Training Area Range Regulation</i>	20-Apr-70
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	DR:189	Hawaii		CP-111406- 001	War Department, General Orders No. 242, concerning a partial survey of Schofield Barracks.	4-Dec-09
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1347	CP-111406- 003	1st Endorsement to Memorandum, <i>Plans and Requirements, Ordnance; Schofield Barracks</i>	25-Oct-46
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	319	Records of the Army Staff		Map Enclosures to "Vulnerability Survey: USARPAC Training and Induction Facilities on Oahu (VS-UIT)"		CP-111406- 007	War Department Special Military Map, Corps of Engineers, U.S. Army, map entitled <i>Master Plan, Schofield Barracks Oahu, T.H., Water Plan</i>	1-Jan-44

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NARA II College Park, Maryland (CP)	HI	Oahu Island	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1350	CP-111506- 003	Map entitled <i>72d Ord Group Ammunition Storage Areas</i>	1-Jan-42
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1350	CP-111506- 004	Map entitled <i>Schofield Ammo. Area</i>	1-Jan-42
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1350	CP-111506- 005	War Department Special Military Map, Corps of Engineers, U.S. Army, map entitled <i>Map- 400A7ER Portion of Schofield Barracks and Wheeler Field</i>	20-Sep-44
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1374	CP-111606- 001	8th Endorsement to memorandum, dated 12 Dec 28, concerning numerical designations of fixed anti-aircraft batters in the Hawaiian Department	3-Apr-29
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1364	CP-111606- 002	9th Endorsement to memorandum, dated 30 Sep 31, <i>Housing and Storage Requirements Hawaiian Chemical Warfare Depot, Schofield Barracks, T. H.</i>	7-Jun-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1364	CP-111606- 004	Memorandum, <i>Storage of Gas Shell in the Ordnance Reserve Area</i> , and backup documents.	29-Dec-30

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1375	CP-111606- 005	War Department Special Military Map, Corps of Engineers, U.S. Army, map entitled <i>Portion of Schofield Barracks Showing Designation of Troop Areas</i>	1-Feb-43
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1354	CP-111606- 006	Map entitled <i>Bldg. Nos., Post of Schofield Barracks, Oahu, T.H., Sheet No. 11</i>	1-Jan-44
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1375	CP-111706- 004	War Department, Corps of Engineers, U.S. Army, prepared by Topographical Section, Third Engineers, map entitled <i>Training Map of East Range</i>	26-Apr-40
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of U.S. Army Forces in the Middle Pacific, 1942- 1946	198	Oahu Ordnance Decimal Files, 1941-1945	1365	CP-111706- 005	War Department, Corps of Engineers, U.S. Army, prepared by Topographical Section, Third Engineers, map entitled <i>Training Map (939A82) East Range</i>	16-Apr-42
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Dept; Adj Gen Sec; Publications Sec Training Memos, 1938-1943	13	CP-120506- 001	Training Memorandum Number 3, entitled <i>Demonstration of Attack</i>	13-Jan-43
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Dept; Adj Gen Sec; Publications Sec Training Memos, 1938-1943	13	CP-120506- 002	Training Memorandum Number 8, entitled <i>Ranger Combat Training</i>	23-Jan-43



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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Dept; Adj Gen Sec; Publications Sec Training Memos, 1938-1943	13	CP-120506- 003	Training Memorandum Number 48, entitled <i>Special Battle Courses</i>	27-Jun-43
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Dept; Adj Gen Sec; Publications Sec Training Memos, 1938-1943	13	CP-120506- 004	Training Memorandum Number 62, entitled <i>Directive to Units Concentrated for Training</i>	5-Aug-43
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	280	CP-120506- 005	<i>Schofield Barracks, T.H., Book No. 2, Index</i>	1-Jan-30
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	280	CP-120506- 006	<i>Completion Report on Reconstruction of Ammunition Storage Building No. 2235 C.W.S. at Schofield Barracks, T.H.</i>	1-Oct-30
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	280	CP-120506- 007	<i>Completion Report on Building #2245 C.W.S. Ammunition Storage at Schofield Barracks, Oahu, Territory of Hawaii</i>	1-Oct-29
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	280	CP-120506- 008	<i>Completion Report on the Construction of Fence enclosing the Gas Area at Schofield Barracks, T.H.</i>	1-Jun-31

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	280	CP-120506- 009	War Department, Quartermaster Corps, Office of the Post and Division Quartermaster, Schofield Barracks, <i>Specifications for the Furnishing of Materials and Labor Involved in the Construction of a Termite Fumigation Vault</i>	1-Jul-29
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	280	CP-120506- 010	<i>Completion Report on the Construction of Ten Ordnance Magazines, Two at Schofield Barracks, T.H., one at Fort Weaver, T.H., Four at Fort Kamehameha, T.H., Three at Fort Ruger, T.H. and Roadways and Rail Sidings therefore; Railroad Extension to New Ordnance Storehouses at Fort Kamehameha; Guard Fence inclosing Two Ordnance Storehouses at Schofield Barracks</i>	1-Aug-30
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	590	CP-120506- 011	Memorandum from Nineteenth Pursuit Squadron, A.C., Office of the CO, subject: <i>Cooperative gunnery problem with 50th Observation Squadron, Luke Field, T.H.</i>	1-Mar-37

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	602	CP-120506- 012	Memorandum from HQ Eighteenth Pursuit Group, Wheeler Field, T.H., subject: <i>Annual Gunnery Report, Fiscal Year 1933- 1937</i>	7-Jul-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	602	CP-120506- 013	Memorandum from HQ Eighteenth Pursuit Group, Wheeler Field, T.H., subject: <i>Annual Gunnery Report, Fiscal Year 1935</i>	25-Jun-35
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	602	CP-120506- 014	Memorandum from Twenty Sixth Attack Squadron, Office of the Squadron Commander, Wheeler Field, subject: <i>Narrative Report of Annual Record Gunnery Practice</i>	28-Jun-38
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	602	CP-120506- 015	Memorandum from Twenty Sixth Attack Squadron, Office of the Squadron Commander, Wheeler Field, subject: Narrative Report of Aerial Gunnery and Bombing conducted by the 26th Attack Squadron at Bellows Field, Waimanalo, T.H.	8-May-36
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	602	CP-120506- 016	Memorandum from Twenty Sixth Attack Squadron, Office of the Squadron Commander, subject: <i>Narrative report of aerial gunnery and bombing of the 26th Attack Squadron at Bellows Field, Waimanalo, T.H.</i>	23-Nov-36

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	603	CP-120506- 017	Memorandum from Eighteenth Pursuit Group, Air Corps, Office of the CO, Schofield Barracks. T.H., subject: <i>Aerial Gunnery Report</i>	1-Nov-27
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3015	CP-120506- 018	Telegram from Department of State, subject: <i>Wilson Visit to Conn: WEU Meeting Luxembourg</i>	1-Jan-69
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3015	CP-120506- 019	Memorandum for Major Kilner, Room 248, State War and Navy Bldg, concerning possibility of making Wheeler Field an Air Corps station	18-Jul-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3015	CP-120506- 020	<i>Annual Inspection Schofield Barracks, T.H., FY – 1935</i>	1-Jan-35
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-75	U.S. Army Hawaii 1968	3	CP-120506- 021	Regulation 210-5, United States Army Support command, Hawaii, entitled <i>Post Regulations and Information</i>	29-Apr-74
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-75	U.S. Army Hawaii 1968	3	CP-120506- 022	Regulation Number 210- 16, entitled <i>Installations, Range Clearance Operations</i>	4-Dec-74
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-75	U.S. Army Hawaii 1968	3	CP-120506- 023	Regulation Number 210-7, entitled <i>Installation, Training Area Regulation</i>	15-Dec-75

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	603	CP-120506- 024	Memorandum from Eighteenth Pursuit Group, Air Corps, Office of the CO, Schofield Barracks. T.H., subject: Target Practice Reports, Training Year 1929-30	24-Feb-30
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	603	CP-120506- 025	Memorandum from Eighteenth Pursuit Group, Air corps, Office of the CO, Schofield Barracks, T.H., subject: <i>Target Practice Reports, Training Year 1927-28</i>	17-Nov-28
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	1178	CP-120606- 001	Report from War Department Real Estate Division, C.S., Q.M.C. entitled <i>List of Government-Owned Real Estate under control of the War Department December 1, 1920</i>	1-Dec-20
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 002	Narrative Report of Aerial Gunnery and bombing of the Tactical Organizations of the Fifth Composite Group for the Training Year 1932-1933	1-Jan-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 003	Narrative Report of Aerial Gunnery and bombing of the Tactical Organizations of the Fifth Composite Group for the Training Year 1931-1932	1-Jan-33

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 004	Memorandum from Fiftieth Observation Squadron, A.C., to CO Luke Field, T.H., subject: <i>Aerial Gunnery and Bombing Records for the Fiscal Year, July 1, 1933 to June 30, 1934</i>	13-Jul-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 005	Memorandum from Fourth Observation Squadron, Luke Field, T.H. to CO Luke field, T.H., subject <i>Aerial gunnery Records for the Fiscal Year Jul 1, 1933 to June 30, 1934</i>	30-Jun-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	1177	CP-120606- 006	Memorandum to chief, War Plans Div, concerning Garrison Stations, Storage and Repair Depots, Stations and Depots Garrisoned, both in the U.S. and foreign possessions	2-Aug-35
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	603	CP-120606- 007	Memorandum from HQ Eighteenth Pursuit Group, Office of the Group Commander, to the Adj Gen, Washington, DC, subject: <i>Target Practice Reports, Training Year 1931-32</i>	8-Mar-32

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	603	CP-120606- 008	Memorandum from HQ Eighteenth Pursuit Group, Office of the Group Commander, to the Adj Gen, Washington, DC, subject: Target Practice Reports, Training Year 1932-33	23-Dec-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	2	U.S. Army Pacific, Military Historian Office, Classified Organization History file, 1950- 1972	235	CP-120606- 009	Report from HQ, 25th Inf Div, APO San Francisco, entitled <i>Quarterly Historical Summary (RCS CS HIS-6 (R2) ) Office of the Assistant Chief of Staff, G3, 1 July - 30 September 1965</i>	1-Jan-65
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	424	Hawaiian Department Adjutant General Section, Publications Section, Circulars, 1940-1943	16	CP-120606- 010	Circular No. 132, <i>Using of Watersheds for Bivouac or Training Areas</i>	27-Dec-42
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	98	Adjutant General; Training Memorandums, 1941-1945	896	CP-120606- 011	Training Memorandum Number 4, <i>Chemical Warfare Training</i>	18-Sep-42
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	98	Adjutant General; Training Memorandums, 1941-1945	896	CP-120606- 012	Training Memorandum Number 19, <i>Ammunition for Training</i>	31-Oct-42
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	98	Adjutant General; Training Memorandums, 1941-1945	896	CP-120606- 013	Training Memorandum No. 15, <i>Chemical Warfare Service</i>	1-Nov-41



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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	98	Adjutant General; Training Memorandums, 1941-1945	896	CP-120606- 014	Training Memorandum Number 19, no subject	18-Dec-41
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	2	U.S. Army Pacific, Military Historian Office, Classified Organization History file, 1950- 1972	237	CP-120606- 015	HQ, US Army, Hawaii, APO 957, Staff Office Report, Preparing Agency Office of the chemical Officer, 2d Qtr FY 64, October - December 1963	1-Dec-63
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	1	U.S. Army Pacific, Military Historian Office, Organizational History File, 1946-1973	278	CP-120606- 016	Memorandum from Dept of the Army, HQ and HQ Co, 2d Brigade, 7th Inf Div, APO San Francisco 96207, subject: <i>Unit Historical/Annual Supplement</i>	12-Jul-68
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	1	U.S. Army Pacific, Military Historian Office, Organizational History File, 1946-1973	278	CP-120606- 017	Memorandum from HQ and HQ Co, 2d Brigade, 7th Inf Div, APO 96207, subject: <i>Annual Historical supplement</i>	24-Jun-66
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	1	U.S. Army Pacific, Military Historian Office, Organizational History File, 1946-1973	278	CP-120606- 018	Report from HQ 1st Brigade, 7th Inf Div, APO US Forces 96206, entitled <i>Annual Supplement to Unit History 1965</i>	30-Mar-66
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	1	U.S. Army Pacific, Military Historian Office, Organizational History File, 1946-1973	279	CP-120606- 019	Report entitled <i>7th Infantry Division, "The Bayonet Division"</i>	1-Dec-60

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	337	Records of the Headquarters Army Ground Forces	55	General Correspondence, 1942-1948	722	CP-120606- 020	Report from 53rd Coast Artillery Brigade (AA), Oahu, T.H., entitled <i>Report on Test Firing of Antiaircraft Ammunition Against Land and Sea Targets</i>	1-Dec-42
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	337	Records of the Headquarters Army Ground Forces	55	General Correspondence, 1942-1948	722	CP-120606- 021	Letter from HQ Hawaiian Dept, Office of the Chief of Staff, Fort Shafter, T.H., concerning the bombing by the Army of the volcano on Mauna Loa	7-Jan-36
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 022	Memorandum from Twenty Sixth Attack Squadron, Office of the Squadron commander, Wheeler Field, subject: <i>Narrative Report of Annual Record Gunnery Practice</i>	28-Jun-38
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 023	Memorandum from HQ Luke Field, Office of the Post Commander, subject: <i>Narrative Report of Annual Gunnery and bombing, Training Year 1936-37</i>	23-Jul-37
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 024	Memorandum from HQ Eighteenth Pursuit Group, Office of the Group Commander, subject: <i>Monthly Activity Report</i>	12-Sep-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 025	Memorandum from War Dept, Office of the Chief of the Air Corps, Washington, subject: <i>Hawaiian Department Training Memorandum No. 4</i>	14-Dec-36

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 026	Memorandum from HQ 18th composite Wing, Air corps, Office of the Wing Commander, Fort Shafter, T.H., subject: <i>Aerial Gunnery Report, Fiscal Year 1935</i>	16-Jul-35
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 027	Memorandum from Seventy Second Bombardment Squadron, Luke Field, T.H., subject: <i>Aerial Gunnery and bombing Exercises</i>	14-Jul-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 028	Memorandum from Twenty-third Bombardment Squadron, A.C., Office of the Commanding Officer, subject: <i>Aerial Gunnery and Bombing Exercises</i>	24-Jul-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 029	Memorandum from Twenty Sixth Attack Squadron, Office of the Operations Officer, Schofield Barracks, T.H., concerning an ordnance demonstration of the squadron on 12 Nov 31	14-Nov-31
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3017	CP-120606- 030	Memorandum from War Dept, The Adjutant General's Office, Washington, concerning publications for training	18-Apr-21
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3013	CP-120606- 031	Memorandum from HQ, Luke Field, T.H., subject: <i>Activity Report for the Month of September, 1932</i>	1-Oct-31

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3013	CP-120606- 032	Three Endorsements and original memorandum from HQ Eighteenth Pursuit Group, Office of the Group Commander, subject: <i>Monthly Activity Report</i>	23-Nov-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3013	CP-120606- 033	Memorandum from HQ Eighteenth Pursuit Group, Office of the Group Commander, subject: <i>Monthly Activity Report</i>	17-Dec-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3013	CP-120606- 034	Two Endorsements and original memorandum from HQ Luke Field, T.H., Office of the Commanding Officer, subject: <i>Activity Report for the month of December, 1932</i>	5-Jan-33
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3013	CP-120606- 035	Memorandum from HQ 18th Pursuit Group, Office of the Group Commander, subject: <i>Annual Report for the Fiscal Year 1932</i>	15-Jun-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	172	Central Dec Files, 1911-1938 (Project Files Depts)	3013	CP-120606- 036	Memorandum from HQ Luke Field, T.H., subject: <i>Activity Report for the month of August, 1932</i>	1-Sep-32
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	18	Records of the Army Air Forces	166	Central Dec Files, 1917-1938	645	CP-120606- 037	Report prepared under direction the Chief of Chemical Warfare Service, entitled <i>Suggestions for Tactical Field Exercises Involving Chemical Warfare Material and Munitions</i>	15-Jan-32

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	279	CP-120706- 001	Book entitled <i>Schofield Barracks</i>	15-Aug-23
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	279	CP-120706- 002	Completion Reports for Schofield Barracks, Hawaii	15-May-24
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	393	Hist Record of Bldgs & Record of Equip & Condition of Bldgs at Active Army Posts	230	CP-120706- 003	QMC Form 104, Annual Report of Construction and Repair, Fiscal year ending June 30, 1940	1-Jul-40
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	281	CP-120706- 004	<i>Combined Completion Report &amp; Final Narrative Report of Road and Trail Project, O.P. 513-1-69 under The Emergency Relief Appropriation Act of 1937, submitted by The CO, Third Engineers</i>	30-Jun-38
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	391A	Const Completion Rpts 1917-1943	329	CP-120706- 005	Memorandum from HQ Wheeler Field, Office of the Commanding Officer, Wheeler Field, T.H., subject: <i>Completion Report on Aerial gunnery Target Pits</i>	13-Jan-41
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	393	Hist Record of Bldgs & Record of Equip & Condition of Bldgs at Active Army Posts	230	CP-120706- 006	Aerial photos of Schofield Barracks	26-Sep-23

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	1011	Formerly Security classified Subject Files, 1941-1945	781	CP-120706- 007	Memorandum from Office of the Div Eng, Hawaiian Div, 214 Federal Bldg, subject: <i>16"</i> <i>emplacements, Schofield</i> <i>Barracks</i>	26-Dec-24
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	2	CP-120806- 001	Regulation Number 40-13, entitled <i>Medical Service,</i> <i>Evaluating and Reporting</i> <i>Internal Exposure to</i> <i>Radioactive Materials</i>	30-Jul-71
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	2	CP-120806- 002	USARHAW Supplement 1 to AR 755-15, entitled <i>Disposal of Supplies and</i> <i>Equipment, Disposal of</i> <i>Unwanted Radioactive</i> <i>Material</i>	1-May-72
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	1	CP-120806- 003	<i>Courses of Instruction</i> <i>Catalog, FY 1972, United</i> <i>States Army, Hawaii</i>	1-Jan-72
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	106B	Gen Corres 1918- 1945	304	CP-120806- 004	Training Memorandum Number 50, entitled <i>Training Program, 1937 -</i> <i>1938</i>	21-Oct-37
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	106B	Gen Corres 1918- 1945	304	CP-120806- 005	The Army-Navy Review, The Medium of Communication for the Army and Navy in Hawaii	1-Apr-38
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	106B	Gen Corres 1918- 1945	304	CP-120806- 006	Memorandum from HQ Third Engineers, Office of the Regimental Commander, subject: <i>Training</i>	21-May-38

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	2	CP-120806- 007	USASCH Supplement 1 to AR 755-15, entitled <i>disposal of Supplies and Equipment, Disposal of Unwanted Radioactive Material</i>	8-Jan-73
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	2	CP-120806- 008	Circular Number 50-1, entitled <i>Nuclear Weapons and Materiel, Schedule for USASCH Nuclear Surety Surveys for FY 74</i>	14-Sep-73
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	393	Historical Record of Buildings and Record of Equipment and Condition of Buildings at Active Army Posts, 1905-1942	232	CP-120806- 009	War Department QMC Form No. 177s, showing construction projects at Schofield Barracks	
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	2	U.S. Army Hawaii 67-68	2	CP-120806- 010	Circular Number 360-1- 13, entitled <i>Troop Topic - Your Army Team in the Pacific</i>	27-Jul-67
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	1	CP-120806- 011	Regulation prepared by USAHAW for Schofield Barracks, Hawaii entitled <i>Range Regulations</i>	10-Sep-71
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977		CP-120806- 012	Regulation Number 210-6, entitled <i>Installations, Range Regulations</i>	14-Jul-75

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	92	Office of the Quartermaster General	1974A	Construction Reports, 1917- 1919	241	CP-121106- 001	<i>Schofield Barracks,</i> Completion Report on Construction of Six Chemical Warfare Magazines	30-Aug-23
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	92	Office of the Quartermaster General	1888	General Correspondence 1917-1922	9612	CP-121106- 002	Requisition for Shooting Galleries and Ranges, F.Y. 1915	26-Feb-15
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	92	Office of the Quartermaster General	1888	General Correspondence 1917-1922	9612	CP-121106- 003	Requisition for Shooting Galleries and Ranges, F.Y. 1916	22-Dec-15
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	92	Office of the Quartermaster General	1974A	Construction Reports, 1917- 1919	241	CP-121106- 004	Completion Report on Construction of Five Ordnance Magazines at Schofield Barracks, Hawaii	25-Aug-23
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	92	Office of the Quartermaster General	1974A	Construction Reports, 1917- 1919	241	CP-121106- 005	Completion Report on Repair of Nine Magazines, Schofield Barracks, Hawaii	15-Aug-23
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	92	Office of the Quartermaster General	1974A	Construction Reports, 1917- 1919	242	CP-121106- 006	Completion Report on the Construction of Ten Ordnance Magazines, two at Schofield Barracks, T.H.; one at Fort Weaver, T.H.; four at Fort Kamehameha, T.H.; three at Fort Ruger, T.H.	1-Aug-23
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	92	Office of the Quartermaster General	1974A	Construction Reports, 1917- 1919	242	CP-121106- 007	Completion Report on Reconstruction of Ammunition Storage Building No. 2235 C.W.S. at Schofield Barracks, T.H.	1-Aug-23



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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	6	CP-121206- 001	Regulation Number 350-1 entitled <i>Training, 25th Infantry Division Training Directive</i>	10-Jun-74
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	6	CP-121206- 001-A CP- 121206-001-B	Regulation Number 350-1 entitled <i>Training, 25th Infantry Division Training Directive</i>	10-Jun-74
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	5	CP-121206- 002	Regulation Number 350-1, Change No. 2 entitled <i>Training, Training Directive</i>	4-Sep-73
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	5	CP-121206- 003	Regulation Number 350-1, Change 3 entitled <i>Training, Training Directive</i>	10-Nov-73
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	4	CP-121206- 004	Regulation Number 700- 12, change No. 1 entitled <i>Logistics, Supply, Storage, and Handling of Conventional Ammunition</i>	31-Mar-76
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	4	CP-121206- 005	Regulation Number 210- 16 entitled <i>Installations, Range Clearance Operations</i>	21-Sep-76

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	5	CP-121206- 006	Regulation Number 350-1, Change No. 1 entitled <i>Training, Training Directive</i>	3-Aug-73
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	401-135	U.S. Army Hawaii 1977	5	CP-121206- 007	Regulation Number 350-1 entitled <i>Training Directive</i> for the 25th Infantry Division	14-Mar-73
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	159	Records of the Office of the Inspector General	26E	General Correspondence, 1939-1947	138	CP-121306- 001	Memorandum from HQ Hawaiian Department, Office of the Inspector, Fort Shafter, T.H., subject: <i>Annual Inspection, Hawaiian Chemical Warfare Depot, F.Y. 1939</i>	9-Jan-39
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	159	Records of the Office of the Inspector General	26E	General Correspondence 1939-1947	138	CP-121306- 002	Memorandum from HQ Hawaiian Department, Inspector General, Fort Shafter, T.H., subject: <i>Annual Inspection, Hawaiian Chemical Warfare Depot, F.Y. 1936</i>	11-Oct-35
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	159	Records of the Office of the Inspector General	26D	General Correspondence 1939-1947	546	CP-121306- 004	Memorandum from HQ Hawaiian Department, Office of the Inspector, Fort Shafter, T.H., subject: <i>Annual Inspection of the Hawaiian Chemical Warfare Depot</i>	21-Aug-41

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	159	Records of the Office of the Inspector General	26D	General Correspondence 1939-1947	546	CP-121306- 005	Memorandum from HQ Schofield Barracks and Hawaiian Division, Office of the Division Inspector General, subject: <i>Annual Inspection, Hawaiian Chemical Warfare Depot, F.Y. 1940</i>	20-Jun-40
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	159	Records of the Office of the Inspector General	26D	General Correspondence 1939-1947	546	CP-121306- 006	Training Memorandum Number 12, <i>Range Assignments, January 1942 to June 1942</i>	19-Nov-41
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	407	Records of the Adjutant General's Office 1917-	37H	Project Files, 1926-1939	3089	CP-121306- 007	Memorandum from HQ Hawaiian Department, Fort Shafter, T.H., subject: <i>Maintenance and Repair of Underground Chemical Storage Facilities at Schofield Barracks, T.H.</i>	9-Sep-38
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	407	Records of the Adjutant General's Office 1917-	37A	Project Files, 1917-1925	1239	CP-121306- 008	Memorandum from HQ Hawaiian Dept, subject: <i>Acquisition of the Maili Pocket and Kalena Tracts, Hawaiian Islands</i>	24-May-19
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	407	Records of the Adjutant General's Office 1917-	37A	Project Files, 1917-1925	1239	CP-121306- 009	Memorandum from HQ Hawaiian Dept, Honolulu, H.T., subject: <i>Acquisition of land at Schofield Barracks and at Fort Shafter, Territory of Hawaii</i>	19-Nov-19

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	407	Records of the Adjutant General's Office 1917-	37A	Project Files, 1917-1925	1239	CP-121306- 010	Memorandum from Schofield Barracks, subject: <i>Explosion of powder magazine at Schofield Barracks, H.T., on April 14, 1921</i>	16-Nov-21
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	407	Records of the Adjutant General's Office 1917-	37A	Project Files, 1917-1925	1239	CP-121306- 011	Memorandum from War Department, Office of the chief of Staff, subject: <i>Correction in Executive Order No. 2694, dated August 30, 1917</i>	31-Jan-18
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	407	Records of the Adjutant General's Office 1917-	37A	Project Files, 1917-1925	1239	CP-121306- 012	Memorandum from HQ Hawaiian Dept, Honolulu, H.T., subject: <i>Magazines for Storage of Explosives</i>	24-Jul-22
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	17	U.S. Army Hawaii 1959- 1963	10	CP-121406- 001	<i>Staff Office Report, Office of the Ordnance Officer, April - June 1962</i>	1-Jul-62
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	17	U.S. Army Hawaii 1959- 1963	10	CP-121406- 002	<i>Staff Office Report, Office of the Ordnance Officer, October - December 1961</i>	31-Dec-61
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	17	U.S. Army Hawaii 1959- 1963	10	CP-121406- 003	Report from HQ, United States Army, Hawaii, APO 957 entitled <i>Staff Office Report, Office of the Ordnance Officer, January - March 1962</i>	1-Apr-62
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	15	U.S. Army Hawaii, 1959- 1960	1	CP-121406- 004	Staff Office Report, Office of the Ordnance Office, July - September 1958, prepared by HQ U.S. Army, Hawaii/25th Infantry Div	1-Oct-58

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	199	Hawaiian Defense Command 1949- 1950	36	CP-121406- 005	Command Historical Report, Reports Control Symbol CSHIS-5, 1949, Volume I Narrative	1-Jan-49
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of U.S. Army, Pacific	199	Hawaiian Defense Command 1949- 1950	36	CP-121406- 006	Command Report, Reports Control Symbol CSHIS-5 (RI) 1950, Volume I - Narrative, Part II	1-Jan-50
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	19	US Army, Hawaii 1957-1963	9	CP-121506- 001	Map prepared by US Army Engineer District, Honolulu, Corps of Engineers, Honolulu, TH entitled <i>Master Plan Plans for Future Development Schofield Barracks Oahu, TH Main Post General Site Plan</i>	22-Dec-60
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	550	Records of the United States Army, Pacific	19	US Army, Hawaii 1957-1963	9	CP-121506- 002	Map prepared by US Army Engineer District, Honolulu, Corps of Engineers, Honolulu, TH entitled <i>Master Plan Plans for Future Development Schofield Barracks Oahu, TH Main Post General Site Plan</i>	15-Jun-61
NARA II College Park, Maryland (CP)	HI	Wheeler Air Force Base	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 003	Map prepared by Department of the Air Force, Directorate of Engineering and Services DCS/Lee - Washington, D. C. entitled <i>Pacific Air Forces Comprehensive Plan Base Plan Wheeler Air Force Base Honolulu, Hawaii</i> , first revision	30-Sep-82

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 004	Document entitled <i>Department of the Air Force Installation Survey Report Wheeler Air Force Base Oahu, Hawaii</i> GSA Control Numbers 5700- 28732 Date of Field Survey, February 10-13, 1984 Office, Assistant Secretary of the Air Force (Manpower, Installations and Logistics)	13-Feb-84
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 005	Map prepared by Department of the Air Force, Directorate of Engineering and Services DCS/Lee - Washington, D. C. entitled <i>Pacific Air Forces Comprehensive Plan Base Plan Wheeler Air Force Base Honolulu, Hawaii</i> , first revision	30-Sep-82
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 006	Map drawn by U.S. Engineers entitled <i>Range Map No. 1</i>	29-Feb-40
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 007	Map drawn by U.S. Engineers entitled <i>Range Map No. 2</i>	29-Feb-40

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 008	Map drawn by U.S. Engineers entitled <i>Map No. 9 Telephone System Field Artillery Range Scale 1 : 10,000</i>	16-Aug-38
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 009	Map drawn by U.S. Engineers entitled <i>Map No. 9 Telephone System Field Artillery Range Scale 1 : 10,000</i>	16-Aug-38
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 010	Map No. 5 of unknown origins entitled <i>22nd Brigade and Special Troops 1,000 Inch Target Range</i>	1-Jan-34
NARA II College Park, Maryland (CP)	HI	Pokai Bay Water Ranges	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 011	Map No. 8 of unknown origins entitled <i>Pokai Bay Water Ranges</i>	1-Jan-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 012	Map of unknown origins entitled <i>Waikoloa Gulch Pistol Ranges</i>	1-Jan-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff	14	CP-121506- 013	Map No. 7 of unknown origins entitled <i>11th Tank Co. National Guard 1,000 Inch Range</i>	1-Jan-34

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						Memos 1940-1943				
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 014	Map No. 4 of unknown origins entitled <i>Garden Gulch Area 21st Brigade Target Range</i>	1-Jan-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	418	Hawaiian Department, Adjutant General Section, Publications Section , Staff Memos 1940- 1943	14	CP-121506- 015	Map No. 6 of unknown origins entitled <i>Air Corps 1,000 Inch Range</i>	1-Jan-34
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Department, Adjutant General Section, Publications Section Training Memos 1938- 1943	13	CP-121506- 016	Document from Headquarters Hawaiian Department at Fort Shafter entitled <i>Training Memorandum Number 67</i> describing training facilities in Oahu with ranges. Several maps accompanied document.	6-Jul-43
NARA II College Park, Maryland (CP)	HI	Waimanalo Amphibious Training Center	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Department, Adjutant General Section, Publications Section Training Memos 1938- 1943	13	CP-121506- 017	Map Prepared by U.S. Engineer Office Honolulu, T.H. entitled <i>War Emergency Construction Hawaiian Department, Building, Utilities &amp; Appurtenances Waimanalo, Oahu T. H. Camp Layout for Battalion Combat Team Plus Navy Detachment</i>	6-Jul-43



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NARA II College Park, Maryland (CP)	HI	Pali Training Center	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Department, Adjutant General Section, Publications Section Training Memos 1938- 1943	13	CP-121506- 018	Map Prepared by U.S. Engineer Office Honolulu, T.H. entitled War Emergency Construction, Hawaiian Department, Buildings Utilities & Appurtenances Nuuanu Pali, Oahu, T. H. Camp Layout for Regimental Combat Team less Battalion, Basic map dated 7 July 1943 with changes	4-Aug-43
NARA II College Park, Maryland (CP)	HI	Kahuku Training Area	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Department, Adjutant General Section, Publications Section Training Memos 1938- 1943	13	CP-121506- 019	Map of unknown origins entitled <i>Boundary of Kahuku Training Area Kahuku Quad, Oahu 1 :20,000</i>	10-Aug-43
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Department, Adjutant General Section, Publications Section Training Memos 1938- 1943	13	CP-121506- 020	Map of unknown origins entitled <i>Additional Training Aids Schofield Area Oahu 1:20,000</i>	10-Aug-43
NARA II College Park, Maryland (CP)	HI	Pali Training Center	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Department, Adjutant General Section, Publications Section Training Memos 1938- 1943	13	CP-121506- 021	Map of unknown origins entitled <i>Pali Camp &amp; Training Center Oahu 1:20,000</i>	2-Aug-43
NARA II College Park, Maryland (CP)	HI	Kahuku Training Area	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Department, Adjutant General Section, Publications Section Training Memos 1938- 1943	13	CP-121506- 022	Map drawn by 47th Engineer Regiment Hawaiian Department entitled <i>Layout RCT Camp Kahuku, Oahu, T. H.</i>	9-Aug-43

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NARA II College Park, Maryland (CP)	HI	Kahuku Training Area	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	416	Hawaiian Department, Adjutant General Section, Publications Section Training Memos 1938- 1943	13	CP-121506- 023	Map from Corps of Engineers, U.S. Army entitled <i>Location Plan of Training Aids Kahuku Area</i>	9-Aug-43
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 024	Report entitled <i>Department of the Army Executive Order number 12348 Installation Survey Report 1984 Schofield Barracks Military Reservation Oahu, Hawaii</i>	8-Mar-84
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 025	Map created by Corps of Engineers, U.S. Army Office of the District Engineer Honolulu District Segment A entitled <i>Real Estate Schofield Barracks Military Reservation</i>	1-Mar-50
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 026	Map created by Corps of Engineers, U.S. Army Office of the District Engineer Honolulu District Segment B entitled <i>Real Estate Schofield Barracks Military Reservation</i>	1-Mar-50

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NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 027	Map created by Corps of Engineers, U.S. Army Office of the District Engineer Honolulu District Segment C entitled <i>Real Estate Schofield Barracks Military Reservation</i>	1-Mar-50
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 028	Map created by Corps of Engineers, U.S. Army Office of the District Engineer Honolulu District Segment C entitled <i>Real Estate Schofield Barracks Military Reservation</i>	1-Mar-50
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 029	Map created by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Master Plan Basic Information Maps Reservation Map East Range</i>	25-Jun-80
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 030	Map created by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Master Plan Basic Information Maps Main Post General Site Map</i>	25-Jun-80

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NARA II College Park, Maryland (CP)	HI	East Range Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 031	Map created by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Master Plan Basic Information Maps East Range</i>	1-Aug-78
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 032	Map created by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>USASCH Mobilization Plan Oahu Regional Map</i>	1-Aug-78
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 033	Map created by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>USASCH Mobilization Plan Schofield Barracks Reservation Plan Main Post</i>	25-Jun-80
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 034	Map created by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>USASCH Mobilization Plan Schofield Barracks Reservation Plan East Range</i>	1-Aug-78

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NARA II College Park, Maryland (CP)	HI	East Range Schofield Barracks	429	Records of Organizations in the Executive Office of the President	17	Records Relating to Property & Installations Surveys 1978- 1984	22	CP-121506- 035	Map created by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>USASCH Mobilization Plan Schofield Barracks Area X Mobilization Site Plan</i>	1-Aug-78
NARA II College Park, Maryland (CP)	HI	Chemical Warfare Depot	494	Records of the U.S. Army Forces in the Middle Pacific (World War II)	198	Oahu Ordnance Decimal Files, 1941-1945	1364	CP-121906- 001	Map from Hawaiian Division 3rd U.S. Engrs, Topographical Section entitled <i>Gas Area Schofield Barracks, T. H.</i>	30-Jul-31
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	407	Records of the Adjutant General's Office, 1917-	601.1	Schofield Barracks 601.1	1239	CP-121906- 002	Map of unknown origins of the Island of Oahu Territory of Hawaii, entitled <i>Portion of Schofield Barracks Oahu, H.T. Showing the Kalena Tract</i>	1-Jan-16
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	92	Records of the Office of the Quartermaster General	1974A	Construction Completion Reports, 1917- 1919	242	CP-121906- 003	Map of unknown origins entitled <i>Map of Gas Area Schofield Barracks, T.H.</i>	1-Jan-30
NARA II College Park, Maryland (CP)	HI	Schofield Barracks	77	Records of the Office of the Chief of Engineers	415	Real Estate Branch Surplus disposal Unit, 1917-1944	77	CP-121906- 004	Map from the Topographical Office Third Engineers entitled <i>Street Names Post of Schofield Barracks Oahu T.H.</i>	18-Jun-32
National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	61L-6091		1	NPRC- 013107-001	Regulation prepared by HQ Schofield Barracks entitled <i>25th Infantry Division Range Regulations</i>	31-May-57

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National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	61L-6091		1	NPRC-013107-002	Training Circular No. 5 entitled <i>Range Regulations, Central Range, East Range, Makua Valley, Kaena Point, Mokuleia and Kahuku</i>	19-Aug-53
National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	338-58K-5014		1	NPRC-013107-003	Corrected Copy Training Circular Number 7 entitled <i>Instructor Training Course</i>	20-Dec-54
National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	338-58K-5014		1	NPRC-013107-004	Daily Bulletin Number 179	15-Sep-54
National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	338-58K-5014		1	NPRC-013107-005	Daily Bulletin Number 253	31-Dec-54
National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	57D-5114		1	NPRC-020107-001	Training Circular No 5, Change No. 1 entitled <i>Range Regulations, Central Range, East Range, Makua Valley, Kaena Point, Moduleia and Kuhuku</i>	28-Jun-54
National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	338-61L-6091		1	NPRC-020107-002-A NPRC-020107-002-B	Regulation prepared by HQ Schofield Barracks entitled 25th Infantry Division <i>Range Regulations</i>	25-May-55

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National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	338-57D-5114		1	NPRC-020107-003	Daily Bulletin Number 211	7-Dec-53
National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	338-58-K-50214		1	NPRC-020507-001	Quad Sheet printed by Army Map Service, Corps of Engineers entitled <i>Schofield, Oahu Sheet 8</i> dated 1952	1-Jun-52
National Personnel Records Center, St. Louis, MO (NPRC)	HI	Schofield Barracks	338	Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter)	338-58-K-50214		1	NPRC-020507-002	Map of unknown origins entitled <i>Master Plan Schofield Barracks Oahu, T.H.</i>	1-Jul-52
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Oahu Island				Department of Public Works		DPW-022607-001	Map entitled <i>Island of Oahu Major Army, Navy and Air Force Installations</i>	1-Mar-54
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-002	Map developed by Topographical Office - Third Engineers entitled <i>Post Schofield Barracks, T.H.</i>	2-Feb-31
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Hawaiian Islands				Department of Public Works		DPW-022607-003	Map developed by the 29th Engineer Battalion (T) Fort Shafter, Hawaii 96 858 entitled <i>Hawaii Military Installations and Facilities</i>	17-Jun-83

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US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Makua Military Reservation				Department of Public Works		DPW-022607-004	Map developed by M & I Engineering Division HUSAEPAC showing <i>Kaena Point Military Reservation, Mokuleia Training Area and Makua Training Area</i>	1-Aug-54
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-005	Map developed by Engineering Mapping Division, USAEPAC entitled <i>Range Map West Portion Schofield Barracks</i>	1-Apr-51
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	East Range Schofield Barracks				Department of Public Works		DPW-022607-006	Map developed by M & I Engineering Division HUSARPAC entitled <i>Hawaiian Infantry Training Center East Range Training Area Oahu, T.H.</i>	1-Nov-51
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-007	Map entitled <i>Schofield Barracks and Vicinity</i>	1-Jul-75
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Wheeler Air Force Base				Department of Public Works		DPW-022607-008	Map developed by Office of the Installations Engineer, 6487 Support Squadron, Wheeler AFB Oahu, Hawaii entitled <i>Basic Layout Plan Wheeler Air Force Base</i>	2-Dec-58
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-009	Map Edition 1 AMS entitled <i>Schofield Barrack and Vicinity</i>	1-Jul-68
US Army Garrison Schofield, Honolulu, HI	HI	Schofield Barracks				Department of Public Works		DPW-022607-010	Map Edition 1 AMS entitled <i>Schofield Barracks and Vicinity</i>	1-Apr-61



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(SCH)										
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-011	Map Sheet 5320 1 NE entitled <i>Schofield Barracks</i>	1-Jul-62
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-012	Map Sheet 1 Series W833S entitled <i>Pohakuloa Training Area</i>	1-Feb-63
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-013	Map Sheet 2 Series W833S entitled <i>Pohakuloa Training Area</i>	1-Nov-76
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-014	Map Sheet 1 Series W833S entitled <i>Pohakuloa Training Area</i>	1-Apr-79
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-015	Map developed by U.S. Army Mapping Center entitled <i>Island of Hawaii Pohakuloa Training Area</i>	1-Feb-65
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-016	Map Edition 5-29 Series W731S Sheet PTA entitled <i>Pohakuloa Training Area</i>	1-Jan-95
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-017	Map Edition 5-29 Series W833S Sheet 1 entitled <i>Ground Preparation of the Battlefield Pohakuloa Training Area</i>	1-Apr-86
US Army Garrison Schofield, Honolulu, HI	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-018	Map Edition 6-29 Series W833S Sheet 2 entitled <i>Pohakuloa Training Area</i>	1-Mar-85

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(SCH)										
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-019	Map Edition 1-DMA Series W733 Sheet 5817 entitled <i>Ahumoa</i>	1-Jan-82
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-020	Map Edition #-652 Series W833S Sheet 2 entitled <i>Pohakuloa Training Area</i>	1-Jun-79
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-021	Map Edition 4-652 Series W833S Sheet 1 entitled <i>Pohakuloa Training Center</i>	1-Jun-79
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-022	Map developed by U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Pohakuloa Training Area Hawaii, Hawaii</i>	1-Aug-79
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-023	Map Edition 1-DMATC (USAEPAC) Series W781S Sheet PTA entitled <i>Pohakuloa Training Area</i>	1-Dec-74
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-024	Map Edition 3-USARPAC (652EB) Sheet 1 entitled <i>Pohakuloa Training Area</i>	1-Apr-79
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-025	Map Edition 3-USASCH Schofield Barracks Range Series W931 entitled <i>Schofield Barracks and Vicinity</i>	1-Jul-75

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US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-026	Map from U.S. Army Engineers Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Schofield Barracks Oahu, Hawaii Master Plan Basic Information Maps Reservation Map Main Post</i>	3-May-76
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Guam				Department of Public Works		DPW-022607-027	Map Edition 1-AMS (AFTE) Series W743 entitled <i>Mariana Islands Guam</i>	1-Jan-62
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-028	An Interim Range Map of Schofield Barracks & East Range entitled <i>Schofield Barracks Military Reservation</i>	1-Oct-59
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-029	Map Series W833S entitled <i>Schofield Barracks and Vicinity</i>	1-Oct-77
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	East Range Schofield Barracks				Department of Public Works		DPW-022607-030	Hawaiian Island City Map entitled <i>Schofield Barracks and Vicinity</i>	1-Dec-74
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-031	Map for Ground Preparation of the Battlefield entitled <i>Pohakuloa Training Area</i>	1-Aug-84
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Makua Military Reservation				Department of Public Works		DPW-022607-032	Map Edition 2-DMATC Series W833 Sheet 5321 entitled <i>Kaena</i>	1-Jan-64

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US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-033	Map Edition 3-USASCH Schofield Barracks Range 1 entitled <i>Schofield Barracks and Vicinity</i>	1-Feb-93
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-034	Map Edition 3-USASCH Schofield Barracks Range 2 entitled <i>Schofield Barracks and Vicinity</i>	1-Feb-93
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-035	Map Edition 2 - USASCH Schofield Barracks Range entitled <i>Schofield Barracks and Vicinity</i>	1-Aug-86
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-036	Map Edition 2 - USASCH Schofield Barracks Range entitled <i>Schofield Barracks and Vicinity</i>	1-Aug-86
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-037	Air Photo Mosaic entitled <i>Pohakuloa Training Area</i>	1-Aug-62
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-038	Map from U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Pohakuloa Training Area</i>	1-Aug-79
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	East Range Schofield Barracks				Department of Public Works		DPW-022607-039	Hawaii Island City Map entitled <i>Schofield Barracks and Vicinity</i>	1-Dec-74
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-040	Map with no name or date	1-Jun-28

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US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-041	Map from U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Pohakuloa Training Area</i>	16-Sep-83
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-042	Map from U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Pohakuloa Training Area</i>	16-Sep-83
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-043	Map from U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Pohakuloa Training Area</i>	16-Sep-83
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-044	Map Edition 3-USASCH Schofield Barracks Range entitled <i>Schofield Barracks and Vicinity</i>	1-Jul-75
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-045	Map from Headquarters Hawaiian Engineer Operations Group Schofield Barracks entitled <i>West Portion of Schofield Barracks Range Map</i>	15-Apr-51
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Chemical Warfare Depot				Department of Public Works		DPW-022607-046	Map of Chemical Warfare Depot entitled <i>Map of Chemical Warfare Depot Schofield Barracks, T.H.</i>	14-Sep-51
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-047	Map from unknown source entitled <i>Range Map Schofield Barracks</i>	1-Jan-52

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US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Makua Military Reservation				Department of Public Works		DPW-022607-048	Map from U.S. Army Engineer Division - Pacific Ocean Corps of Engineers Honolulu, Hawaii entitled <i>Makua Military Reservation Oahu, Hawaii Master Plan Future Development Plan General Site Plan</i>	15-Apr-85
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-049	Map Edition 2 - USASCH Schofield Barracks Range and Edition 1 - USARPAC Series W931 Schofield Barracks West entitled <i>Schofield Barracks and Vicinity</i>	1-Aug-86
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Chemical Warfare Depot				Department of Public Works		DPW-022607-050	Map of Chemical Warfare Depot entitled <i>Map of Chemical Warfare Depot Schofield Barracks, T.H.</i>	14-Sep-51
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-051	Map from Directorate of Facilities Engineering U.S. Army Support Command, Hawaii entitled <i>Grounds Maintenance Schofield Barracks Outlying Areas</i>	25-Feb-87
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-052	Map from Directorate of Facilities Engineering U.S. Army Support Command, Hawaii entitled <i>Grounds Maintenance Schofield Barracks Outlying Areas &amp; Barracks and Dining Facilities - Quad A</i>	23-Apr-87

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US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-053	Map from Directorate of Facilities Engineering U.S. Army Support Command, Hawaii entitled <i>Grounds Maintenance Schofield Barracks Outlying Areas &amp; Barracks and Dining Facilities - Quad A</i>	23-Apr-87
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-054	Map from Directorate of Facilities Engineering U.S. Army Support Command, Hawaii entitled <i>Commercial Activities (C. A.) Schofield Barracks, Hawaii Herbicide Central Range Area</i>	1-Aug-86
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Oahu Island				Department of Public Works		DPW-022607-055	Map from United States Department of the Interior Geological Survey <i>Topographic Map of the Island of Oahu City and County of Honolulu Hawaii</i>	26-Nov-41
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		DPW-022607-056	Map Edition 5-29 Series W731S Sheet PTA entitled <i>Pohakuloa Training Area</i>	1-Jan-95
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-057	Map from unknown source entitled <i>Range Map Schofield Barracks</i>	1-Jan-52
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Oahu Island				Department of Public Works		DPW-022607-058	Map from unknown source entitled <i>Island of Oahu Training Areas Camps &amp; Centers</i>	30-Jun-45

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US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-022607-059	Map Edition 2-USARPAC Schofield Barracks Range entitled <i>Schofield Barracks and Vicinity</i>	1-Sep-73
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-031207-001	Map from Headquarters, United States Army, Pacific Office of the Signal Office entitled <i>Key Sheet Post Cable Map Target Range Area Schofield Barracks</i>	9-Apr-69
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		DPW-031207-002	Map entitled <i>Schofield Barracks &amp; East Range Showing Impact Areas, Training Areas &amp; Artillery Firing Positions</i>	1-Jan-55
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		SCH-022307-001	Map developed by Department Engineer Office H.H.D. Fort Shafter entitled <i>Western Portion Schofield Barracks Military Reservation</i>	10-Jan-41
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		SCH-022307-002	Map developed by Construction Division Office of the Quartermaster General entitled <i>Schofield Barracks Territory of Hawaii Layout Plan</i>	8-Aug-40
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Schofield Barracks				Department of Public Works		SCH-022307-003	Quadrangle Sheet showing southern edge of Schofield entitled <i>Hawaii 1:25,000 Schofield Barracks</i> Edition 3-DMATC Series W833 Sheet 5320 1 NE	1-Jan-67



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US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Pohakuloa Training Area				Department of Public Works		SCH-022307-004	Quadrangle Sheet showing area of Pohakuloa Training Area entitled <i>Hawaii 1:50,000 Pohakuloa Training Area</i> Edition 1-DMATC(USARPAC) Series W781S Sheet PTA	1-Dec-74
US Army Garrison Schofield, Honolulu, HI (SCH)	HI	Hawaiian Islands				Department of Public Works		SCH-022307-005	Map entitled <i>Hawaii Military Installations and Facilities (Islands Other Than Oahu)</i>	17-Jun-83
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-012307-001	Department of the Army Field Manual <i>FM 23-20 Davy Crockett Weapons System in Infantry and Armor Units</i> , dated 18 December 1961	18-Dec-61
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-012307-002	Army Regulation <i>AR 385-63 Safety Regulations for Firing Ammunition for Training, Target Practice, and Combat</i> with change 1 dated 17 June 1968	17-Jun-68
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-013007-001	Report entitled <i>Archive Search Report for Low Level Radioactive Waste at Lake City Army Ammunition Plant</i>	1-Aug-96

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USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-020107-001	Memorandum from Headquarters Department of the Army, Office of the Adjutant General, Subject: <i>Safety Rules for Peacetime Operations with the Davy Crockett / MK 54 Mod 2 Atomic Weapon System</i> , dated 1 November 1961	1-Nov-61
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-020107-002	25th ID(L) & USARHAW Regulation Number 350-1, entitled <i>Training</i>	19-Jun-97
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-020207-001	Firing Tables FT 279-B-4 entitled <i>Weapon System Battle Group, Light: M28 (Davy Crockett)</i> , Headquarters Department of the Army dated July 1964	1-Jul-64
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-020207-002	Ammunition Data Cards	1-Jan-60
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-020707-002	Ammunition Data	1-Jan-60
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-020707-003	Ammunition drawings for 20mm Spotting M101	1-Jan-60
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-020807-001	DD Form 550 Ordnance Corps Ammunition Lot Records for Lot No. LC-2-28 and LC-2-35	26-Feb-62
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-020807-002	Historic Guide, Schofield Barracks, Hawaii	1-Jan-97

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USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Pohakuloa Training Area				Ordnance and Technical Services Historic Manuals Library		MVS-031907-001	Department of the Army Field Manual FM 23-6 <i>Antitank Guided Missile (ENTAC)</i>	13-May-64
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks				Ordnance and Technical Services Historic Manuals Library		MVS-031907-002	Headquarters Department of the Army Regulation AR 210-21 entitled <i>Installations Training Areas and Facilities for Ground Troops</i>	18-Dec-64
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks				Ordnance and Technical Services Historic Manuals Library		MVS-031907-003	Headquarters Department of the Army Regulation AR 210-21 entitled <i>Installations Training Areas and Facilities for Ground Troops</i>	18-Nov-68
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks				Analysis of data		MVS-032707-001	Analysis of Ammunition Data Cards (ADC) of Cartridge, 20mm Spotting M101, document no. LC-031507-004	27-Mar-07
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks				Analysis of data		MVS-032707-002	Analysis of DD Form 550 Ordnance Corps Ammunition Lot Record for Cartridge, 20mm Spotting M101, document no. LC-031507-005	27-Mar-07
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-110806-001	Map from 29th Engineer Battalion entitled <i>Schofield Barracks and Vicinity, Oahu Hawaiian Islands City and County of Honolulu</i> , Edition 3 - USASCH Schofield Barracks Range 2, dated 1993	1-Feb-93

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USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-110806-002	Map from 29th Engineer Battalion entitled <i>Schofield Barracks and Vicinity, Oahu Hawaiian Islands City and County of Honolulu</i> , Edition 3 - USASCH Schofield Barracks Range 1, dated 1993	1-Feb-93
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Hawaiian Islands						MVS-110806-003	Pacific Division Naval Facilities Engineering Command, map entitled <i>Hawaiian Area Targets</i> , Real Estate Dwg No. RE-1149	31-Jan-77
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Waipahu						MVS-110806-004	United States Department of the Interior Geological Survey, Map entitled <i>Waipahu Quadrangle Hawaii - Honolulu Co. Island of Oahu, 7.5 Minute Series (Topographic)</i>	1-Jan-83
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Oahu Island						MVS-110806-005	United States Department of the Interior Geological Survey, map entitled <i>Hauula Quadrangle Hawaii - Honolulu Co. Island of Oahu, 7.5 Minute Series (Topographic)</i>	Nd
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Oahu Island						MVS-110806-006	U.S. Geological Survey, map entitled <i>Honolulu, Hawaii 5420 IV W733 Edition 1-DM</i>	1-Jan-83

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USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Oahu Island						MVS-110806-007	Copied by National Imagery and Mapping Agency Combat Support Element USPACOM, map entitled <i>Noise Sensitive Area IAW USASCH Reg 95-1</i> , Edition 3-29 EBT	5-Nov-96
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Oahu Island						MVS-110806-008	Printed by U.S. Army Mapping Center, Hawaii, map entitled <i>Island of Oahu Army, Navy and Air Force Installations</i>	1-Mar-65
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Oahu Island						MVS-110806-009	Prepared and printed by the 29th Engineer Battalion (T) Fort Shafter, Hawaii 96858, map entitled <i>Hawaii Military Installations and Facilities Island of Oahu</i>	17-Jun-83
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Oahu Island						MVS-110806-010	Prepared by the 29th Engineer Battalion (BT), map entitled <i>Island of Oahu</i> , over lay of quadrangle sheet from US Geological Survey	1-Dec-83
USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Hawaiian Islands						MVS-110806-011	Compiled and printed by the U.S. Coast and Geodetic Survey, map titled <i>Sectional Aeronautical Chart Hawaiian Islands North Pacific Ocean</i>	1-Jun-49

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USACE St. Louis District, St. Louis, Missouri (MVS)	HI	Schofield Barracks						MVS-112006- 001	Information Paper Memorandum, entitled <i>Depleted Uranium from Davy Crockett Weapon System Spotting Round located in the Schofield Barracks Impact Area</i>	20-Oct-96
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# **APPENDIX C**

## **TEXTUAL REFERENCES**



## TEXTUAL REFERENCES

<u>Section No.</u>	<u>Reference</u>
C-1	USACE St. Louis District, St. Louis, Missouri (MVS), Ammunition Data Cards, dated circa 1960, MVS-020707-002.
C-2	NARA II College Park, Maryland (CP), Memorandum from HQ Hawaiian Dept, Honolulu, H.T., Subject: <i>Acquisition of land at Schofield Barracks and at Fort Shafter, Territory of Hawaii</i> , dated 19-Nov-19, RG 407, Records of the Adjutant General's Office 1917-, Entry 37A Project Files 1917-1925, Box 1239, CP-121306-009.
C-3	Military History Institute Carlisle Barracks, Pennsylvania (MHEC), Article from the Infantry Journal, Vol XXI, No. 5, <i>Schofield Barracks and the Hawaiian Division</i> , dated November 1927, MHEC-120307-001.
C-4	USACE St. Louis District, St. Louis, Missouri (MVS), Memorandum from Headquarters Department of the Army, Office of the Adjutant General, Subject: <i>Safety Rules for Peacetime Operations with the Davy Crockett / MK 54 Mod 2 Atomic Weapon System</i> , dated 1 November 1961, MVS-020107-001.
C-5	Defense Technical Information Center (DTIC), Report entitled <i>Development of Light Battle Group Weapon System, M28, Davy Crockett</i> , AD351142, dated 1 March 1962, DTIC-011607-001.
C-6	USACE St. Louis District, St. Louis, Missouri (MVS), Department of the Army Field Manual <i>FM 23-20 Davy Crockett Weapons System in Infantry and Armor Units</i> , dated 18 December 1961, MVS-012307-001.
C-7	Lake City Army Ammunition Plant, Independence, Missouri (LC), Ammunition Data Card for Ctg, 20mm TP M106, dated 10 April 1963, Records Holding Area QA Files, Accession A-148, Box 1409-08, LC-031507-001.
C-8	USACE St. Louis District, St. Louis, Missouri (MVS), Army Regulation AR 385-63 <i>Safety Regulations for Firing Ammunition for Training, Target Practice, and Combat</i> , with change 1 dated 17 June 1968, MVS-012307-002.

- C-9 USACE St. Louis District, St. Louis, Missouri (MVS), Headquarters Department of the Army Regulation AR 210-21 entitled *Installations Training Areas and Facilities for Ground Troops*, dated 18 December 1961, Ordnance and Technical Services Historic Manuals Library, MVS-031907-002.
- C-10 USACE St. Louis District, St. Louis, Missouri (MVS), Headquarters Department of the Army Regulation AR 210-21 entitled *Installations Training Areas and Facilities for Ground Troops*, dated 18 November 1968, Ordnance and Technical Services Historic Manuals Library, MVS-031907-003.
- C-11 Defense Technical Information Center (DTIC), Report entitled *Uranium Alloys for Critical Ordnance Components*, AD609896, dated 23 October 1961, DTIC-011607-003.
- C-12 National Personnel Records Center, St. Louis, MO (NPRC), Regulation prepared by HQ Schofield Barracks entitled *25th Infantry Division Range Regulations*, dated 25 May 1955, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 61L-6091, Box 1, NPRC-020107-002A and NPRC-020107-002B.
- C-13 National Personnel Records Center, St. Louis, MO (NPRC), Regulation prepared by HQ Schofield Barracks entitled *25th Infantry Division Range Regulations*, dated 31 May 1957, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 61L-6091, Box 1, NPRC-013107-001.
- C-14 NARA II College Park, Maryland (CP), Regulation prepared by Headquarters United States Army Hawaii entitled *25th Infantry Division Range Regulations*, dated 15 August 1959, RG 550, Records of U.S. Army, Pacific, Entry 20 Organization Planning Files, Military Historians Files and Regulations of U.S. Army Hawaii 1957-1961, Box 1, CP-010907-006.
- C-15 NARA II College Park, Maryland (CP), Regulation prepared by USAHAW for Schofield Barracks, Hawaii entitled *Range Regulations* dated 10 September 1971, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 401-135 U.S. Army Hawaii 1977, Box 1, CP-120806-011.

- C-16 NARA II College Park, Maryland (CP), Regulation No. 210-11 *Installations Pohakuloa Training Area Range Regulations*, dated 13 December 1971, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 401-135 U.S. Army 1977, Box 1, CP-031507-001.
- C-17 NARA II College Park, Maryland (CP), Department of the Army Headquarters United States Army Support Command, Hawaii Regulation Number 210-11 *Installations Pohakuloa Training Area Range Regulation*, dated 18 March 1974, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 401-75 U.S. Army Hawaii 1968, Box 3, CP-031507-005.
- C-18 NARA II College Park, Maryland (CP), Department of the Army, Headquarters United States Army Hawaii, Regulation Number 210-11 entitled *Installations Pohakuloa Training Area Range Regulation*, dated 20 April 1970, RG 338, Records of U.S. Operational, Tactical, and Support Organizations (World War II and Thereafter), Entry 401-284, Department of the Army HQ USARPAC 1962-1972, Box 1, CP-032207-001.
- C-19 USACE St. Louis District, St. Louis, Missouri (MVS), Department of the Army Field Manual FM 23-6 *Antitank Guided Missile (ENTAC)*, dated 13 May 1964, MVS-031907-001.
- C-20 NARA II College Park, Maryland (CP), Report from HQ, United States Army, Hawaii, APO 957 entitled *Staff Office Report, Office of the Ordnance Officer, January - March 1962*, dated spring 1962, RG 550, Records of the United States Army, Pacific, Entry 17, U.S. Army Hawaii 1959-1963, Box 10, CP-121406-003.
- C-21 USACE St. Louis District, St. Louis, Missouri (MVS), Firing Tables FT 279-B-4 entitled *Weapon System Battle Group, Light: M28 (Davy Crockett)*, Headquarters Department of the Army, dated 1 July 1964, MVS-020207-001.
- C-22 USACE St. Louis District, St. Louis, Missouri (MVS), Analysis of Ammunition Data Cards (ADC) of Cartridge, 20mm Spotting M101 from document no. LC-031507-004, dated 27 March 2007, MVS-032707-001.

- C-23                    USACE St. Louis District, St. Louis, Missouri (MVS), Analysis of DD Form 550 Ordnance Corps Ammunition Lot Record for Cartridge, 20mm Spotting M101 document no. LC-031507-005, dated 27 March 2007, MVS-032707-002.
- C-24                    USACE St. Louis District, St. Louis, Missouri (MVS), DD Form 550, Ordnance Corps Ammunition Lot Records for Lot No. LC-2-28 and LC-2-35, dated 26 February 1962, MVS-020807-001.

## **APPENDIX C-1**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Ammunition Data Cards,  
dated circa 1960, MVS-020707-002.**

## *Ammunition Data Cards*

✓ 20mm XM101 Spotter Cartridge Family

✓ All use M154 Case (Steel, cadmium plated with screw in plug in head)

XM101 Spotter - Brown tipped projectile with safety wire, Black marking on case, Uranium projectile body

XM106 Target Practice - Black tipped projectile with safety wire, Black markings on case, Uranium projectile body

✓ XM107 High Pressure Test - Black flat ended projectile, White markings on case, Steel projectile

✓ XM147 Dummy - Blue projectile with safety wire, Steel projectile body, Black markings on case, hole in case side wall.

MVS-020707-002

CARTRIDGE: 20MM Spotter, XM101 "Davy Crockett"

WEAPON: Rifle, 20mm, Spotting, XM69

**BALLISTIC PERFORMANCE:**

VELOCITY:	530 ± 7 FPS at 25.5 feet
CHAMBER PRESSURE:	NA, Approx 25 KPSI High, 12 KPSI Low
ACTION TIME:	NA
ACCURACY:	50% Prob. inside 50 Yd dia. at 1750 Yards 93% Prob. inside 75 Yd dia. at 1750 Yards
FUNCTION:	Function against earth at 1750 Yards
PROJ. EXTRACTION:	250 Pounds Min, 650 Pounds Max.

**TECHNICAL DATA:**

SPECIFICATION:	LCA-PD-19 or LCA-PD-37
CARTRIDGE:	D-7258876, Weight 7291 Grains approx
IDENTIFICATION:	Brown Tipped Proj., M154 Case, Black markings
CASE ASSEMBLY:	M154, D7258877
CASE BODY:	Weight 3016 grains approx, Steel, MIL-S-3289 D7258878, LCA-PD-18 Steel, C1030 or C1040, ASTM A108 Cadmium Plated, Chromate Treated, QQ-P-416
METERING DISC:	7258880, LCA-PD-18 Steel, Corrosion Resisting, Type 420, ASTM A276
COVER:	7258930, Brass, Alloy #6, ASTM B36
CASE PLUG:	7258879, LCA-PD-18 Steel, C1030 or C1040, ASTM A108 Cadmium Plated, Chromate Treated, QQ-P-416
CASE VENT SEAL:	7259014, Weight - Negligible Paper, JAN-P-224, Type I or II, Color Red
PROJECTILE ASS'Y:	M101, D7259062, LCA-PD-37 Weight 4275 ± 35 Grains
CHG'D PROJ ASSY:	D7258887, Weight 3347 Grains Approx
BODY & ROT BAND:	D7258886, Weight 3187 ± 26 Grains
BODY:	D7258884, Weight 3180 ± 25 Grains D-38 Uranium Alloy, MIL-U-46045 (92% U, 8% Mo)
ROTATING BAND:	B7258889, Weight 7 Grains approx PVC, Type 1, Normal Impact
CAPSULE ASS'Y:	D7259031, Weight 158 Grains Minimum
BODY:	C7259032, Weight 24 ± 1 Grains Aluminum, ASTM B209
SEAL:	B7259033, Weight - Negligible Paper, JAN-P-224, Type I or II, Color Red
DISC:	B7259034, Weight - Negligible Aluminum, 5052-H32, ASTM-B209
CHARGE:	Mix, Incendiary, LCOP-1, 7259099 Weight 90 Grains Minimum
CHARGE:	PETN, MIL-P-387, Weight 25 Grains Minimum
FUZE, PD, ELEC:	M538, D11075700, LCA-PD-36 Weight 735 ± 13 Grains
SAFETY PIN:	C7258981, Steel Wire, ASTM A228
PRIMER:	#36, 7645332, Weight 5.5 Grains approx
PROPELLANT:	IMR-4198, D-7258841-1, 43 Grains approx

CARTRIDGE: 20MM Target Practice, XM106 "Davy Crockett"

WEAPON: Rifle, 20mm, Spotting, XM69

**BALLISTIC PERFORMANCE:**

VELOCITY: 530  $\pm$  7 FPS at 25.5 feet  
CHAMBER PRESSURE: NA, Approx 25 KPSI High, 12 KPSI Low  
ACTION TIME: NA  
ACCURACY: 50% Prob. inside 50 Yd dia. at 1750 Yards  
93% Prob. inside 75 Yd dia. at 1750 Yards  
PROJ. EXTRACTION: 250 Pounds Min, 650 Pounds Max.

**TECHNICAL DATA:**

SPECIFICATION: LCA-PD-28  
CARTRIDGE: D-7259039, Weight 7291 Grains approx  
IDENTIFICATION: Black Tipped Proj., M154 Case, Black markings  
CASE ASSEMBLY: M154, D7258877  
Weight 3016 grains approx, Steel, MIL-S-3289  
CASE BODY: D7258878, LCA-PD-18  
Steel, C1030 or C1040, ASTM A108  
Cadmium Plated, Chromate Treated, QQ-P-416  
METERING DISC: 7258880, LCA-PD-18  
Steel, Corrosion Resisting, Type 420, ASTM A276  
COVER: 7258930, Brass, Alloy #6, ASTM B36  
CASE PLUG: 7258879, LCA-PD-18  
Steel, C1030 or C1040, ASTM A108  
Cadmium Plated, Chromate Treated, QQ-P-416  
CASE VENT SEAL: 7259014, Weight - Negligible  
Paper, JAN-P-224, Type I or II, Color Red

PROJECTILE ASS'Y: M106, D7258929, LCA-PD-30  
Weight 4275  $\pm$  35 Grains  
PROJ & Capsule ASSY: D7259042, Weight 3347 Grains Approx  
BODY & ROT BAND: D7258886, Weight 3187  $\pm$  26 Grains  
BODY: D7258884, Weight 3180  $\pm$  25 Grains  
D-38 Uranium Alloy, MIL-U-46045 (92% U, 8% Mo)  
ROTATING BAND: B7258889, Weight 7 Grains approx  
PVC, Type 1, Normal Impact  
DUMMY CAPSULE: D7259038, Weight 158  $\pm$  2 Grains  
Aluminum, ASTM B211  
Nose Assembly: D7259035, LCA-PD-36  
Weight 767  $\pm$  6 Grains  
Nose Body: 7259036, Weight 600 Grains Approx  
Steel, ASTM A106  
Nose Disc: 7259037, Steel, ASTM A108 or A109  
Nose Filler: Lead  
TAIL: 7258890, Weight 193  $\pm$  3 Grains  
Aluminum 2024-T6, ASTM B211

PRIMER: #36, 7645332, Weight 5.5 Grains approx

PROPELLANT: IMR-4198, D-7258841-1, 43 Grains approx



CARTRIDGE: 20MM High Pressure Test, XM107 "Davy Crockett"

WEAPON: Rifle, 20mm, Spotting, XM69

BALLISTIC PERFORMANCE:

VELOCITY: N/A  
CHAMBER PRESSURE: NA, Approx 25 KPSI High, 12 KPSI Low  
ACTION TIME: NA  
PROJ. EXTRACTION: 250 Pounds Min, 650 Pounds Max.

TECHNICAL DATA:

SPECIFICATION: LCA-PD-29  
CARTRIDGE: D-7259039, Weight 7291 Grains approx  
IDENTIFICATION: Black Flat End Proj., M154 Case, White markings  
CASE ASSEMBLY: M154, D7258882  
Weight 3016 grains approx, Steel, MIL-S-3289  
CASE BODY: D7258878, LCA-PD-18  
Steel, C1030 or C1040, ASTM A108  
Cadmium Plated, Chromate Treated, QQ-P-416  
METERING DISC: 7258880, LCA-PD-18  
Steel, Corrosion Resisting, Type 420, ASTM A276  
COVER: 7258930, Brass, Alloy #6, ASTM B36  
CASE PLUG: 7258879, LCA-PD-18  
Steel, C1030 or C1040, ASTM A108  
Cadmium Plated, Chromate Treated, QQ-P-416  
CASE VENT SEAL: 7259014, Weight - Negligible  
Paper, JAN-P-224, Type I or II, Color Red  
PROJECTILE ASS'Y: M107, D7258893, LCA-PD-31  
Weight 4300  $\pm$  35 Grains  
BODY & ROT BAND: D7259044, Weight 4107 Grains approx  
BODY: D7259045, Weight 4100 Grains approx  
Steel, ASTM A108  
ROTATING BAND: B7258889, Weight 7 Grains approx  
PVC, Type 1, Normal Impact  
TAIL: 7258890, Weight 193  $\pm$  3 Grains  
Aluminum 2024-T6, ASTM B211  
PRIMER: #36, 7645332, Weight 5.5 Grains approx  
PROPELLANT: WC550, D-7258825, 43 Grains approx

CARTRIDGE: 20MM Dummy, XM147 "Davy Crockett"

WEAPON: Rifle, 20mm, Spotting, XM69

BALLISTIC PERFORMANCE:

VELOCITY:	N/A
CHAMBER PRESSURE:	N/A
ACTION TIME:	N/A
ACCURACY:	N/A
PROJ. EXTRACTION:	N/A

TECHNICAL DATA:

SPECIFICATION:	LCA-PD-33
CARTRIDGE:	D-7259050, Weight 7291 Grains approx
IDENTIFICATION:	Blue Proj., M154 Case, Black markings, Hole in case

CASE BODY:	D7258878, LCA-PD-18 Steel, C1030 or C1040, ASTM A108 Cadmium Plated, Chromate Treated, QQ-P-416
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CASE PLUG:	7258879, LCA-PD-18 Steel, C1030 or C1040, ASTM A108 Cadmium Plated, Chromate Treated, QQ-P-416
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PROJECTILE :	M147, D7259051, LCA-PD-32 Steel, ASTM A108
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SAFETY WIRE:	11075078
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PRIMER POCKET PLUG:	7259052
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PROPELLANT:	None
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## **APPENDIX C-2**

**NARA II College Park, Maryland (CP),  
Memorandum from HQ Hawaiian Dept,  
Honolulu, H.T., Subject: *Acquisition of land at  
Schofield Barracks and at Fort Shafter, Territory  
of Hawaii*, dated 19-Nov-19, RG 407, Records of  
the Adjutant General's Office 1917-, Entry 37A  
Project Files 1917-1925, Box 1239,  
CP-121306-009.**

REPRODUCED AT THE NATIONAL ARCHIVES

6011

HEADQUARTERS HAWAIIAN DEPARTMENT,  
HONOLULU, H. T.

November 19, 1919.

From: Commanding General, Hawaiian Department.

To: The Adjutant General of the Army.

Subject: Acquisition of land at Schofield Barracks and at Fort  
Shafter, Territory of Hawaii.

1. Copies of the Report on Kalena Tract and Maili Pocket are enclosed herewith, as requested in your letter of October 16, 1919.

2. Regarding the acquisition, by condemnation proceedings, of 48 acres, more or less, of land adjoining the Fort Shafter Military Reservation, as an addition to the Reservation, there is no record in this Department of a request being made to acquire the property.

3. Under date of July 22, 1919, the Attorney General of the United States notified the United States District Attorney, Honolulu, T. H., to institute proceedings to condemn the land in question; on August 18, 1919, these proceedings were ordered stayed by the Attorney General on the grounds that there was no appropriation available for an Award in this connection.



17/11/19  
Incls.  
Cite  
17/11/19



CP-121306-009

REPRODUCED AT THE NATIONAL ARCHIVES

KALENA TRACT, SCHOFIELD BARRACKS, TERRITORY OF HAWAII.  
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1. The present military reservation of Schofield Barracks, Island of Oahu, was originally a part of the public domain and was set apart for military purposes and declared a military reservation by Executive Order dated July 20, 1899, amended by Executive Order dated November 15, 1909, and enlarged by Executive Order dated August 23, 1910.

2. When the Schofield Barracks reservation was acquired by the Government there was left a privately owned parcel of land lying entirely within its boundary and known as the KALENA TRACT. (See Map No. 1.) Prior to 1917 it had been leased by the Quartermaster from year to year, but the lease expired with the fiscal year 1917 and has not been renewed. In 1910 the former owner, an aged Hawaiian woman, transferred title to L.L. McCandless, the present owner, who, it is rumored, intends to erect a summer home on this tract.

3. The tract terminates just in rear of the target range, so that it receives the full benefit of the fire at the range. The range was constructed by troops and is capable of accommodating six regiments of Infantry. The site of the present range, or any change thereof which may be made by releasing a part of the present range for other field exercises, makes the acquisition of the Kalena Tract absolutely necessary for the proper military use of the reservation. Surrounded on all sides, as this tract is, by the reservation its use by private parties would be disastrous to the proper control and discipline of the garrison and would hamper by its location the movement of military bodies from one part of the reservation to another in that direction. When the target range is not in use, this tract becomes equally necessary for field training.

4. In the Urgency Deficiency Bill, approved August 26, 1917, there was an item of \$10,300 for the purchase of this tract. The U.S. Attorney in Honolulu was directed by the Attorney General of the United States to institute proceedings for condemnation, which was done early this year. At the request of the U.S. Attorney the Department Engineer detailed an officer to take local planters over the ground to estimate its value, and the result was a price of about \$20,000. For some time the proceedings were delayed owing to the time necessary to properly estimate the value of the tract, and partially owing to the fact that the owner was attempting to have the title to the tract registered. The registration, the U.S. Attorney informs Department Headquarters, has been completed and he will proceed with the suit.

5. Mr. McCandless values the land at \$65,000; the land is taxed by the Territory at \$40,000, and it has been appraised by government appraisers at about \$20,000; but owing to the fact that there was such a difference between the appraisers' valuation and the value placed upon the property by Mr. McCandless, and that the appraised value is only about one half of its assessed value, although the taxed value may have been placed upon Mr. McCandless's own return, and the further fact that jurors in condemnation proceedings are usually liberal in favor of the owner of the land under condemnation, it was thought best to recom-

(Inclosure 1) 116

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*Hawaii*

mend to the War Department that a further appropriation of \$20,000 be asked for, making \$30,300. in all.

6. While the owner of the land may be asking far more than its value and while \$30,000 may actually be more than the land is worth, there remains the fact that additional pineapple acreage is being sought by various corporations, that the pineapple industry in these Islands is increasing yearly, thereby causing an increase in the value of land, and also the fact that land values throughout this Island are increasing year by year to an extent which is far from normal.

7. For the above reasons it is urgently recommended that all possible haste be made in securing the above tract of land, thereby affecting a saving to the government in the price to be paid, as well as adding to the efficiency of the troops at Schofield Barracks. It is recommended that \$20,000 be appropriated, in addition to the \$10,300 now understood to be available. If this latter amount is not available it is recommended that the appropriation be made \$30,000.

REPRODUCED AT THE NATIONAL ARCHIVES

MAILI POCKET TRACT, SCHOFIELD BARRACKS, TERRITORY OF HAWAII.  
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1. The present military reservation of Schofield Barracks, Island of Oahu, was originally a part of the public domain and was set apart for military purposes and declared a military reservation by Executive Order dated July 20, 1899, amended by Executive Order dated November 16, 1909, and enlarged by Executive Order dated August 23, 1910.

2. Joining this reservation on the north is a tract of land known as the Maili Pocket Tract, which is necessary as an addition to the Schofield Barracks reservation on account of its great need for artillery purposes. (See Map No. 2.) This ground is also required by the cavalry and infantry in combat problems and proficiency tests. It is adjacent to the present limited combat range and has been freely used by troops in combat problems when not required for artillery practice. It is also necessary for use in combined exercises. The loss of this tract would seriously hamper the field training of the large command ordinarily stationed at Schofield Barracks, which command normally consists of all mobile branches of the service. The addition of this tract would release a portion of the present target range for other exercises and permit a desired change in its location. This tract was used with the consent of the owners, the Kaala Land Company, Ltd., for the above purposes up to the time a part of it was leased in 1916.

3. The Maili Pocket Tract comprises an area of 736 acres, 654.5 acres of which is owned by the Kaala Land Co., Ltd.; the remainder, 81.5 acres, is not tillable, is described as of practically no value, and the owner is unknown. Under date of November 10, 1916, a part of the above Maili Pocket Tract, consisting of 283.15 acres, was leased by the Kaala Land Co., Ltd., to the Hawaiian Islands Packing Co., Ltd., at an annual rental of \$6.65 per acre for a period of ten years from January, 1917, with the option for the lessee to renew the lease for six years thereafter; the purpose of the lessee being to cultivate the tract for the growth of pineapples. It is understood that of the remainder of the land owned by the Kaala Land Co., Ltd., about 76.65 acres is second quality pineapple land, and that the Hawaiian Islands Packing Co., Ltd., contemplates leasing the same at an annual rental to be determined later. The Maili Pocket Tract is at present inaccessible, except by crossing the military reservation, which crossing would interfere with the proper use of said reservation, and the expense of constructing an approach to the tract outside of the reservation would be very great. Under date of May 24, 1919, the Kaala Land Co., Ltd., confirmed a former offer made on December 18, 1916, to sell to the United States Government 654.5 acres of land known as the Maili Pocket Tract for \$40,000; copy of letter enclosed.

4. The acquisition of this land has been the subject of much correspondence during the past three years, and under date of October 3, 1917, The Adjutant General of the Army wired Department Headquarters that an estimate of \$41,000 for the purchase of the tract had been submitted to Congress, the \$40,000 being for the purchase of the interest of the Kaala

(Inclosure 2) *BB*

REPRODUCED AT THE NATIONAL ARCHIVES

(Maili Pocket Tract -- #2)

Land Co., Ltd., and the \$1,000 for the purchase of the 81.5 acres held by unknown persons.

5. The Hawaiian Islands Packing Co., Ltd., is willing to sublet its leasehold interest in the Maili Pocket Tract covering 283.15 acres in exchange for a lease from the government of two parcels of the reservation, marked "B" and "C" on the accompanying Map No. 2, which tracts have an aggregate area of 360 acres and adjoin land under cultivation by the Company, but not on the reservation.

6. Inasmuch as no authority exists for the Secretary of War to enter into a lease for a greater length of time than five years, and as the expiration of any such lease would still find the lease of the Packing Company from the Land Company with many years to run, it was decided by the War Department to draft an item of legislation making appropriation for the acquisition of the Maili Pocket Tract, subject to existing leases and conferring authority upon the Secretary of War to "acquire the existing leasehold right in such tract by granting in exchange therefor a leasehold right on lands within the said Schofield Barracks Military Reservation at such rental and under such conditions as he may determine, the total area of such land not to exceed 360 acres, and the said leasehold right therein to run for not exceeding sixteen years."

7. In this manner it is hoped to acquire the Maili Pocket Tract free from the right of any other person to interfere with the use of the tract for military operations. This naturally presupposes the exchange of the leasehold prior to the purchase of the fee. While it is impossible to state that the use of the 360 acres of land for pineapple purposes on the reservation by the Packing Company would not interfere in some way with its use for military purposes, yet in view of the amount of money involved and the probable litigation in procuring by condemnation the release of that part of the Maili Pocket Tract now under lease to said Company, it is believed that the use of the said 360 acres by the Packing Company would be of minor importance as compared with its use of the leased land contained in the Maili Pocket Tract.

The proposed sixteen years' lease should be cut down to, say, ten years and the acreage to, say, 250 acres.

Note: Tract "B" on enclosed map shows an area of 229 acres which is the survey of the ground desired by the Hawaiian Islands Packing Co., Ltd. but this amount of ground will be cut to 220 acres or such lower figures as may be later decided upon. This will make the 360 acres alluded to in paragraph 5.

1 incl.



REPRODUCED AT THE NATIONAL ARCHIVES

Office of  
CASTLE & COCKE, LTD.

Honolulu, Hawaii, May 24, 1919.

Brigadier General Henry C. Hodges, Jr.,  
Commanding Hawaiian Department, U.S.A.,  
Honolulu.

Dear Sir:

This is to confirm our offer made to you under date of  
December 18, 1916, to sell to the United States Government 654.5  
acres of land located on the slopes of Mt. Kaala and known as the  
Maile Pocket Tract, for \$40,000.00.

Very truly yours,

KAALA LAND COMPANY, LIMITED.

By T. H. Petrie,  
Secretary.

C/Y

A TRUE COPY:

E.K. Massee  
Lt. Colonel, J.A.

## **APPENDIX C-3**

**Military History Institute Carlisle Barracks,  
Pennsylvania (MHEC), Article from the Infantry  
Journal, Vol XXI, No. 5, *Schofield Barracks and  
the Hawaiian Division*, dated November 1927,  
MHEC-120307-001.**

# INFANTRY JOURNAL

Vol. XXXI

NOVEMBER, 1927

No. 5

## Schofield Barracks and the Hawaiian Division\*

EIGHTEEN years ago the cowboys of the Leilehua Ranch drove their herds over the plains where the United States now maintains its largest Army post. Where once savage tribes gathered on the highlands under the shadow of the Waianae range to prepare for war, the largest combat division of our Army is in daily training to gain proficiency in the use of the most modern weapons known to the profession of arms. The Schofield Barracks of today has grown from small cavalry post under canvas in 1907 to a thriving military city in 1927.

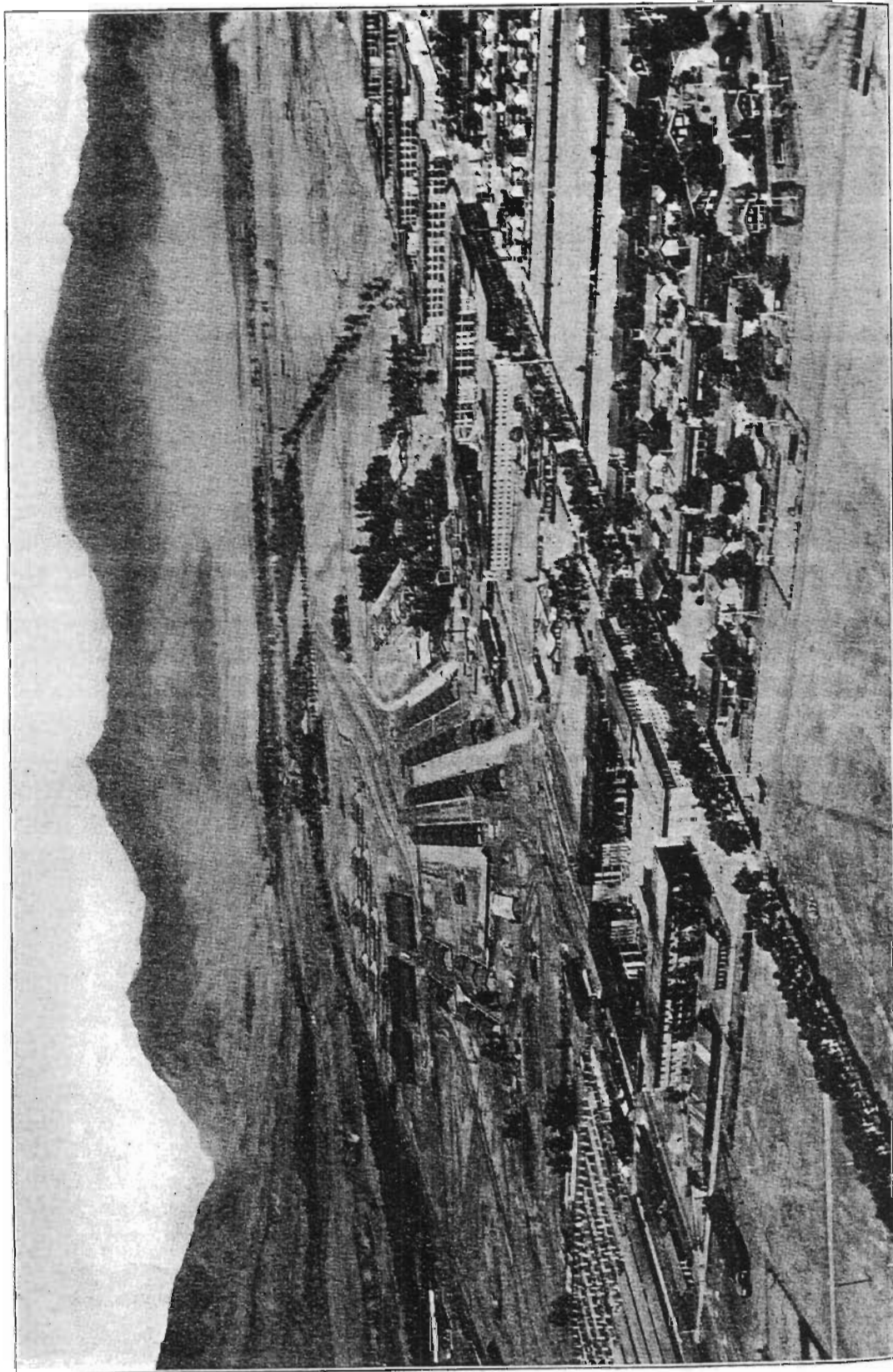
The post was named Schofield Barracks in honor of Lieut. Gen. John McAllister Schofield, who commanded the XXIII Corps in Sherman's Georgia campaign of the Civil War. In 1910 the War Department committed itself to the policy of making Schofield Barracks the largest and most strongly garrisoned post of our Army. The period of greatest expansion started in 1915, when Congress appropriated large sums for the construction of what is now the lower post. The specifications called for concrete barracks of the most modern type, and during this period several such barracks, the Army National



Maj. Gen. William R. Smith, U. S. A.,  
Commanding Hawaiian Division  
February 24, 1925, to August 27, 1927.

Bank and the Post Library, were built. In the period immediately following the war twelve million dollars was authorized for the construction of additional concrete barracks, a hospital, officers' quarters, a water and a sewage system. Ku Tree Dam,

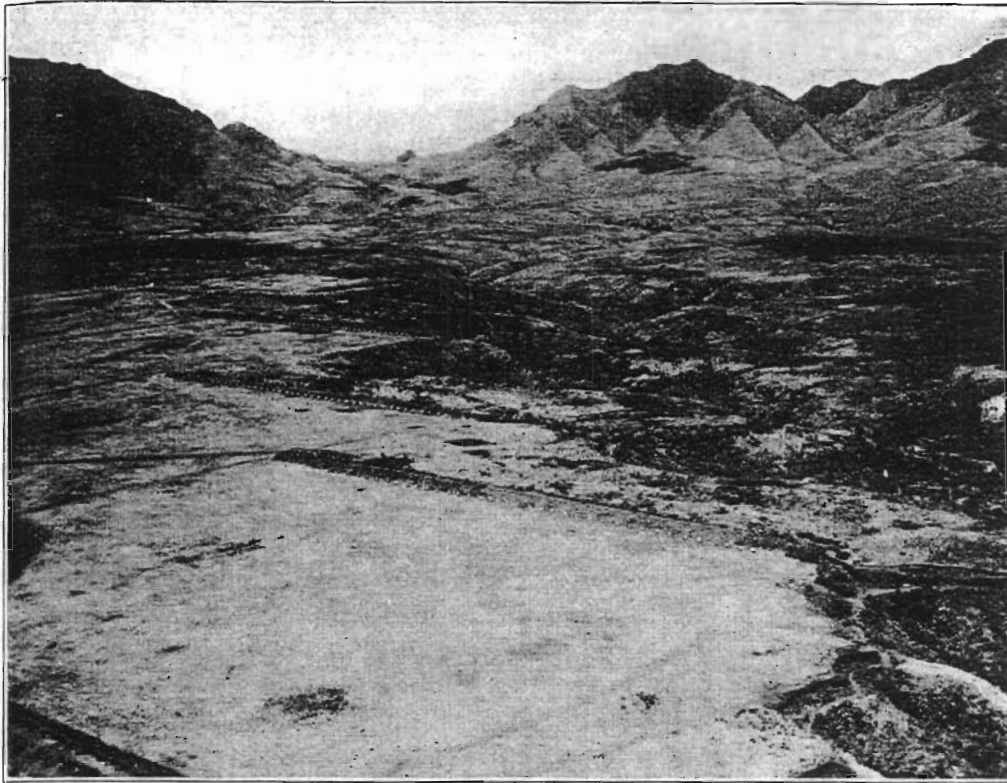
\* This paper was prepared at the Headquarters of the Hawaiian Division.



Schofield Barracks

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General View of the Small Arms Range and Adjacent Terrain

Training in the division goes hand in hand with the development and refinement of the defense plans. It begins with study of the terrain over which the troops must operate. The "Paradise of the Pacific" is a crowded, intensively cultivated, irregular shaped volcanic outcrop of the Pacific. It has two mountain ranges, one along its east and one along its west side. The plateau between is probably the result of the overflow of two adjacent volcanoes, the remains of which constitute the Koolau (windward) and the Wai-anae (leeward) ranges. The soil is of volcanic origin and erosion has produced many surprisingly steep slopes; gulches and ridges, which make the terrain unusually difficult.

In view of all that has been said

about Hawaii as a part of the National Defense, our outpost at the "Crossroads of the Pacific," one might assume that the tactical training of the garrison would be primarily in the defense. But the Hawaiian Division operates under the same field service and training regulations as the rest of the Army and, therefore, its tactical training, just like that of the rest of the Army, is based on the offensive. The tactical training of the Infantry in Hawaii is essentially the same as that of the rest of the Army, although certain local conditions do exert marked influence. The conditions that have the greatest effect on the training are weather, terrain, auxiliary arms, strength of units and the specific local mission of the garrison.

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which solved the water supply problem for all time, was completed in 1925.

The Hawaiian Division came into being on March 1, 1921. It consists of a division headquarters, special troops (including an attached gas company), the 21st Infantry Brigade (the 19th and the 21st Infantry), the 22d Infantry Brigade (the 27th and the 35th Infantry), and the 11th Field Artillery Brigade (the 8th, the 11th and the 13th Field Artillery and the 11th Ammunition Train).

The western section of the post, usually referred to as the "Upper Post" since it lies on the gentle slope leading toward Kole Kole Pass and the Waianae Mountains, houses the 19th Infantry, the 11th Medical Regiment, the Station Hospital, the 11th Tank Company and the Chemical Warfare troops. The field artillery occupies the northern section of the post, the "Artillery Area." The 21st, the 27th and the 35th Infantry have areas in the "Lower Post." Most of the special troops, division staff and the 3d Engineers occupy the "Engineer Area" of the "Lower Post." Wheeler Field is to the south. The provost marshal exercises area control over the Koolau watershed and Castner village, which is the old constructing quartermaster's camp and is now principally occupied by Orientals employed on the post.

On account of the large area of Schofield Barracks and the size of the garrison, the duties of military housekeeping cannot be carried on as at small posts. The post is divided into areas, in general corresponding to the regimental or separate unit areas, and the senior line officer in each area per-

forms most of the routine duties that ordinarily fall to a post commander. In other words, Schofield Barracks is a group of eight regimental posts on one reservation, with a complete system of utilities, military stores and medical facilities pooled in agencies common to all and coordinated by division headquarters. This scheme of unit responsibility fosters the strongest sort of *esprit de corps* and friendly rivalry between organizations, without detracting in any way from general post spirit. Each unit feels its responsibility to stand well among the other units of the post whether in athletic events, military training or housekeeping. Such a desire to excel naturally elevates the post as a whole, as is demonstrated by the enthusiastic support given the boxing tournaments, football, baseball and basketball leagues, and the high standing of the division units at annual inspections of the past two years. The determination to win, whether at work or play, has been thoroughly instilled into the mind of every officer and man of the Hawaiian Division. The result is a high rating of combat efficiency.

### TRAINING ACTIVITIES

The ambitious officer who desires to take advantage of his opportunities can well look upon assignment to the Hawaiian Division as a post-graduate course after theoretical work in the service schools. Here the officer has the opportunity, while serving with a combat division, to put into practice many of the theories he has learned.

The mild weather conditions permit outdoor field training the year around, so that tactical training in the field receives an unusual amount of time and attention.

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The terrain may affect tactical training in any locality, either through the absence of normal physical features that are apt to be met in war, or through the presence of physical features apt to be met but which are not present on most of our posts or available maneuver grounds. The conditions in Oahu come mainly under the latter class. They include, first, the small island situation, with its effect on all time and space factors and the opportunity it affords to practice the study of coast operations; and, second, the presence throughout the island of long, deep gulches which offer opportunity for varied and numerous problems in troop movements, local security and defensive and offensive situations.

While Schofield Barracks is not the only post that includes in its garrison both Infantry and auxiliary arms, the fact that it does has its effect in broadening the tactical training of the Infantry. Especially does this result from a real desire for cooperation in training that exists among the branches represented. The opportunity for this combined training in the field is of especial importance to both officers and men in view of the infrequency of such opportunity at most posts. In the field exercises, practically all of which are with one or more of the auxiliary arms, the Infantry officers get much practical information about the capabilities and limitations of the auxiliary arms, and how to obtain the maximum support from them. Demonstrations by the auxiliary arms are also of great value. Service in the Hawaiian Division is really attendance at a school of application, as distinguished from our spe-

cial service schools where the instruction is largely theoretical, although imparted through the applicatory method of problems.

Considering next the reduced strength of our units, we have found that among the many disadvantages there are certain advantages. In our schools, tactical instruction is based almost, if not entirely, on war-strength units; but here we must face the situation, admit that we may have to fight with what we have, look for means to overcome the lack of strength, work out the tactics of other situations than those of the last half of the World War, and apply them to our tactical training. The company commander attacking with three squads in assault and two in support cannot simulate eighteen squads and say what he would do. He must make the best use of the ground and of his special weapons. He must know what the auxiliary arms can do for him and how to get their maximum support. In the defense he must do likewise. He cannot content himself with one position, but must be prepared to move his squads about in alternate positions to meet the attack wherever it may come.

This brings us to the primary local mission of this garrison, and that is readiness for the defense of the Hawaiian Islands. Although it might be assumed that this defensive mission would unduly influence the tactical training of the garrison, such is not actually the case. Of course, preparation for carrying out this mission is important, but such preparation involves matters other than purely defensive training. For example, the offense in the form of the counter-



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attack is an essential of the defense; the probable methods of the attack must be carefully studied in preparation for the defense; the defender must study the problems of an expeditionary force and of landings against resistance. Thus, tactical training follows a well-rounded program rather than a lopsided one devoted entirely to the defense.

The effect of the mission on the tactical training of the Infantry troops, and the opportunity to work on the actual terrain of possible operations exert a noticeable influence on tactical instruction and serve as an incentive for study. One consequence of the study and experiment is that defense plans are in constant state of preparation; another and perhaps more important one is the training and experience that accrue to all who have a part in the work.

The mission of Oahu calls for the study of historical example of offensive and defensive landing operations. The Gallipoli campaign, being the most recent example, is probably used most often in the officers' schools. From study of the Turkish dispositions and actions, the student learns the need of flexibility in the defense, how small groups can hold superior numbers in the first day's fighting, the use of reserves, and the need of energetic action in using them. From study of the British and Australian landings, the student appreciates the extreme difficulty of such a maneuver under even ideal conditions. This study is essential to proper training of troops in the execution of the local mission, and is bound to influence the training.

In the training of the artillery, tac-

tics are primarily a concern of the battery detail. Reconnaissances are made periodically, not only in the area to which the battery is to be normally assigned according to the prepared initial plans for defense of the island, but also in any other area in which it may possibly have to operate. The only thing that limits such activities of the battery is the lack of gasoline for motive power. Since the personnel of the batteries is always changing, it is possible to have a regular series of problems and exercises, and to repeat it from time to time. To the new men the problems are new and interesting, while the batteries as units accumulate experience and knowledge.

The artillery brigade is completely motorized and has a quota of corps artillery in the form of a regiment of 155-mm. howitzers. It is the best laboratory that we have for development and testing. There is training with other branches in the combinations that would actually obtain under the defense plan; regiments conduct tactical schools; there are lectures by the senior officers of the brigade and by officers from all branches; there is opportunity to attend the Infantry tactical exercises; there are the brigade tactical exercises and service firing in the latter part of the firing season; and, finally, there is training under the defense plan, which is a war game played first on the map and then on the ground. This final stage completes the tactical training and is a part of the training of the higher command.

A special training that is distinctive of the Hawaiian Division is the machine gun training of rifle companies. Each Infantry company has four ma-



## **APPENDIX C-4**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Memorandum from Headquarters  
Department of the Army, Office of the Adjutant  
General, Subject: *Safety Rules for Peacetime  
Operations with the Davy Crockett / MK 54 Mod 2  
Atomic Weapon System*, dated 1 November 1961,  
MVS-020107-001.**

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HEADQUARTERS  
DEPARTMENT OF THE ARMY  
OFFICE OF THE ADJUTANT GENERAL  
WASHINGTON 25, D. C.

IN REPLY REFER TO

AGAM-P (M) 471.6 (1 Nov 61) DCSOPS

1 November 1961

SUBJECT: Safety Rules for Peacetime Operations with the DAVY CROCKETT/MK  
54 Mod 2 Atomic Weapon System (U)

TO: Commanders in Chief  
US Army, Europe  
US Army, Pacific  
Commanding Generals  
US Continental Army Command  
US Army, Alaska

1. (U) Inclosed are the following:
  - a. Summary of Operational Concept for the DAVY CROCKETT/MK 54 Mod 2 Atomic Weapon System (Inclosure No. 1).
  - b. Safety Features Inherent in the DAVY CROCKETT/MK 54 Mod 2 Atomic Weapon System (Inclosure No. 2).
  - c. Safety Rules To Be Observed During Peacetime Operations with the DAVY CROCKETT/MK 54 Mod 2 Atomic Weapon System (Inclosure No. 3).
2. (C) The Secretary of Defense has granted interim approval of the above rules pending final clearance by the Atomic Energy Commission. Until such time as final approval has been received, peacetime operations with this system will be held to the minimum consistent with operational readiness requirements.
3. (U) The approved safety rules are basic controls and procedures for peacetime operations with the weapon system described, and their promulgation does not rescind or modify restrictions of Hold Orders or of other specific temporary limitations imposed by competent authority. These latter will be modified or superseded only by directives or instructions pertaining specifically to them.
4. (U) It is directed that you promulgate the safety rules through command channels as an operational matter, and disseminate appropriate data concerning the safety features of the system to such of your subordinate elements as may be necessary. It is further directed that this be done in a manner to assure retention of the mandatory nature of the safety rules at all levels.

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for Mr. P. K. H. 9/1/61  
refer to 100-101080-51W

100-101080-51W

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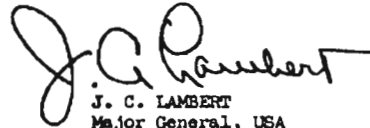
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5. (U) As stated in paragraph 1b of Inclosure No. 3, no deviation is authorized from the safety rules. In case operational experience shows safety rules to be so stringent as to adversely effect operational readiness or conversely shows adequate safety is not attained, recommended changes will be transmitted to the Department of the Army under the provisions of AR 15-12 and AR 385-25.

By Order of the Secretary of the Army:

  
J. C. LAMBERT  
Major General, USA  
The Adjutant General

3 Incl

1. Summary of Op Concept  
for The Davy Crockett/MK  
54 MOD 2 Atomic Wpn Sys
2. Safety Features Inherent in  
The Davy Crockett/MK 54  
MOD 2 Atomic Wpn Sys
3. Safety Rules to be Observed  
During Peacetime Op with the  
Davy Crockett/MK 54 MOD 2  
Atomic Spn Sys

Copies furnished:

Chairman, Joint Chiefs of Staff  
Deputy Chiefs of Staff  
Chief of Research and Development  
Assistant Chief of Staff for Intelligence  
The Inspector General  
The Adjutant General  
The Provost Marshal General  
Chief of Ordnance  
Chief of Engineers  
Chief Chemical Officer  
Chief Signal Officer  
Chief of Transportation  
The Quartermaster General  
Commanders in Chief  
US European Command  
Pacific  
Alaska  
Caribbean  
US Strike Command  
Commanding Generals  
ZI Armies  
Military District of Washington, US Army  
US Army Infantry Center  
US Army Armor Center  
US Army Special Forces Center

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AGAM-P (M) 471.6 (1 Nov 61) DCSOPS 1 November 1961  
SUBJECT: Safety Rules for Peacetime Operations with the DAVY CROCKETT/MK  
54 Mod 2 Atomic Weapon System (U)

Copies furnished: (cont)

Commanding Generals

US Army Combat Experimentation Center  
XVIII Airborne Corps

Commanding Officer

US Naval Weapons Evaluation Facility

Commanders

Field Command, DASA  
Military Air Transport Service (MAIOS/GM & NS)

Chiefs

Defense Atomic Support Agency  
US Army Board for Aviation Accident Research

Commandants

US Marine Corps  
US Army Infantry School  
US Army Armor School  
US Army Aviation School  
US Army Command and General Staff College  
US Army War College

Chief of Naval Operations

Chief of Staff, US Air Force

Presidents

US Army Infantry Board  
US Army Armor Board  
US Army Airborne and Electronics Board  
Sandia Corporation

Directors

Special Weapons Development (USCONARC)  
Nuclear Safety Research, US Air Force  
Division of Military Application, Atomic Energy Commission

Officer in Charge

US Navy Explosive Ordnance Disposal Technical Center  
Manager, Albuquerque Operations, Atomic Energy Commission

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SUMMARY OF OPERATIONAL CONCEPT FOR THE DAVY CROCKETT/MK 54

MOD 2 ATOMIC WEAPON SYSTEM (U)

1. (SRD) Description of Major Assemblies.

a. Projectile. The DAVY CROCKETT projectile (Projectile, Atomic, Supercaliber 279mm: XM388) consists of the warhead and adaption kit assembled into a round of ammunition. The projectile weighs approximately 75 pounds and may be used with either of the two piston type recoilless rifle delivery systems.

b. Warhead. The warhead for the DAVY CROCKETT application is the MK 54 MOD 2. It is an unboosted, sealed pit system, containing 26 pounds of high explosive. This warhead weighs approximately 51 pounds and has a nominal yield of 20 tons. An environmental sensing device (MC-1258 Inertial Switch) is incorporated in this warhead. No electrical, pressure, or functional testing is required during the minimum desired storage life of four years throughout the stockpile-to-target sequence.

c. Adaption Kit. The XM119 adaption kit includes the fuzing system, power supplies for radar and warhead, safing and arming device (timer), manual arm-safe switch and the ballistic case. The fuzing system consists of a dual-channel pulse-doppler proximity fuze for an air burst at about 40 feet above target and a dual-channel capacitance fuze for a near surface burst at about 2 feet above target. An option selector switch is provided for selection of the desired height of burst. Minimum desired storage life without testing is also four years.

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d. Delivery Systems.

(1) XM 28 Battle Group Atomic Delivery System (DAVY CROCKETT)

is a vehicle mounted or man-portable ground mounted nuclear delivery system with a minimum range of about 555 meters and a maximum range of about 2000 meters. The piston for this system is a 120mm titanium tube, with base, obturator and adapter. A separate cartridge is provided and contains the propelling charge and primer ignition system.

(2) XM 29 Battle Group Atomic Delivery System (DAVY CROCKETT)

is a vehicle mounted or ground mounted nuclear delivery system with a minimum range of about 545 meters and a maximum range of about 4000 meters. The piston for this system is a 155mm aluminum tube, with base, obturator and adapter. Two separate cartridges are provided for the two zones of fire. These cartridges each contain the propelling charge and primer ignition system.

e. Functioning. Firing setback starts the safing and arming

timer which can be pre-set by the firing crew from 1 to 50 seconds.

Setback also activates the adaption kit low voltage batteries. At 0.6 to 1 second after activation, the low voltage batteries start the chopper motors of the firing set, prearming the warhead. The environmental sensing device (MC-1258 Inertial Switch) interrupts the critical arming lines between the adaption kit low voltage batteries and the warhead converter transformers until operation of the ESD in the proper inertial environment. At the expiration of the pre-set time interval, switches in the safing

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and arming timer close and permit power to be applied from the 180 volt thermal batteries to either the airburst or near surface burst fuze. Timer closed switches permit power to be applied from the low voltage batteries to the transformers in the chopper converters. Chopper converter outputs are rectified and applied to the X-unit to accomplish final warhead arming. Thereafter, either the proximity or the capacitance fuze, depending on the option selected, provides the signal to detonate the warhead.

2. (SRD) Concept of Operations.

a. The DAVY CROCKETT system is designed to provide close nuclear fire support for combat troops. Its principal advantage is that it is a fast-reacting nuclear delivery system available to the commander facing the target. Firing teams which have the mission of firing DAVY CROCKETT projectiles will be organic to battle groups/battalions, armor and armored infantry battalions, and armored cavalry squadrons in the present Army organization, and to infantry, mechanized, parachute and tank battalions and reconnaissance squadrons in the reorganized divisions. Employment of these teams in a support role is envisioned down to and including company level, and the level of infantry platoons performing independent or semi-independent missions.

b. During peacetime, necessary exercises and technical proficiency inspections of Ordnance support units and firing teams may be conducted. Moreover, a commander of a unified or specified command may authorize deploying projectiles with firing teams in his command. The above operations will not entail unlocking projectile

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containers or removal of the nuclear projectiles from their containers. Firing of the DAVY CROCKETT system will be controlled by the battle group/battalion/squadron command facing the target and will not be undertaken until receipt of authenticated firing orders through command channels.

c. Upon assembly of the warhead and adaption kit into a projectile, the projectile is placed in its storage and transport container. The sealed, desiccated and locked container protects against shock and vibration encountered during normal handling and transporting. The projectile stays in this container throughout the logistical support system. Stockage of projectiles at a battle group/battalion/squadron supply point may be required because of the widespread distribution and high density of firing teams. In peacetime operations, projectiles issued to battle group/battalion/squadron supply points will remain in their locked containers.

d. On removal from the container:

(1) The projectile is fastened on a porta-pack (pack board XM1) which is supplied with each projectile and which includes a zippered canvas cover (the pack board is used either for man-carrying or as a mounting bracket with the  $\frac{1}{4}$  ton truck, 4 x 4), or

(2) The projectile is secured in a specially designed receptacle in an armored personnel carrier. As many as ( \* ) war reserve

\*Studies to be completed will determine whether any additional projectiles in other arrays may be so transported.

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projectiles can be carried in an armored personnel carrier; interim approved number in a linear array is six.

e. Army aviation lift is authorized only when tested and approved equipment and procedures exist. Positive measures will be instituted to insure that aviation jettison policy and procedures are in accordance with current service directives.

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SAFETY FEATURES INHERENT IN THE DAVY CROCKETT/MK 54 MOD 2

ATOMIC WEAPON SYSTEM (U)

1. (SRD) General.

A one-point detonation of the MK 54 MOD 2 warhead, such as could be caused by fire or impact, would result in the burning or explosion of approximately 26 pounds of high explosive. The probability of any nuclear contribution to the detonation is extremely remote. Some scattering of plutonium may present a local problem of decontamination.

2. (SRD) Safety Features Inherent in the DAVY CROCKETT/MK 54 Weapon System.

a. Warhead.

(1) The principal safety features of the MK54 MOD 2 warhead are:

- (a) The absence of an internal source of electrical energy.
- (b) The requirement for two continuous arming signals and one firing signal to detonate the warhead.
- (c) The open warhead arm circuits furnished by the MC-1258 inertial switches.

(2) The warhead does not require monitoring or testing. One connector is used for all warhead arming and firing inputs. The female connector eliminates the possibility of a male-to-male connection, which might apply power to the warhead. It also reduces the possibility of "one-point arming" due to bent connector pins. To make unauthorized access to the warhead electrical connection detectable, a sealed connector

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cover is used. A broken seal would provide evidence that the warhead may not be in proper condition for use.

(3) The functioning of the warhead components for achieving a nuclear detonation is discussed below:

(a) MC-1258 Inertial Switch. There is an MC-1258 inertial switch in each arm circuit channel. The function of this device is to provide a high level of safety during normal ground handling operations. The switches are mounted so that the sensitive axis is parallel to the longitudinal axis of the projectile. Design of the switch is such that it will not actuate when 700g and 1g-second are applied, and will actuate when 1100g and 13 g-seconds are applied.

(b) MC-908 Rotary Chopper. The MC-908 is a small direct current motor that turns a heavy duty commutator. The commutator is electrically isolated from the motor circuit. When the rotary chopper operates, the commutator alternately opens and grounds the ends of the center-tapped primary of the converter transformer. Susceptibility to spurious signals is minimized since a continuous current must be supplied for motor operation.

(c) Converter Transformer. The converter transformer is a step-up transformer having a center-tapped primary winding and two separate electrically isolated secondary windings. When the MC-908 motor operates and 28 volts is supplied to the center tap of the transformer primary, an output is available in the secondaries. One secondary output charges the X-unit storage capacitor; and the other arms the trigger circuit.

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(d) Spark Gap Switch. One dual-probe gap switch is required in the warhead circuitry. When ionized by a signal from the secondary of the trigger transformer, the spark gap switch provides a conducting path for the discharge of the X-unit capacitor to the detonators in the warhead. The probability for the spark gap to break down spontaneously while the X-unit capacitor is being charged is extremely small. The possibility that the X-unit capacitor will be charged when the warhead is stored separately is considered to be unlikely. Bleeder resistors are provided for the X-unit capacitor and for the trigger circuit capacitor which will reduce the voltage to safe levels in approximately four seconds should voltages inadvertently be applied to the capacitors.

b. Adaption Kit. The XM 119 adaption kit has a number of features which contribute to safety from an unauthorized or unintentional nuclear detonation or detonation in other than the intended target area.

(1) Manual Arm-Safe Switch. The manual arm-safe switch is normally kept in the safe position and only set to the arm position in direct preparation for a firing mission. Since the slot in the end of the switch shaft is recessed below the surface of the skin of the projectile, the equivalent of a small screwdriver blade must be used to set the switch on "arm". This reduces the possibility of the switch being inadvertently set on "arm". Should the projectile be fired with the switch set on "safe", the circuit supplying power from the low voltage batteries to the warhead would be open.

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(2) 28 Volt Batteries. These batteries are activated on the firing setback of the projectile, and supply power to the warhead through the arm-safe switch. If these batteries are not activated, the warhead will not arm.

(3) XM 35 Timer. Mounted in the base of the projectile, the XM 35 timer is both an arm-safe device and a timer to control minimum fuze arming time. It is turned manually from the "safe" position to a time setting only in direct preparation for a firing mission. Minimum fuze arming time may be set in one-second increments from zero to fifty seconds. The XM 35 timer has several inherent safety features.

(a) The timer is normally set on the "safe" position. In this position two electrical circuits are kept open. One circuit, when open, prevents application of power to the adaption kit fuzes. The other circuit, when open, prevents application of power to the primary of the converter transformer in the warhead.

(b) Upon firing the projectile, the force of acceleration causes each leaf of a sequential leaf mechanism to retract in turn. Retraction of the final leaf arms the timer. A sustained acceleration is required to actuate the XM 35 timer. This characteristic minimizes the possibility of timer arming from an impact to the projectile during handling.

(c) A fuze arming time is set on the timer prior to firing. This, along with the inherent minimum arming time, provides an assurance against a premature detonation early in the projectile trajectory.

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c. Projectile.

(1) An adequate degree of resistance to the disassembly has been incorporated into the design of the projectile and the warhead. An unauthorized nuclear detonation of the warhead requires that a knowledgeable person have an adequate power supply, an ability to bypass the firing set and sufficient time to accomplish the above.

(2) The tamping or reflecting effect of water cannot cause the nuclear material in the warhead to achieve criticality. Warhead components are sufficiently insensitive to electromagnetic radiation; it is unlikely that any of the required arming signals would be supplied by an electromagnetic field.

d. Delivery Systems. Certain clearly defined actions must take place in order to fire the projectile with the delivery systems. Three of these are mentioned below.

(1) Removal of the projectile from the locked storage and transport container. This action will be carefully controlled and may only take place in accordance with the provisions of the safety rules.

(2) Mating of the projectile to a launching piston. This action is permitted by the safety rules only in order to execute an actual nuclear fire mission, following receipt of properly authenticated authority to fire from an appropriate U. S. commander.

(3) Removal of safety pin from firing mechanism. Ignition of the propelling charges is achieved by means of a 75 foot transmission line of low energy detonating cord. The firing mechanism at the end of the cord cannot be fired until a safety pin is removed.

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SAFETY RULES TO BE OBSERVED DURING PEACETIME OPERATIONS WITH  
THE DAVY CROCKETT/MK 54 MOD 2 ATOMIC WEAPON SYSTEM (U)

1. (C) General.

a. (U) To fire or detonate the weapon by accidental, deliberate or inadvertent action, a series of sequential events is required. Deliberate action requires technical knowledge and familiarity with the projectile components and exclusive access to the projectile for a significant time period. The safety features inherent in the system, combined with the safety rules listed below, assure that the probability of a nuclear detonation prior to the desired time is extremely remote. The safety rules contained herein apply to all phases of operational readiness involving war reserve weapons, including exercises and logistic movements. These safety rules are designed to provide positive measures to:

- (1) Prevent weapons involved in accidents or incidents or jettisoned weapons from producing a nuclear yield.
- (2) Prevent deliberate arming, launching, firing or releasing except upon execution of an actual nuclear fire mission or when directed by competent authority.
- (3) Prevent inadvertent arming, launching, firing or releasing.
- (4) Insure adequate security.

b. (C) These rules are mandatory for use until a Defense Emergency or comparable state of readiness is declared for his command by a designated commander of a unified or specified command or higher authority.

EXCLUDED FROM AUTOMATIC REGRADING;  
DOD DIR 5200.10 DOES NOT APPLY

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~~SECRET~~2. (C) Safety Rules.

- a. (U) War reserve projectiles will not be removed from their locked storage and transport containers except for Department of the Army authorized maintenance, inspection, or modification.
- b. (U) Positive measures will be instituted for control of keys to padlocks on projectile storage and transport containers to assure that there is no unauthorized opening of the containers .
- c. (U) Positive measures will be instituted to insure that aviation jettison policy and procedures are in accordance with current service directives.
- d. (U) Aerial delivery and Army aviation lift is authorized only when tested and approved equipment and procedures are published and are complied with.
- e. (U) Minimum security clearance of ~~SECRET~~, to include a national agency check, will be required for all personnel with access to projectiles or warheads.
- f. (U) All personnel who will have access to projectiles or warheads will be carefully selected and continuously supervised by appropriately qualified personnel while in the vicinity of projectiles or warheads.
- g. (U) The minimum number of required personnel will have access to projectiles or warheads; however, a minimum of two authorized persons, each capable of detecting incorrect or unauthorized procedures

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with respect to the task being performed and familiar with pertinent safety and security requirements, will be present during any operations requiring access\* to the projectile or warhead.

h. (U) Projectiles or warheads being transported will be guarded continuously by at least two armed guards.

i. (U) Adequate physical security measures appropriate to the situation will be instituted during transportation and storage. In temporary locations, increased reliance will be placed upon use of armed guards in lieu of physical barriers.

j. (U) Prior to packaging a projectile in its container and immediately on unpackaging a projectile, the arm-safe switch and the XM 35 timer setting dial must be visually checked and verified by a second person to determine that they are in their safe position.

k. (C) Positive measures and controls will be established to insure that the arm-safe switch and the XM 35 timer setting dial are not set off their safe positions until required to execute an actual nuclear fire mission, following receipt of properly authenticated authority to fire from an appropriate U. S. commander.

\* Access is the opportunity to activate, alter or observe critical elements of a warhead or its associated equipment so as to cause then or later a nuclear incident, accident or unauthorized disclosure. In any specific case of determination of "access to the projectile or warhead", compliance with paragraphs 1a(1) through 1a(4) above, is required.

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1. (C) Positive measures and controls will be established to insure that the projectile is not mated to a launching piston until required to execute an actual nuclear fire mission, following receipt of properly authenticated authority to fire from an appropriate U. S. commander.

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## **APPENDIX C-5**

**Defense Technical Information Center (DTIC),  
Report entitled *Development of Light Battle  
Group Weapon System, M28, Davy Crockett*,  
AD351142, dated 1 March 1962,  
DTIC-011607-001.**

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**AD351142**

**DEVELOPMENT OF LIGHT BATTLE GROUP WEAPON SYSTEM, XM28,  
DAVY CROCKETT**

**PITTSBURGH UNIV PA**

**MAR 1962**

**Distribution authorized to U.S. Gov't. agencies and their  
contractors; Administrative/Operational Use; Mar 1962. Other  
requests shall be referred to Army Materiel Command, Alexandria,  
VA.**

DTIC - 011607-001

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TECHNICAL INFORMATION  
REPORT 1-6-1(1)

OFFICE, CHIEF OF ORDNANCE  
MARCH 1962

DEVELOPMENT  
OF

LIGHT BATTLE GROUP WEAPON SYSTEM, XM28,

\*This document contains information affecting the National Defense of the United States within the meaning of the Espionage Laws, Title 18, U. S. C., Sec. 793 and 794, the transmission or the revelation of its contents in any manner to an unauthorized person is prohibited by law.\*

(U) The XM28 light battle group weapon system is one of a series of two recoilless systems of different calibers and ranges for offensive and defensive operations. It will fire a low-yield atomic shell and will give close tactical support by rapid and accurate employment against targets of opportunity and in situations where the safety of friendly troops precludes the use of other atomic weapons. Emplaced on the ground or mounted on a jeep, the manually transportable XM28 system is employed in direct or indirect fire.

(C) Development of the XM28 and its heavier companion system, the XM29, each having the popular name of Davy Crockett, stemmed from a requirement of the Combat Development Objectives Guide, in which paragraphs 1137A(1) and 1137A(2) call for battle group weapon systems with maximum ranges of 2,000 and 4,000 meters. A feasibility study conducted in 1957 by Picatinny Arsenal indicated that the systems were practicable, and their development began in March 1958.

(U) It was originally proposed that each system would fire a piston-launched projectile from a full-caliber recoilless gun. Design studies and experimental firings early in 1958, however, led to the selection of a 120-mm recoilless gun for the short-range XM28, and a 155-mm gun for the long-range XM29, each system firing the same 279-mm projectile.

(U) The idea of a piston-launched shell is not new. In World War II such projectiles were successfully used as antitank shell by the Germans and for

RELATED TIRs

12-60	TIR CD-7	Infantry Weapons
3-62	TIR 1-6-2(1)	Heavy Battle Group Weapon System, XM28, Davy Crockett
9-60	TIR 9-1-2A1	Fire Control Equipment for XM28 and XM29 Battle Group Weapon Systems

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C. H. U.S. Army Weapons Command

## **APPENDIX C-6**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Department of the Army Field Manual  
*FM 23-20 Davy Crockett Weapons System in  
Infantry and Armor Units,*  
dated 18 December 1961, MVS-012307-001.**

FM 23-~~20~~<sup>20</sup>

DEPARTMENT OF THE ARMY FIELD MANUAL

Publication previously in another Agency

Source Classification assigned by MARS

**DAVY CROCKETT  
WEAPONS SYSTEM IN  
INFANTRY AND ARMOR  
UNITS**



HEADQUARTERS, DEPARTMENT OF THE ARMY  
DECEMBER 1961

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MVS-012307-001

## CHAPTER 1

### INTRODUCTION

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#### 1. Purpose and Scope

a. This manual furnishes guidance for commanders in the training and employment of the Davy Crockett section in infantry and armor units. It is applicable to all units receiving a Davy Crockett team (augmentation) under TOE 7-97T.

b. Throughout this manual the term *parent unit* will apply to the battle group in infantry units and the battalion or squadron in armor units. The term *company* will also apply to troop.

c. Organization and tactical employment of the Davy Crockett within the new division organizations (ROAD) are covered in the appropriate unit manuals.

d. Material contained herein applies to nuclear warfare only.

e. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to the Commandant, United States Army Infantry School, Fort Benning, Ga.

#### 2. Description

a. The Davy Crockett weapons system consists of two weapons, the XM28 (light weapon) (fig. 1) and the XM29 (heavy weapon) (fig. 2). Both weapons function in the same manner, use the same fire control equipment, and fire the same major caliber ammunition—the principal differences between the two are the size and weight of the barrel, the range of the weapon, and the manner of adjustment of fire on target. Fire adjustment with the XM28 (light weapon) is made by an attached 20-mm spotting rifle; and with the XM29 (heavy weapon), by using major caliber (279-mm) high explosive ammunition.

b. The light and heavy weapons are open-breech, recoilless, smooth bore, single shot, low-angle fire, muzzle-loaded weapons.

c. The light weapon consists of a 120-mm barrel with a 20-mm spotting rifle attached. It can be mounted on a tripod for ground use or by a special adaption kit on a  $\frac{1}{4}$ -ton truck. Two fixed propellants and two launching pistons, designed for use in this weapon only, are used to propel the major caliber projectile to the target. The light weapon has the capability of engaging targets at ranges up to 2,000 meters.

d. The heavy weapon consists of a 155-mm barrel mounted on a tripod for ground use. In the infantry battle group, armor battalion, or

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armored cavalry squadron it is stowed in the M113, full-tracked armored personnel carrier. When transported in this manner, it can be fired from the ground mount only. In the airborne battle group, the weapon is mounted by means of an adaption kit on a  $\frac{1}{4}$ -ton truck, and can be fired from the  $\frac{1}{4}$ -ton carrier or from the ground mount. A launching piston and one of two different type fixed propellants, all designed specifically for this weapon, are used to propel the major caliber projectile to the target. A "Zone I" propellant is used for ranges up to 1,900 meters, and a "Zone II" propellant is used from 1,700 to 4,000 meters.

e. The 20-mm spotting round (XM101) and the HE major caliber projectile (XM390) detonate on impact.

### 3. Technical Data

#### a. XM28 (Light Weapon).

Component	Weight (lbs)	Diameter	Length inches	Height inches
(1) Barrel, recoilless, XM63E1 w/bracket.....	73.5	120-mm	60 $\frac{7}{16}$	-----
(2) Rifle, spotting, XM69.....	7	20-mm	27 $\frac{1}{2}$	-----
(3) Mount, tripod, XM120.....	23	-----	49 $\frac{3}{8}$ (folded)	41 (assembled)
(4) Mount, vehicle.....	84	-----	25	17 $\frac{1}{4}$
(5) Sight unit (telescope XM107 and telescope mount XM117).....	5	-----	-----	-----
(6) Overall weight of the light weapon to include barrel, spotting rifle, tripod mount, and sight unit.....	108.5	-----	-----	-----
(7) Overall length of light weapon.....	-----	-----	60 $\frac{7}{16}$	-----
(8) Packboards (15 ins. wide).....	7	-----	-----	24
(9) Maximum range 2,000 meters				
(10) Launching piston drop pattern —150–600 meters.				
(11) Performance characteristics on mount XM120:				
(a) Elevation firing limits—0– 800 mils:				
1. Maximum elevation—875 mils				
2. Minimum elevation— 0 mils				
3. Per turn of elevation—8 mils (average).				
(b) Traverse limits from center position:				
1. Traverse screw right or left—40 mils				
2. Cross tube right or left— 160 mils				
3. Per turn of traverse— 3 mils (average)				

26 inches long, with a dovetail slot in one end and a hole for a clevis pin in the other end. The clevis pin end is attached to the cross tube, and the dovetail end attaches to the front leg. The strut assembly holds the front leg of the mount in firing position. The dovetail provides disassembly and assembly of the mount. To assemble the right and left strut assembly to the protruding dovetail on either side of the front leg, place the dovetail of the strut below the front leg dovetail and pull the strut assembly up. A spring-loaded plunger in the dovetail end of the strut assembly snaps into the plunger seat in the front leg dovetail and secures the strut assembly. Disassemble the strut assembly from the front leg by holding the leg and pulling up on the assembly. The plunger will pull back from its seat and the strut will slide up off the front leg dovetail.

*j. Strut Springs.* Two (spring-wire) strut springs are located on the right strut assembly. The strut spring holds the right and left strut in folded position against the cross tube. (Do not detach the struts from the cross tube.) To unfold struts, press down on the hook end of the spring while supporting the struts. To attach the spring, fold the struts, place the left strut in the hook opening, and press the loop of the hook against the left strut. When springs are not being used to hold the struts in the traveling position, they remain on the cross tube assembly.

## **8. Mount, Rifle, Spotting, 20-MM, XM69**

*a. General.* Mount, rifle, spotting (fig. 4), attaches spotting rifle XM69 to barrel XM63. It is designed to be compatible with the arrangement of the barrel and tripod mount, and is placed on the underside of barrel XM63 to minimize the effects of recoil. In this position, the XM101 spotting projectile clears the major caliber (279-mm) projectile by one inch. The mount houses a positive displacement device capable of movement in 1-mil increments for both azimuth and elevation for the spotting rifle. The mount system includes a bracket made of weldable titanium shrunk-fitted to barrel XM63. The rear of the bracket houses retaining hardware, and the front houses the adjustment device. The cross-leveling device for the sight unit is located on top of the bracket above the barrel, XM63.

*b. Insertion and Removal of the Spotting Rifle from the Mount.* This operation is accomplished from the rear of the bracket. Remove the quick-release pin (fig. 5) to allow ball sections on the rifle to clear spline seat. The quick-release pin is attached to left side of the 20-mm spotting rifle bracket by lanyard. This pin retains the spotting rifle in the bracket if it is released from its interrupted thread. Depressing the locking plunger (using quick-release pin) (fig. 6) in the ball section of the spotting rifle allows the rifle to be rotated 60° counterclockwise. When splined ball sections on the rifle are aligned with slots in the ball seat retainer, the rifle may be removed (fig. 7). Field stripping of XM69 can be accomplished while XM63 barrel is on the tripod mount. The XM69 spotting

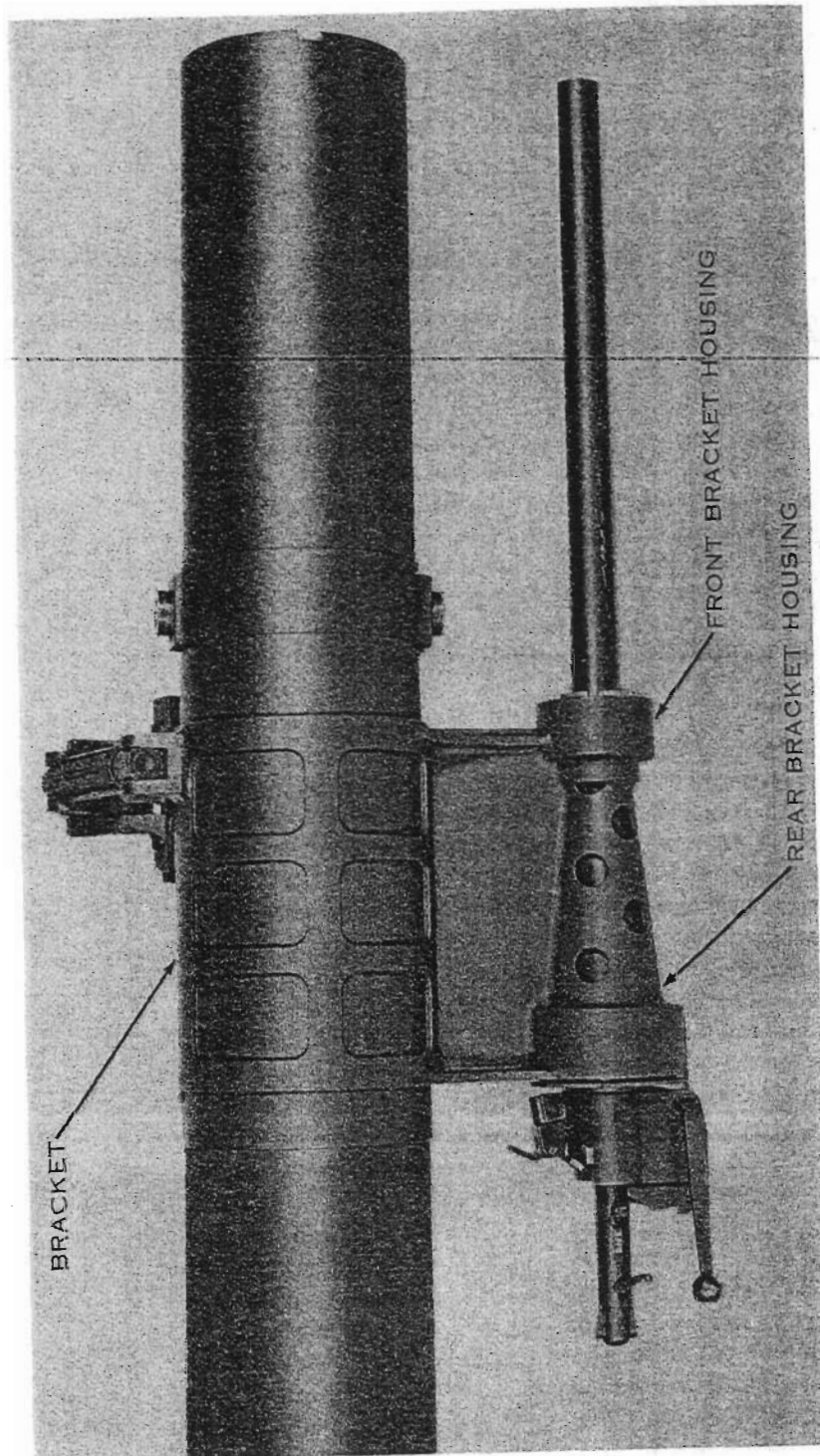


Figure 4. Mount, rifle, spotting, XM69.

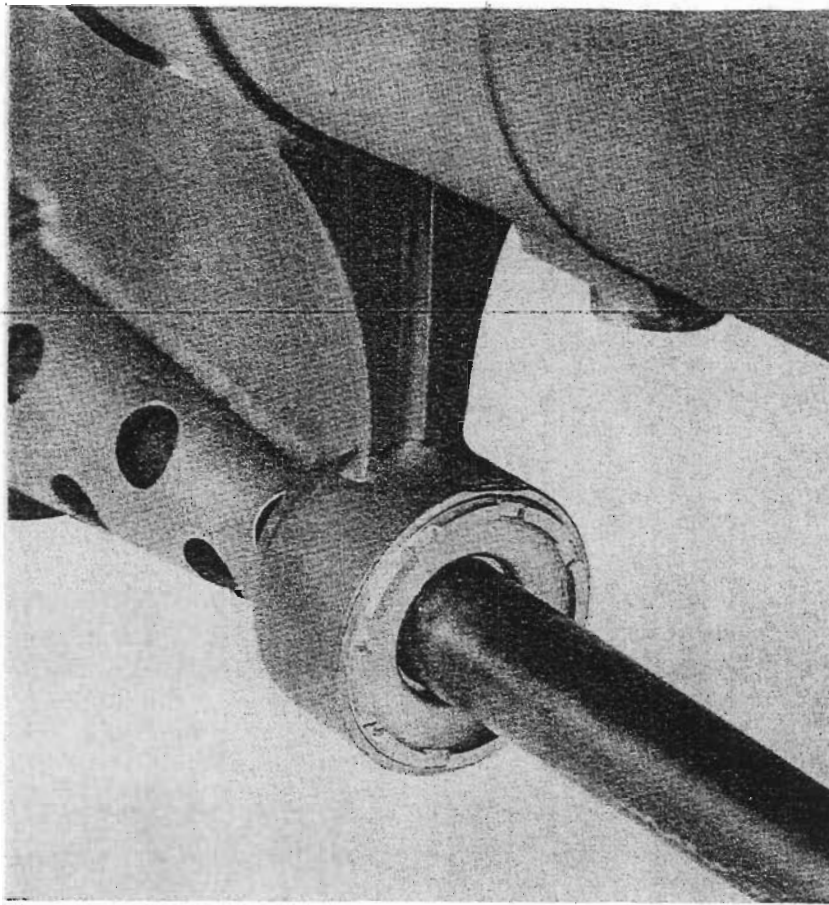


Figure 8. Front adjustment housing.

- (3) Mounting means are also provided on spotting rifle bracket for the sight unit.

## 9. Rifle, Spotting, XM69

a. *General.* The spotting rifle, XM69, is a single shot, manually operated, dropping breechblock weapon. It is designed as a range determining device for the XM28 light weapon system.

b. *Disassembly.* Spotting rifle is disassembled (field stripped) in the following manner:

- (1) Open breech to insure weapon is clear, close breech, turn safety to FIRE position, and depress trigger lock and trigger. Pull safety outward one-eighth of an inch and turn clockwise to the disassemble notch.

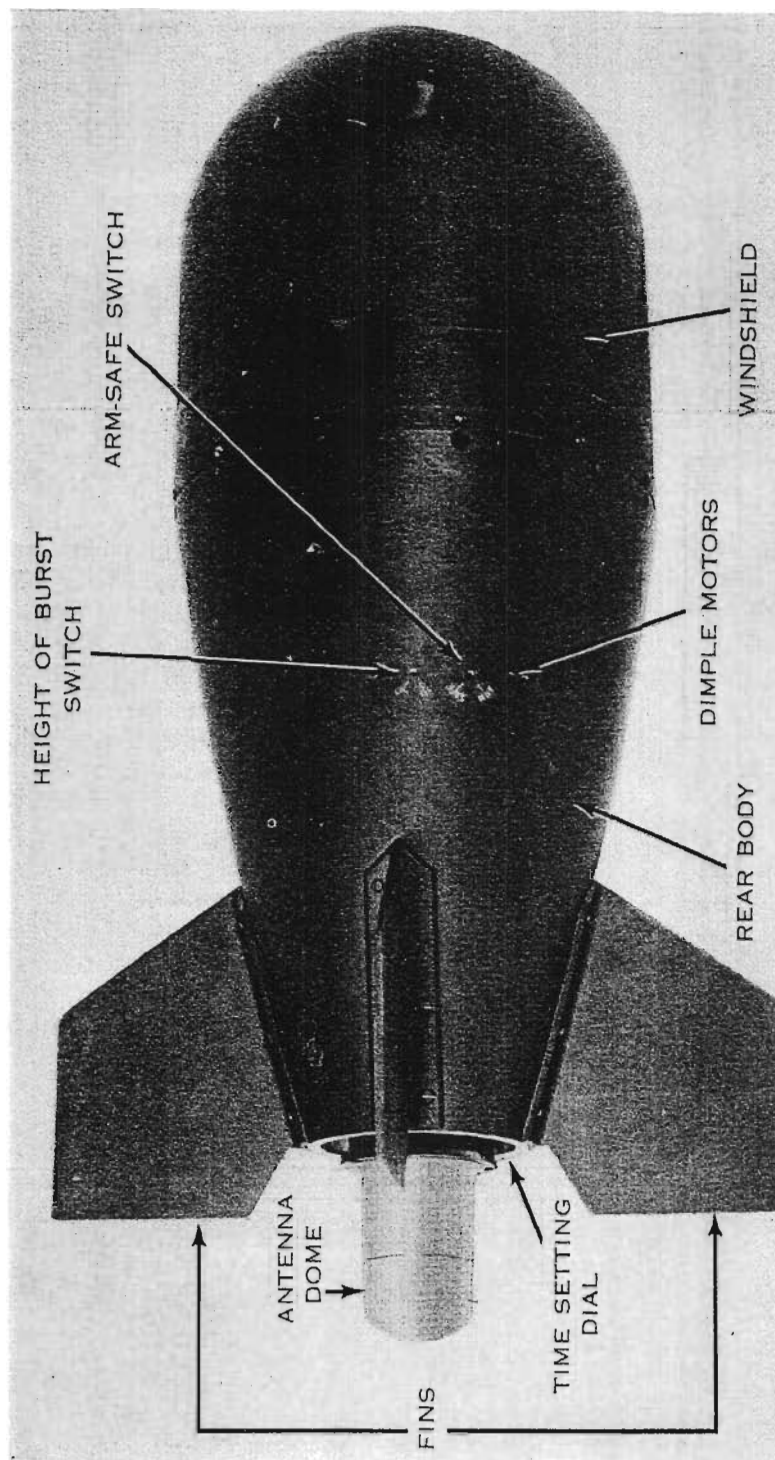


Figure 28. Projectile, atomic, supercaliber, 279-mm, dummy, XM421.

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Table I—Continued

Difficulty	Probable cause	Corrective action
<i>Tripod Mount XM120</i>		
1. Gimbal quick-release pins fail to remain locked.	Broken or maladjusted quick release plunger.	Notify ordnance maintenance.
2. Tripod legs do not telescope smoothly.	Legs dirty, gritty, or scored.	Clean. Remove scoring as necessary.
3. Rear tripod leg separated.	Housing seal unscrewed.	Assemble leg; screw on housing seal.
4. Elevating mechanism tube fails to slide through cross tube assembly.	Cross tube locking handle in improper position.	Place handle in proper position. If handle cannot be positioned properly, notify ordnance maintenance.
<i>Sight Unit, Instrument Light XM53, and Aiming Post Light M14</i>		
1. Lamp fails to light.	Lamp burned out.	Replace lamp.
	Batteries weak.	Replace batteries.
	Wiring defective.	Notify ordnance maintenance.
2. Cannot obtain proper focus of image and reticle.	Optical elements not properly positioned.	Notify ordnance maintenance.
	Outer surface of optical lens may be dirty, wet, or fogged.	Clean with optical tissue.
	Reticle may be dirty.	Notify ordnance maintenance.
3. Looseness between fitted parts.	May be worn.	Notify ordnance maintenance.
	Screws backed off.	Notify ordnance maintenance.
	Levers may not be set.	Set levers.
4. Movement of elevation and azimuth knobs is alternately tight and loose at each half revolution.	Worm shaft may be bent.	Notify ordnance maintenance.

## Section IV. AMMUNITION

### 23. General

a. Weapon systems XM28 and XM29 utilize projectile, atomic, supercaliber, 279-mm, XM388; projectile, atomic, supercaliber, 279-mm, practice, XM390; and projectile, atomic, supercaliber, 279-mm, dummy, XM421. The light system uses a subcaliber spotting rifle which fires the cartridge, spotting, 20-mm, XM101, for fire adjustment; and the heavy

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system utilizes projectile, atomic, supercaliber, 279-mm, practice, XM390, for fire adjustment pending development and issue of the 37-mm spotting rifle.

b. The light system employs the piston, launching, XM1 or XM5, to launch the 279-mm projectile, while the heavy system utilizes the piston, launching, XM2, for this purpose.

c. To launch the piston and projectile, the light system uses two fixed propellant charges, XM75 and XM92. The heavy system uses two fixed propellant charges, XM76 Zone I and XM77 Zone II, used for different ranges (zones), and they provide a ten percent overlap at midrange.

*Note.* Piston XM1 is used with charge XM75 only; piston XM5 is used with charge XM92 only.

## **24. Projectile, Atomic, Supercaliber, 279-MM, XM388**

a. *General.* Atomic projectile XM388 is a fin-stabilized, low-drag projectile which uses an atomic warhead. It is used with both the light and heavy weapons. The projectile has a windshield, a rear body, four fins, and a warhead. The rear body is aluminum and the fins and windshield are plastic. A time-setting dial is in the rear well of the body. A height-of-burst switch, an arm-safe switch, and two dimple motors are located on the exterior of the rear body. The two positions on the height-of-burst switch are marked HI for a medium height burst and LO for a near surface burst. The arm-safe device is a two position switch located near the height-of-burst switch, and is marked ARM and SAFE. The fuze will function only when the switch is turned to the ARM position.

b. *Body Section.* The body section with the windshield forms the outer casing and gives the ballistic shape to the projectile. The well in the rear of the body is for mounting the projectile on the launching piston. Two aluminum bayonet pins (shearpins) are 180° apart in the well, and are mated to the bayonet slots on the piston adapter to secure the projectile to the piston. The pins shear at separation of the projectile and the launching piston.

c. *Fins.* The fins are molded, reinforced resilient fiberglass. If bent or struck during normal handling, the fins spring back to original shape. Extreme bending or shock, however, can result in cracking or breaking the fins.

d. *Time-Setting Dial.* Fuze arming time is selected by the time-setting dial located in the rear body well (fig. 27). The dial is graduated in 1/2-second increments and numbered at each 5-second graduation from 0 to 50. The SAFE position of the timer dial is marked S. The dial is rotated clockwise down the scale to setting desired. If the desired setting is passed, continue rotating in a clockwise direction past S (safe), and down the scale to the correct setting. (Do not rotate dial in a counter-clockwise direction.) The dial is held in place by friction, and is usually set by hand, by pressing in and rotating clockwise. Two holes in the outer rim of the timer dial face permit insertion of the spanner wrench

which sets the dial when operator is wearing gloves or mittens. If the dial is set on a greater setting than required, the projectile will impact, causing a functional failure (DUD). The time-setting dial serves as an additional safety. *When the timer dial is set at the safe position (S), the fuze cannot become armed regardless of other conditions.* A minimum of 1 second must be set on the timer dial in order for the fuze to function.

*e. Dimple Motors.* Two dimple motors in recesses in the body of the projectile near the height-of-burst and arm-safe switches are connected to the power sources of the nuclear projectile (fig. 28). If the power supply becomes active, the dimple motors will be activated and protrude from their recesses in the projectile body. The two dimple motors protruding from their recesses indicate that power sources are unserviceable. The dimple motors are checked by visual inspection or by rubbing the hand over their recesses on the projectile body. If a dimple motor can be touched by the hand, it has been activated. When this condition exists, the projectile should be returned to the special ammunition supply point for replacement.

*f. Disarm Procedures.*

- (1) If the nuclear projectile is to be disarmed after prepared for firing, the procedure is—
  - (a) Reset arm-safe switch to SAFE.
  - (b) Reset height-of-burst switch to LO.
  - (c) Reset timer dial to S (safe position) by rotating clockwise.
  - (d) Remove projectile from weapon.
- (2) If the nuclear projectile impacts after firing without detonation, a functional failure has occurred. The procedure then is—
  - (a) Wait 30 minutes in a safe position before approaching the projectile.
  - (b) Follow procedure in (1)(a), (b), (c), and (d) above.

## **25. Projectile, Atomic, Supercaliber, 279-MM, Practice, XM390**

Projectile XM390 is primarily a spotting round for the XM388 projectile when used with heavy weapon XM29. It is also used for practice firing with both light and heavy weapons. In an emergency, when the atomic round has already been expended, a substituted XM390 projectile is effective against soft and medium targets. The projectile consists of windshield, rear body, four fins, and warhead. The rear body is aluminum and the fins and windshield are plastic. The warhead located within the windshield section, contains 16 pounds of composition B high explosive. The XM1117 fuze detonates the projectile. This fuze is an electromechanical impact fuze containing a pull wire for safe handling. A tool may be required to remove safety wire; once removed, the wire cannot be replaced, and the round is safe for ground transport. A thermal battery, which activates on launch, supplies energy to an electrical detonator which functions on impact. Electric switches within



the fuze permit it to function at almost any angle of impact. This projectile is designed to be an exact ballistic match with nuclear projectile XM388. For training, the XM390 may be issued with only a spotting charge.

**26. Projectile, Atomic, Supercaliber, 279-MM, Dummy, XM421**

(fig. 28)

This projectile duplicates the external characteristics of XM388 except color and markings. It is a solid two-piece castable material, duplicating the weight and center of gravity of the XM388. It also contains mock switches and a time-setting dial so actual prefire settings can be made during drill. This projectile is used for training only (NOT TO BE FIRED).

**27. Cartridge, Spotting, 20-MM, XM101**

*a. General.* The 20-mm XM101 cartridge (fig. 29) is a low velocity cartridge used to determine impact point for the 279-mm projectile fired from the light XM28 system. Upon impact, the XM101 projectile emits a puff of white smoke. This method of determining point of impact insures a high probability of a first round hit for the major caliber projectile.

*b. High-Low Ignition System.*

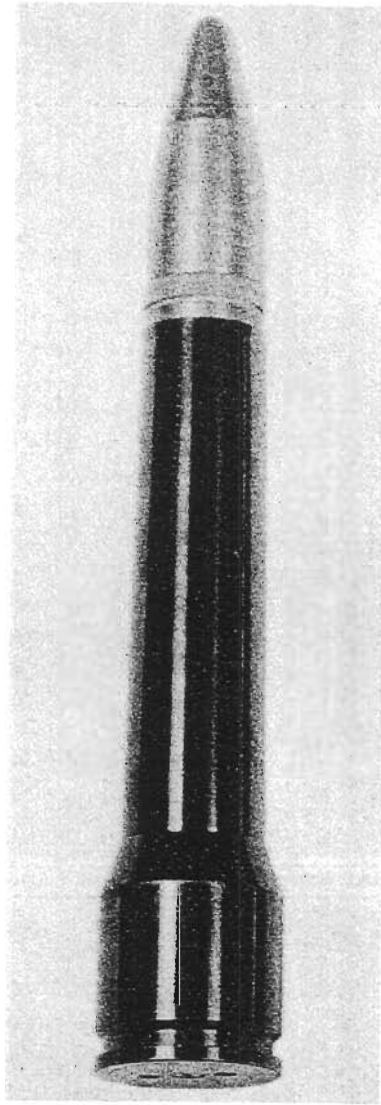
- (1) In order to achieve minimum velocity dispersion for XM101 spotting projectile, a unique type of high-low propellant ignition system is used in the cartridge case.
- (2) The high-low ignition system used in XM101 cartridge case contains a propellant charge which is ignited by primer action. The resulting closely confined gas pressure constitutes the high side of the system. Propellant gas is metered through a perforated disc and expands into the larger volume of the case. This constitutes the low side of the system. The low pressure side (15,000 psi) of the system acts on the projectile and provides energy to propel it down the rifle barrel.
- (3) Minimum velocity dispersion is achieved by complete burning of the propellant charge even under extremes of temperature.

*c. Projectile.* For ballistic purposes, the body of the 20-mm spotting projectile (fig. 30) is heavy material and has an aerodynamic shape. It is stabilized in flight by bore-size fins, and rifling in the barrel spin stabilizes the projectile during first stage of flight.

*d. Cartridge Components.*

- (1) Spotting cartridge, XM101, has the following components:
  - (a) Primer.
  - (b) Chamber.
  - (c) Propellant package.
  - (d) Propellant retainer.

- (e) Case body.
- (f) Projectile.
- (2) Projectile and its components—
  - (a) Tail.
  - (b) Body.
  - (c) Rotating band.
  - (d) Incendiary mix (120 grains).
  - (e) Fuze, XM538.



*Figure 29. Cartridge, spotting, 20-mm, XM101.*

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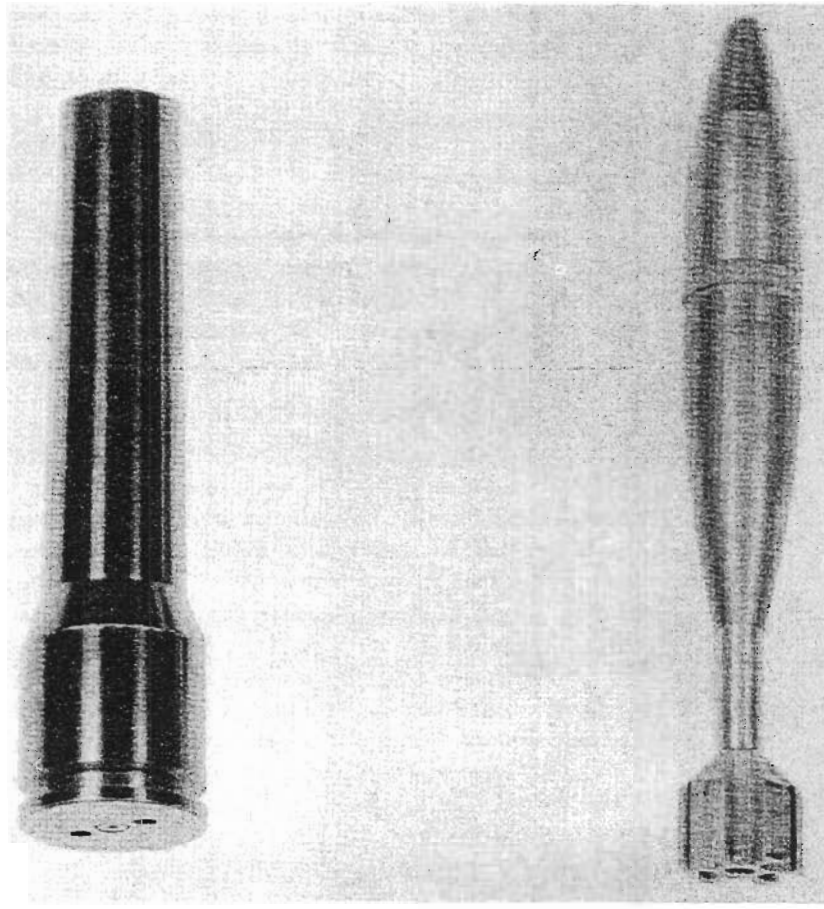


Figure 30. Projectile and case, cartridge, spotting, 20-mm, XM101.

## 28. Fuze, PD, XM538

a. *General.* Fuze, PD, XM538 (fig. 31) used in cartridge spotting, XM101, is electromechanical in design. It is supersensitive and detonates upon impact. The fuze is boresafe.

b. *Operation and Functioning.*

- (1) To prepare fuze for operation, the pull pin is extracted prior to loading. This permits the striker to be freed. The set-back forces, during firing, allow striker to initiate percussion primer in thermal power supply. Approximately 1 second is required for the power supply to become activated after initiation of percussion primer. This interval provides delayed arming of fuze for approximately 165 meters beyond muzzle of spotting rifle. After activation of thermal battery, the fuze is capable of functioning.

- (2) In event fuze fails to function after initiation of thermal power supply, the power supply is exhausted in approximately 30 seconds. This will render projectile inert.
- (3) Upon impact, one or more of four metal balls positioned 90° apart on a circular leaf spring and located between the leaf and the detonator, move forward due to deceleration of the projectile. Movement of the balls allows contact with the power supply, thereby completing the electrical circuit from power source to detonator and initiating a T44 detonator which ignites the pyromix in the body of the projectile.

c. *Pyrotechnic Display.* Upon impact, the XM101 projectile produces a display of smoke which varies from two to three meters in diameter and two to five meters in height. The display is visible for several seconds.

## 29. Piston, Launching, XM1

The launching piston (except the obturator) for use in the light weapon (figs. 32 and 33) is made of titanium. The obturator is made of copper and steel. The piston consists of five main components: adapter, main cylinder, cap end, strainer, and obturator. The adapter is smaller in diameter than the main body of the piston to permit insertion into the rear well of the projectile. It is open in the center and allows rear projection of major caliber projectile to recede into the piston. The adapter has two bayonet slots for firm bayonet-type connection with bayonet pins of projectile, and an indexing tab for positioning the piston in the barrel. The main cylinder's outside diameter is slightly less than 120-mm which prevents binding of the piston in the barrel. It is coated

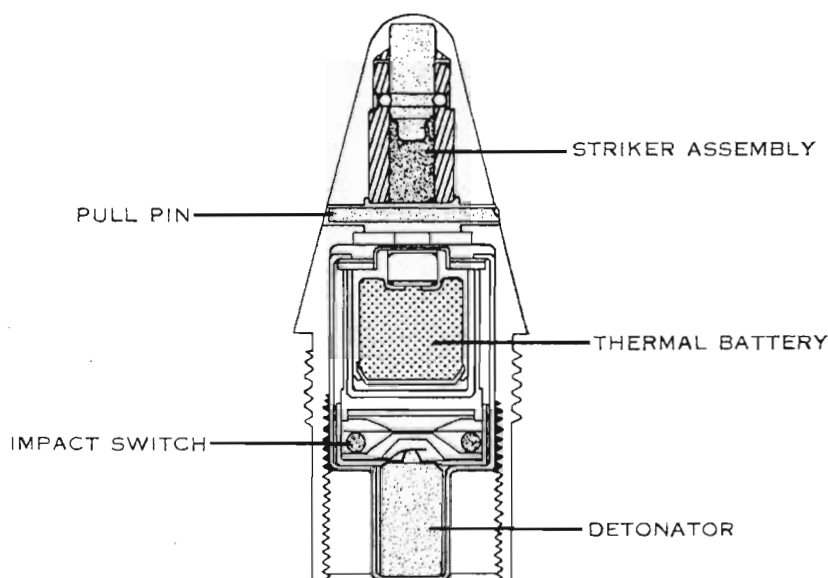


Figure 31. Fuze, PD, XM538.

with apoxy graphite to prevent scoring the barrel. The cap end forms the base of the piston and has a strainer through which propellant gases pass, enter the hollow cylinder, build up a pressure (800 psi), and eventually cause separation of launching piston and projectile in flight. Upon separation, the launching piston falls about 150 to 350 meters from the weapon. A strainer is threaded into the cap end opening to prevent pieces of burning propellant from entering the piston and damaging the plastic portion of the projectile base. The obturator is metal and is located on the outer circumference of the main cylinder wall near the base. It prevents escape of the propellant gases between walls of the barrel and the main cylinder body.

### 30. Piston, Launching, XM5

The XM5 piston is used in the light weapon. It is identical to the XM1 except for weight—12.3 pounds. The additional weight provides greater structural strength which permits this piston to be used *ONLY* with propellant charge XM92.

### 31. Piston, Launching, XM2

The launching piston for use in the heavy weapon (figs. 33 and 34) is 155-mm in diameter, and constructed of high strength aluminum except the cap end which is made of titanium. The launching piston, upon separation from the projectile, falls 150 to 700 meters from the weapon. Otherwise, it is similar to the XM1.

### 32. Piston, Launching, Dummy, XM3 and XM4

These are dummy launching pistons used for drill. Piston XM3 duplicates launching piston XM1 and XM5, used with the light weapon. Piston XM4 duplicates launching piston XM2, used with the heavy weapon.

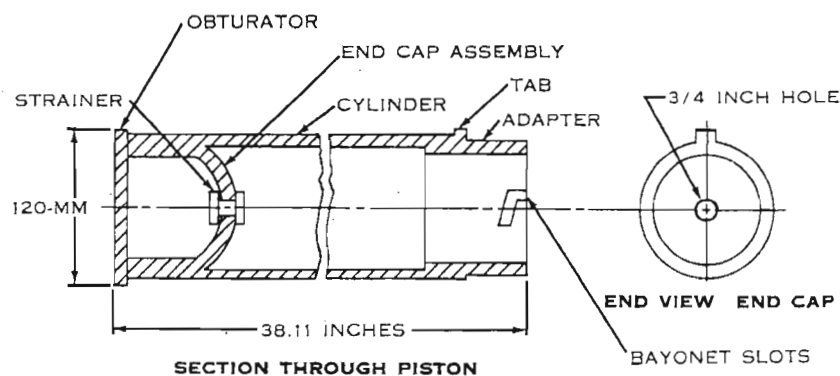


Figure 32. Piston, launching, XM1 or XM5.

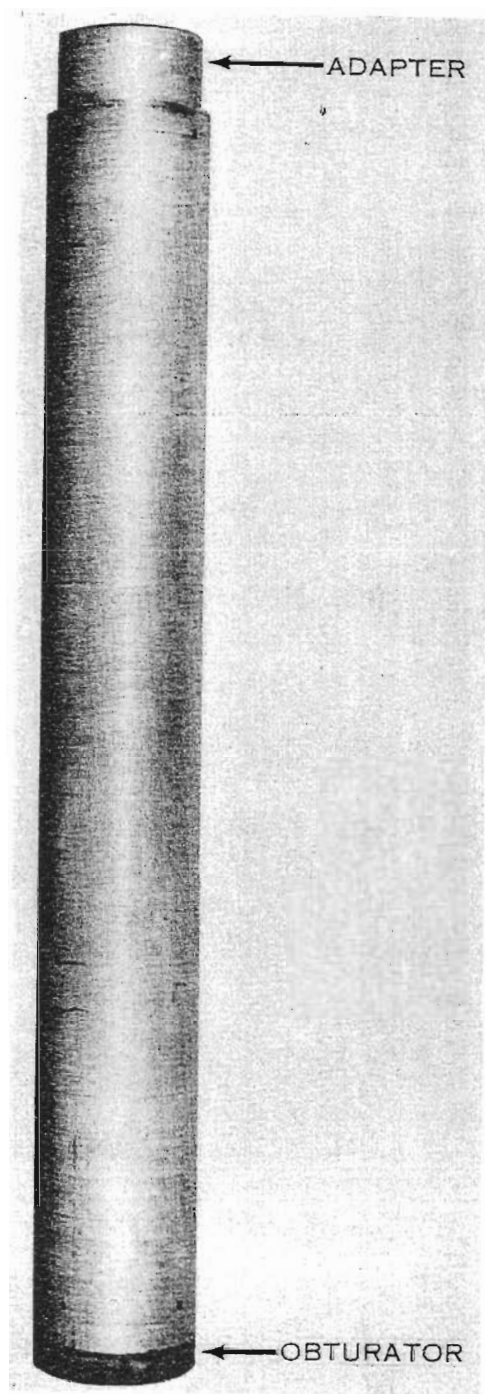


Figure 33. Piston, launching, XM1, XM2, or XM5.

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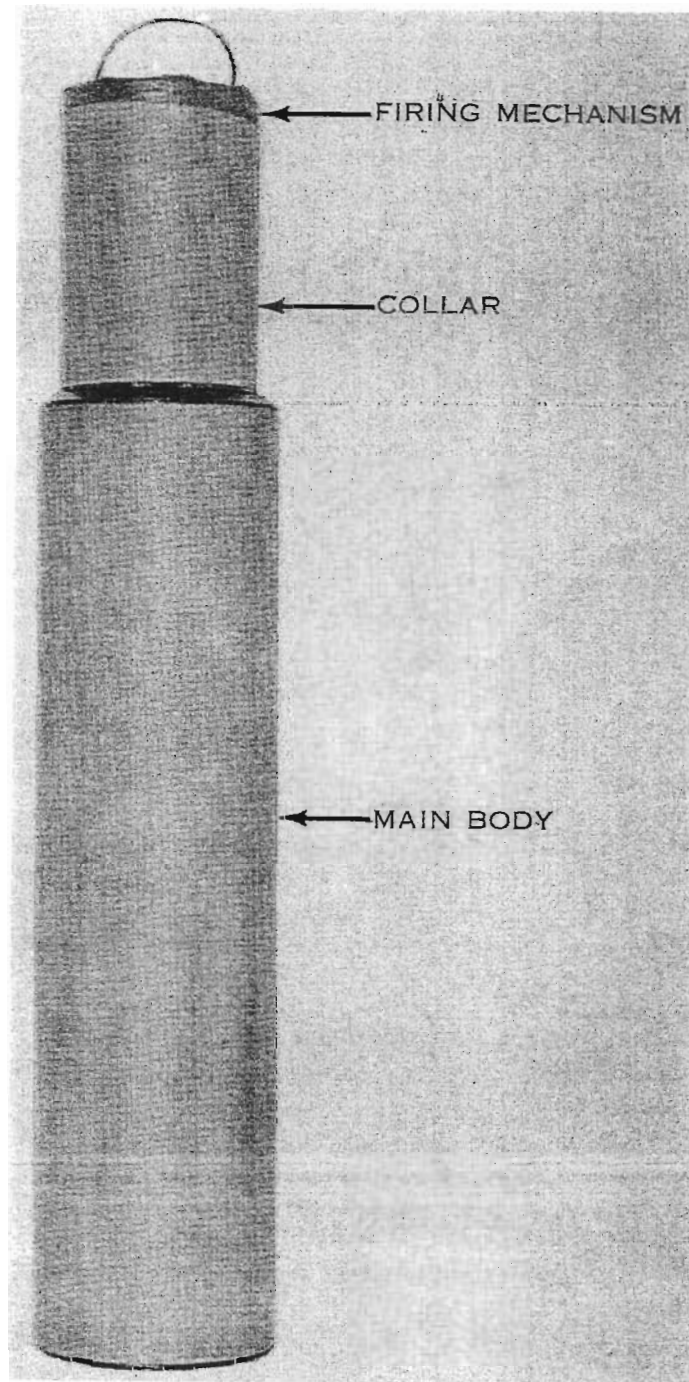


Figure 35. Propellant charges XM75, XM76, XM77, and XM92.

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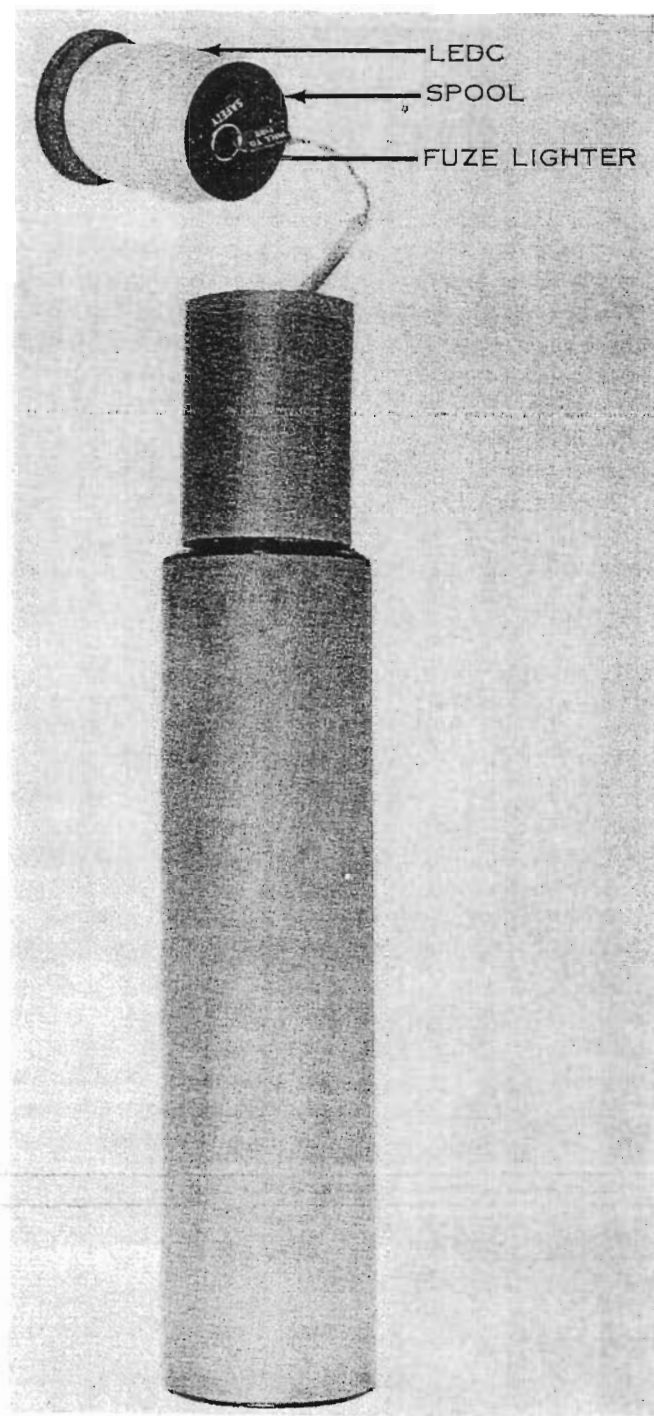


Figure 36. Firing mechanism.

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tainer. The sleeve may be attached to guide tube; if so, remove it.

- (2) *Repacking.* Place sleeve over guide tube, insert propellant cartridge into container, replace filler, replace container cover, and seal joint with pressure-sensitive tape.

f. *Cartridge, Spotting, 20-mm, XM101.* The 20-mm spotting cartridge is in a web pouch containing five rounds.

- (1) *Unpacking.* Unsnap pouch top and rip tape off plastic bag. Open fiberboard box containing five rounds, extract one round, remove cardboard cover from round.
- (2) *Repacking.* Replace protective cover on round, replace round in fiberboard box, close and snap pouch.

## Section VII. SAFETY

### 50. General

a. The procedures outlined below are minimum requirements for handling and storage operations of Davy Crockett ammunition. Local directives and standing operating procedures (SOP) of the area are required as a supplement. Standing operating procedures should include safety requirements, personnel and explosive limits, location and sequence of operations, equipment required for handling material and protection of personnel, and supervisory designation.

b. Individual responsibility for operations involving explosives must be clearly designated. Rigid observance of safety precautions, explicitly prohibiting troops tampering with projectiles and disassembling any component other than those authorized, must be enforced.

c. Personnel in operational or maintenance activities must observe the following safety precautions:

- (1) Explosives are sensitive to high temperatures and force of impact. Care must be exercised in handling projectiles and related components. Normal handling will not damage the items. Dropping, rolling, rough or other improper handling must be avoided. All handling equipment must be thoroughly inspected before use. To prevent displacement when vehicles are parked and unattended, wheels must be blocked and/or brakes set.
- (2) Do not smoke nor have open flame, matches, or other flame-producing devices within 20 meters of explosive sites.
- (3) Do not park vehicles within 35 meters of explosive sites.
- (4) Using units will not tamper with ammunition in any manner.
- (5) Do not expose ammunition to dampness or direct rays of sun for a period longer than is absolutely necessary.
- (6) If there is a fire, and if the projectile is not burning or engulfed in flames, attempt to remove projectile from fire. If this is not possible, extinguish the fire in the normal manner (from upwind

100 meters to the rear, the base of the triangle is 200 meters wide. The triangle is oriented 50° right and left of the line of fire.

c. The weapon should not be fired from confined spaces like dugouts or rooms. Structural damage to inclosures may occur and personnel may be injured from concussion or falling articles. Fire may result if weapons are fired inside a building.

d. Davy Crockett weapons require special type emplacements constructed to expose rear of gun with no obstruction behind nozzle. Most conventional type weapons emplacements are unsuitable (par. 129).

e. Personnel should protect their ears from concussion when weapon is fired.

f. All personnel must be located at least 22 meters to the flank of the weapon when the major caliber is fired.

g. The weapons are clear only when the major caliber is free of propellant and the breech of the spotting rifle is open. During all firing, safety personnel inspect weapons and announce CLEAR before other personnel are permitted behind or in front of weapons.

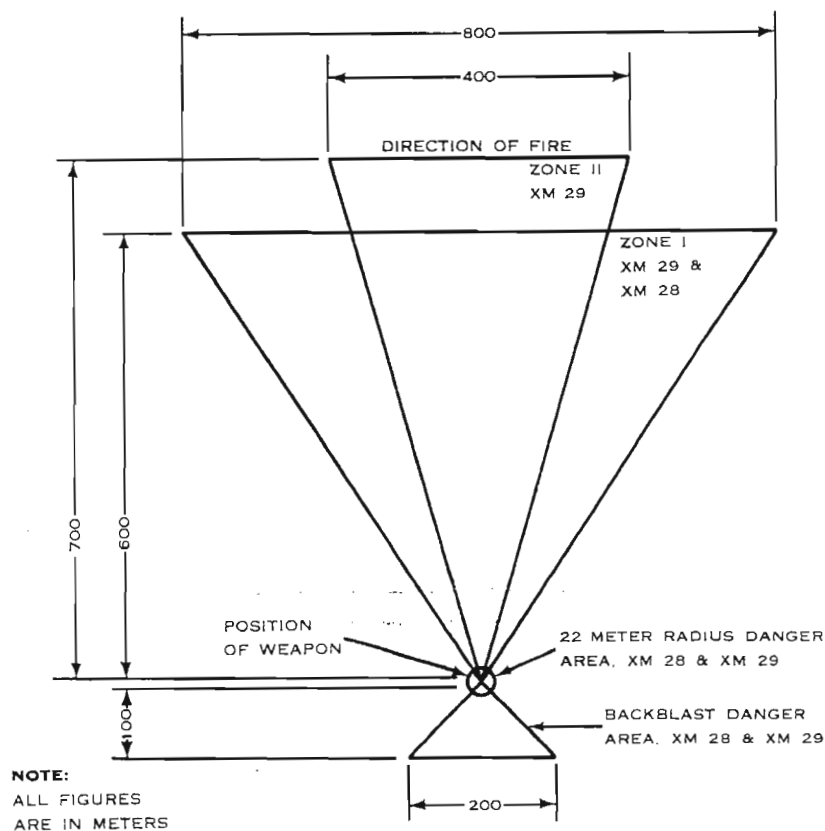


Figure 37. Backblast and launching piston danger areas.

- h. When the XM29 is fired from the 1/4-ton truck, the hood, windshield, and rearview mirror must be removed. The long axis of the weapon must be perpendicular to the long axis of the vehicle with the muzzle over the left side. From center, traverse is limited to 1,022 mils right and left.
- i. Firing overhead of troops is prohibited.
- j. Firing is limited to temperature between 0° and 105° F.
- k. Periodic inspection of weapons by ordnance personnel is required.
- l. The XM28 will not be fired from the 1/4-ton truck pending approval of the Chief of Ordnance.

## **52. Safety Checks Before and During Firing**

- a. The gunner makes certain—
  - (1) For both weapons—
    - (a) There is mask and overhead clearance.
    - (b) The barrel is securely attached to the mount.
    - (c) The sight is seated properly.
    - (d) The timer dial is set correctly.
    - (e) The HOB and arm-safe switches are set correctly.
    - (f) Danger area is free of personnel.
    - (g) LEDC is fully extended 22 meters from weapon and not permitted to overlap or double over itself.
    - (h) Firing mechanism is held behind body (away from face) when fired.
  - (2) For the light weapon: Elevation lock securely locks elevation tube in correct position.
  - (3) For heavy weapon—
    - (a) Latch of tripod legs is locked.
    - (b) Elevation screw is properly attached to barrel.
    - (c) Carriage is securely locked to mount.
    - (d) Elevation screw does not slip when downward pressure is applied near the muzzle.
    - (e) Nozzle is not over tripod leg.
- b. The assistant gunner makes certain—
  - (1) For both weapons—
    - (a) Barrel and chamber are free of foreign objects.
    - (b) Indexing tab is properly positioned in keyway slot.
    - (c) 279-mm projectile is locked to launching piston and firmly seated against the piston with no visible gap.
    - (d) The fin of 279-mm projectile does not mask muzzle of spotting rifle.
    - (e) The obturator rings separations are staggered in alinement (180° apart).
    - (f) Propellant containers are free of cracks or other damage.
    - (g) Dimple motors do not protrude from body of projectile.

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## CHAPTER 5

### CREW DRILL

#### Section I. PURPOSE, ORGANIZATION, AND DUTIES

##### 103. Purpose

a. Crew drill develops teamwork in putting the weapon into action with precision and speed. Precision is achieved by adherence to prescribed training procedures, and when this has been achieved, work is begun on speeding up the process.

b. Squad members should be rotated frequently during drill so each squad member may become proficient in the duties of other members.

c. Precision and teamwork must not be sacrificed for speed. (During crew drill, members move from one position to another at double time. Unless otherwise directed, perform initial training for precision at quick time.)

d. In general, the organization of squads, equipment carried by individuals, and duties performed by squad members are the same for both light and heavy weapons. Differences in organization, equipment, or procedure will be pointed out in succeeding paragraphs where appropriate.

e. To insure proficiency in operation and maintenance of squad communication equipment, the equipment is used frequently during drill.

f. Due to construction of the nuclear projectile, it is necessary to set timer dial before projectile is attached to launching piston. Once loaded, to change timer dial setting, projectile must be removed from weapon.

g. With the XM28 light weapon, to prevent disturbing the lay of the weapon after fire has been adjusted, the nuclear projectile is loaded before fire for adjustment is started.

##### 104. Organization

###### a. *Lightweight Weapons System XM28 (5-Man Squad).*

Squad member	Individual load	Equipment operated
Squad Leader ----	Binoculars, compass (M2), radio (AN/PRC-10), telephone (TA 312/PT), firing tables.	
Runner (No. 1) ----	Barrel (XM63) with spotting rifle (XM69), sight unit, compass (M2).	

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Squad member	Individual load	Equipment operated
Assistant Gunner (No. 2).	Tripod (XM120), propellant (XM72), launching piston (XM1), five rounds spotter cartridge (XM101), aiming posts (M1A1).	Weapon carrier.
Loader (No. 3)-----	Projectile, atomic, supercaliber, 279-mm (XM388).	Drives second squad vehicle, equipment CE-11, radio AN/PRC-10, and/or AN/VRC-10, aiming posts.
Computer (No. 4)---	Plotting board (M16), firing tables, map, radio AN/PRC-10.	Aiming circle (M2) radio AN/VRC-10 and/or AN/PRC-10.

*b. Heavy Weapons System XM29 (5-Man Squad).*

Squad Leader-----	Binoculars, compass (M2), radio AN/PRC-10, telephone (TA 312/PT), firing tables.	
Gunner (No. 1)-----	Compass (M2)-----	Sight unit.
Assistant Gunner (No. 2).		Weapon carrier (airborne squad), tripod (XM121).
Loader (No. 3)-----		M113 (second vehicle of airborne squad) radio AN/PRC-10 and/or AN/VRC-10, aiming posts (M1A1), equipment CE-11.
Computer (No. 4)---		Firing tables, plotting board (M16, map, radio (AN/PRC-10 and/or AN/VRC-10).

*c. Lightweight Weapons System XM28 (3-Man Squad).*

Squad Leader-----	Binoculars, compass (M2), firing tables.	Plotting board, map, firing records, aiming circle, radio, telephone.
Gunner (No. 1)-----	Compass (M2)-----	XM28 complete.
Assistant Gunner (No. 2).		Weapon carrier, ammunition, aiming posts.

*d. Heavy Weapons System XM29 (3-Man Squad).*

Squad Leader-----	Binoculars, compass (M2), firing tables.	Plotting board, map, firing records, aiming circle, radio, telephone.
Gunner (No. 1)-----	Compass (M2)-----	XM29 complete.
Assistant Gunner (No. 2).		Weapon carrier M113, (M38A1D in airborne battle group), ammunition, aiming posts.

## CHAPTER 6

### ORGANIZATIONAL AND TACTICAL EMPLOYMENT

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#### Section I. MISSION AND ORGANIZATION

##### 119. General

This chapter includes guidance on both the three-man section as prescribed in TOE 7-97T and an augmented section of fifteen men. Paragraphs 121 and 122 outline the organization and equipment for infantry and armor units for both type sections with a suggested method of utilization for the three-man section and its augmentation from parent unit sources. The bulk of this chapter is concerned with relatively detailed coverage of the 15-man section. The same broad basic considerations apply to employment of the three-man section; however, inadequacies of the three-man section in personnel and equipment will affect its ability to make a timely response to fire requests and to operate for extended periods in the field.

##### 120. Mission

The mission of the Davy Crockett section is to provide organic nuclear fire support for the parent unit.

##### 121. Organization and Communications, Infantry Units

###### *a. Three-Man Section.*

- (1) This organization in infantry units is assigned to the combat support company, infantry division battle group, and the mortar battery of the airborne division battle group. It has three squads, two armed with the light Davy Crockett (XM28) and one armed with the heavy Davy Crockett (XM29) (fig. 66). Each squad consists of one EM who is the team leader (squad leader). Each light weapon is mounted on a 1/4-ton truck which tows a 1/4-ton trailer. The heavy weapon is stowed in the M113 APC in infantry units and mounted on the 1/4-ton truck in airborne units. The airborne 1/4-ton truck pulls a 1/4-ton trailer. The senior squad leader is also the section leader.
- (2) Each light squad and the heavy airborne squad has a mounted AN/VRC-10 radio for communication. The heavy squad has an AN/VRC-15 radio mounted in the APC. A remote control group, AN/GRA-6, must be added from facilities within the battle group to allow

communication during actual firing posture of both type weapons.

- (3) Each squad must be augmented with four additional men for sustained operation, for dismounted operation of any duration, or when more than one weapon is employed. Men chosen for this augmentation should be trained in indirect fire procedures and techniques and cross-trained on Davy Crockett to fill squad positions as computer, gunner, assistant gunner, and loader.

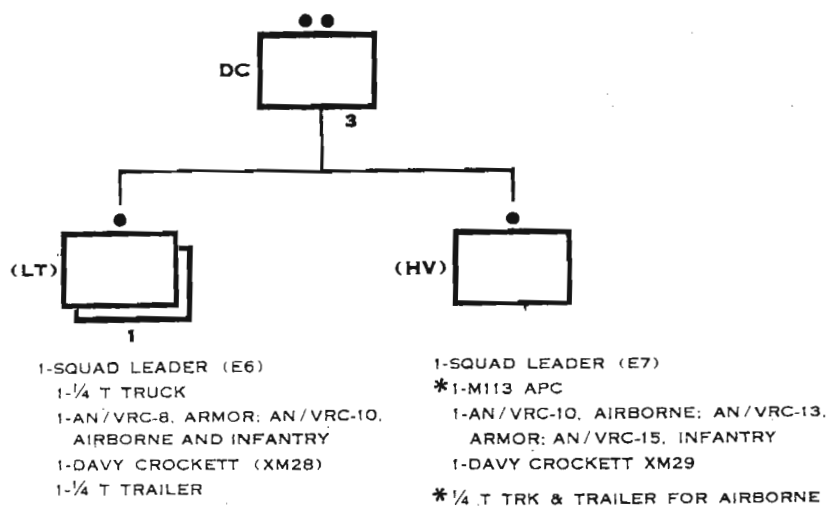


Figure 66. Davy Crockett section, TOE 7-97T.

- (4) Until augmented by additional squad members, vehicles, and communications, the three squad leaders give an immediate capability of firing one weapon by operating as a reduced crew on the heavy weapon and utilizing the APC for transportation. If this method is used, the 1/4-ton trucks and trailers of the light squads will be left with the battle group field trains or a higher echelon. Airborne sections may operate their heavy weapon and utilize one of the light weapon's 1/4-ton carriers as transportation only.
- (5) The battle group commander will cross-train selected battle group mortarmen to operate Davy Crockett. This includes those from the heavy mortar platoon, rifle company mortar sections, and the support squad of the reconnaissance platoon.
- (6) Augmentation personnel may come from units to which squads are attached, or from the nearest mortar unit when employed in general support.

- (7) The three-man section is considered capable of planning for and firing a single Davy Crockett round without augmentation. Both preplanned and target of opportunity fires can be fired if sufficient time is allowed for registration and preparation of data.
- (8) If augmentation must come from sources within the battle group, the personnel may be drawn from the units given in (5) and (6) above. Two additional vehicles to provide transportation for augmentation personnel for the two light squads will be taken from battle group units as directed by the battle group commander. AN/PRC-10 radios may be taken from the utility sets of the battle group. The addition of one AN/PRC-10 to each squad is considered sufficient for all operations except when the squad is employed in direct support or during dismounted and airborne operations when two will be required.

*b. Fifteen-Man Section.*

- (1) The section consists of three squads (fig. 67). Each squad contains a squad leader, fire direction computer, gunner, assistant gunner, and loader. The senior squad leader will be the section leader.
- (2) The primary armament of the section consists of two light Davy Crocketts (XM28) and one heavy Davy Crockett (XM29).
- (3) Transportation for the section consists of two 1/4-ton trucks and one 1/4-ton trailer for each light squad and an M113 armored personnel carrier for the heavy squad.
- (4) Figure 68 shows the radios of the section and a type radio net used by the section when employed in general support. Employed in direct support, the squads will additionally enter the command net of the supported unit. In attachment, the squads will enter the heavy mortar fire direction net and the command net of the unit to which it is attached.
- (5) Whenever the tactical situation permits, wire systems parallel the radio nets.

*c. Duties of Personnel.*

- (1) *Squad leader.* Responsible for the command, discipline, training, and tactical employment of his Davy Crockett squad. He is trained in forward observation procedures and may issue commands to the squad for direct fire missions. He is qualified to make recommendations to the supported unit on the employment of the Davy Crockett weapon.



- (4) Necessity of obtaining mask and backblast clearance.
- (5) Extremely limited portability.
- (6) The coordination, control, safety criteria, and warning necessary for nuclear fires.
- (7) Ammunition allocation and resupply.
- (8) Piston impact area.

#### **124. Fundamentals of Employment**

a. Davy Crockett supplements and enhances the fire support available to the parent unit commander.

b. In order to take maximum advantage of its range inclusive of required troop safety limits, Davy Crockett weapons must be employed well forward.

c. Davy Crockett fires should be observed unless specific information is received on location and type of target.

d. During active nuclear wartime conditions the allocation of DAVY CROCKETT nuclear ammunition with authority to expend will be retained by the parent unit (battalion/squadron/battle group) commander.

e. Davy Crockett weapons are normally fired using indirect fire methods.

f. Davy Crockett fires will be coordinated with other fire support elements to the extent permitted by the time available.

g. Decision to use Davy Crockett is based on normal considerations of the fire unit to be utilized, such as: size and type of target, availability of ammunition, effects desired, responsiveness to request, ranges of weapons involved, and proximity of friendly forces.

h. Fire planning is continuous.

i. Fire mission authentication systems, commander's safety criteria, and warning systems will be established by the commander concerned.

j. Davy Crockett units must be placed with or near other friendly units for security.

k. Ammunition in possession of a Davy Crockett squad will not be in excess of the squad's ability to transport it.

#### **125. Methods of Employment**

The Davy Crockett section or its individual squads may be employed in either general support or direct support roles. The parent unit commander decides which method best supports his scheme of maneuver. In determining the method of employment for the section or its squads, the parent unit commander considers aspects of the following: desirability and capability of centralized control and coordination of fires, and the desirability of increasing

tions are issued to the squad leaders in his section order. He then performs necessary coordination, insures that communications are established, and supervises the operations of his squads.

b. If the section is employed in direct support of one unit, the section leader performs the necessary coordination with the supported unit commander. When the squads are employed in direct support of different units, the squad leaders perform this coordination. In the case of a rifle company, the company commander normally utilizes his weapons platoon leader to coordinate Davy Crockett fires along with those of other organic fire support units.

c. The squad leader normally works closely with the individual who is responsible for coordinating the organic and supporting fire support units. The squad leader may utilize one of his radios to maintain contact with his squad when vehicles must be separated. He coordinates with the forward observer after receipt of the company order.

d. Squad leaders choose the exact location of their weapon in either of the above methods of employment. Every attempt is made to establish alternate means of communication. Emergency warning devices and pyrotechnics are kept on hand consistent with unit SOP. At each firing position, coordination for local security is made with the leader of the nearest friendly unit. When in general support, a reconsideration of security provisions must be made by the parent unit commander when proposed firing positions are not near a unit or when the unit furnishing security by its presence is redeployed.

e. For additional information on troop leading procedures, see FM's 7-10 and 17-1.

## **127. Targets, Types of Fire, and Fire Planning**

### *a. Targets.*

- (1) There are no specific rules for selection of remunerative Davy Crockett targets. Targets are considered in their relationship to the commander's plan, other fire support means available, size and type of target, effects desired, and availability of ammunition. Generally, targets which are vulnerable to the effects of the weapon and whose destruction or neutralization are critical to the commander's plan are selected.
- (2) Type targets.
  - (a) Massed personnel targets of platoon or larger size.
  - (b) Mortar, artillery, missile launching positions.
  - (c) Groups of vehicles.
  - (d) Command posts or logistical installations of battalion or larger size units.

(e) Fortified positions.

*b. Types of Fire.*

- (1) Davy Crockett squads are prepared to deliver scheduled fires, on-call fires, and fire on targets of opportunity.
- (2) In the defense, the squads participate in long-range fires, close-in defensive fires, and fires within the battle area.

*c. Fire Planning.*

- (1) The parent unit commander is responsible for the planning and coordination of Davy Crockett fires. Based on guidance of the commander, the section leader performs detailed fire planning for those squads employed in general support. Squad leaders perform fire planning for direct support squads.
- (2) The Davy Crockett fire plan is submitted in the form of an overlay and becomes a part of the parent unit fire support annex to the operation order. As a minimum, a target list is submitted to the commander for coordination with other fire support units.
- (3) Preplanned fires are coordinated by the FSC as directed by the parent unit commander.
- (4) Davy Crockett nuclear safety lines are established by the FSC consistent with the parent unit commander's safety criteria informally expressed in the SOP. A succession of nuclear safety lines is planned for offensive or retrograde operations. The nuclear safety line must be disseminated to all subunits of the parent unit.
- (5) Davy Crockett squads utilize the common numbering system for concentrations as prescribed in the unit SOP.
- (6) Fire planning is continuous. Fires are planned on likely avenues of approach, assembly areas, weapons positions, defiles, and obstacles.
- (7) Location of the position(s) of Davy Crockett weapons by a survey section will assist the squads in bringing surprise fire on a target.
- (8) For further information on fire planning, see FM's 6-20-2, 7-19, 7-40, and 17-1.

**128. Observation**

a. Fires delivered by Davy Crockett squads are observed whenever possible.

b. The forward observers of mortar platoons are normally utilized to observe Davy Crockett fires. If no mortar platoon forward observer is available, any commander, mortar or artillery observer may observe the fires provided they can establish communication with the squad delivering the fire. Aerial observers in communica-

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tion with a delivery squad can adjust the spotting rounds and the nuclear round can then be delivered after they have moved a safe distance or placed a mask between themselves and the target area.

### **129. Reconnaissance, Selection, and Occupation of Firing Positions**

a. The primary consideration in selection of firing positions is the capability of delivering accurate and timely fire for the supported unit.

b. Position disclosing features of the backblast and enemy counterfire location of the weapon by the distinctive trajectories of its piston and major caliber round will necessitate frequent shifting of position. In addition to the primary position, alternate and supplementary positions must habitually be reconnoitered and selected. If time permits, these positions, and the route between them, are prepared.

c. Desirable features of a good position include—

- (1) Mask and backblast clearance.
- (2) Defilade for weapon and crew. Preferably the reverse slope of a hill.
- (3) Concealment from ground and air observation.
- (4) Routes to rear and flanks for rapid shifting of position.
- (5) Free of materials contributing to the backblast cloud.
- (6) Near friendly units for security.
- (7) Hard standing nearby for vehicles. Desirably, the heavy squad APC is placed on the flank of the weapon to be used as a position for the crew during firing of the major caliber round and to furnish protection from artillery and mortar fires.
- (8) A piston impact area clear of friendly troops.

d. Squad leaders must be prepared to recommend position areas from which they can accomplish the desired fire support. Continuous reconnaissance is necessary to locate good positions. Squad leaders pick the exact location of the weapon within the area designated by the section leader or the supported unit commander. After informing the supported unit, the squad leader orders displacement to an alternate position whenever the primary position becomes untenable due to enemy fire.

e. Since Davy Crockett sites will be prime targets for enemy weapons, special precautions may be required. Positions may be occupied only long enough to adjust on targets and the weapon and crew then moved to a covered and concealed area until a fire mission is requested. In open terrain, the primary position may be selected but not immediately occupied if enemy air is active. Fire data is prepared as completely as possible without registration.

Unless required by restrictive terrain, the squads do not occupy positions in close proximity to each other to preclude counter-battery fires from destroying more than one squad.

f. In areas where terrain restricts movement and the weapon must remain in one position for an extended period, it may be necessary to construct a protective wall on each side of the weapon and dig emplacements for the ammunition and crew. An alternate solution is to dig emplacements for the disassembled weapon and its ammunition near the foxholes of the crew members.

### **130. Security**

a. *Local Security.* Positions are chosen which enhance local security by proximity to other friendly troops. Commanders of nearby friendly units should be notified of the weapon position and its provisions for security. Field expedient warning devices and trip flares are used to assist security personnel, particularly during hours of darkness.

b. *Ammunition Security.* Peacetime security provisions for the XM388 warhead are contained in (SRD) DA Letter AGAM-P (M) 471.6 (1 Nov 61) DCSOPS, Safety Rules for Peacetime Operations With the Davy Crockett/MK54 Mod 2 Atomic Weapons System (U), dated 1 November 1961 and in (CRD) TM 9-1000-209-12, Operator and Organizational Maintenance Manual (prefire procedure): Battle Group Lightweight Weapon System XM28 (portable and vehicle-mounted) and Battle Group Heavy Weapon System XM29 (vehicle-mounted) (U).

### **131. Ammunition Supply**

a. The Davy Crockett section is dependent on other elements for its ammunition supply. The parent unit commander is responsible for resupply of the squads.

b. The special ammunition load (SAL) for Davy Crockett rounds will be established by higher headquarters for each operation. The SAL specifies the number of nuclear rounds authorized to be carried by the unit and is based on the tactical situation and allocations made available to the parent unit commander. Replenishment of the SAL is not made on an automatic basis as is normal with nonnuclear ammunition; but is a command decision.

c. Ammunition personnel of the parent unit draw the XM388 nuclear projectiles from the nearest ordnance special ammunition supply point (SASP). These projectiles are kept on vehicles at the parent unit ADP or at the ADP of the mortar platoon if such a platoon is organic to the parent unit. From the ADP, unit distribution is effected as directed by the parent unit commander. See paragraph 124k.

d. Spotter rounds, pistons, and propellants are drawn through normal ammunition channels and distributed with the nuclear round.

e. The use of helicopters expedite resupply over long distances or difficult terrain.

### **132. Movement by Air**

a. All components of the Davy Crockett weapon and its ammunition are transportable by Army aircraft.

b. This air transportability provides the commander with readily available nuclear firepower during airmobile operations. Arrangements for transportation within the objective area must be made, however, since the weapon is portable for very short distances only.

## **Section III. DEFENSE AND RETROGRADE**

### **133. General**

Defensive employment of the Davy Crockett section is characterized by careful and continuous fire planning. Proper utilization by the commander in conjunction with other fire support means and prompt reaction to fire requests by the squads will contribute materially to any defense.

### **134. Preparation and Planning for Defense**

a. *General.* In determining the best method of employment for Davy Crockett units in defense, the commander must first consider them in relation to the fundamentals of defense (see FM's 7-40 and 17-1). Those fundamentals having the greatest influence on his decision as to method of employment are proper utilization of terrain (avenue of approach) and the coordinated fire plan. Of the considerations included in paragraph 125, the major considerations should be the responsiveness of the squad to fire requests and its ability to deliver fires on the most dangerous avenues of approach into the zone of the parent unit as determined in the commander's estimate.

b. *Use with Security Forces.*

- (1) Davy Crockett provides the COP with an excellent weapon to assist in the performance of its mission.
- (2) The weapons should be positioned well forward to provide long-range fires. However, the terrain, the ability of the COP commander to cause the enemy to mass and present a profitable target, and the minimum range must be considered in positioning the weapon. The commander may have to temporarily withdraw his force prior to

using Davy Crockett in order to maintain the required safety distance.

- (3) Prior to movement to the COPL, the squads must know the position they are to occupy upon return to the FEBA. If time permits, initial fire planning and computation of fire data are started for this position. Routes forward to the COPL and for the return are planned, coordinated with commanders concerned, and prepared whenever possible.
- (4) Squad leaders must be prepared to advise the COP commander on the best use of their weapon. The COP commander must insure adequate communications with the squad and keep the squad leader informed of the situation.
- (5) Those commanders receiving support by Davy Crockett units should also receive an FO.

*c. Preparation for the Defense.*

- (1) Squads receive an initial load of nuclear ammunition for the operation as prescribed by the parent unit commander. Consistent with local security requirements, those rounds for immediate utilization should be removed from their containers and inspected. Nonnuclear components are carefully inspected and stored. Squad equipment and vehicle should be checked and maintenance performed prior to initiation of action.
- (2) Firing positions are selected which will take advantage of the relatively limited range. Normally, these will be in the forward company sectors regardless of the type of command control. When employed in direct support, the squads will be located in the sector of the supported unit.
- (3) Section and squad leaders perform necessary troop-leading steps. The section leader assumes the major portion of coordination and reconnaissance requirements whenever possible. Communication is established as soon as possible.
- (4) Survey data is particularly valuable when fires must be delivered on unobserved targets.

*d. Fire Planning.*

- (1) Fire planning is continuous and as detailed as time will permit.
- (2) Target lists and fire capabilities charts are kept current. Fire data should be prepared for the primary position and as many alternate positions as possible.
- (3) Concentrations are planned and registered on likely avenues of enemy approach, probable assembly areas, and

## **APPENDIX C-7**

**Lake City Army Ammunition Plant,  
Independence, Missouri (LC), Ammunition Data  
Card for Ctg, 20mm TP M106, dated 10 April  
1963, Records Holding Area QA Files,  
Accession A-148, Box 1409-08, LC-031507-001.**



ASSEMBLY PLANT OR DISTRICT		RLC 888 (REV. 7/26/60)		ORDNANCE CORPS		NET QUANTITY		LOT NUMBER	
Lake City Ordnance Plant		AMMUNITION DATA CARD		PACKING OF LOT		Bulk Pack		LC Special-7	
ITEM	CTG. 20MM, TP, XM106	CONTRACT OR ORDER NO.	DAWING AND REVISION	DATE	DATE	DATE	DATE	DATE	DATE
CONTRACTOR	Remington Arms Co., Inc.	0033, 218, 01 FY63	DX7259039 A1-26-62	DATE STARTED	4-19-63	DATE COMPLETED	4-19-63	DATE INSPECTED	4-19-63
CHARGE WEIGHT	41 Grains	EXPECTED MUZZLE VELOCITY	EXPECTED PRESSURE	DATE SENT		LINE	65	ZONE WT. SHELL	
NO. OF BALLISTIC SAMPLES	22 LCOP	SENT TO	DAWING AND REVISION	DATE	DATE	DATE	DATE	DATE	DATE
		DAWING AND REVISION	DATE	DATE	DATE	DATE	DATE	DATE	DATE
C O M P O N E N T S									
COMPONENT	DRAWING NO.	MODEL	MANUFACTURER	DATE MFG.	LOT NO.	QUANTITY			
Case Assembly	D7259062	M101	Lake City Ordnance Plant	1963	LC 1-169	135			
Projectile Assembly	DX7258929 Rev. A 1-26-62	XM106	Lake City Ordnance Plant	1963	LC Special-7	135			
TP Nose Assembly	DX7259035 Rev. B 1-26-62	XM106	Lake City Ordnance Plant	1963	LC Special-7	135			

DESCRIPTION: Finally Accepted

INSPECTOR'S SIGNATURE AND TYPED NAME: C. F. Chedotte

REMARKS: (CONTINUED ON BACK IF NECESSARY)

LC-031507-001

REMARKS: (Symbol: \*Changes in Process; \*\*Deviations from Draw. or Spec.; \*\*\*Unusual Occurrences or Difficulties)  
Letter of instructions from Lt Col, Bruce Pierce to Mr. Sparre, dtd 5 Mar 63.

## **APPENDIX C-8**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Army Regulation AR 385-63 *Safety  
Regulations for Firing Ammunition for Training,  
Target Practice, and Combat*, with change 1  
dated 17 June 1968, MVS-012307-002.**

*Superseded by AR 385-63*

*(28 Feb 73)*

ARMY REGULATION

AR 385-63

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SAFETY

# REGULATIONS FOR FIRING AMMUNITION FOR TRAINING, TARGET PRACTICE, AND COMBAT

QUARTERMASTER SCHOOL  
U.S. ARMY  
FORT MONMOUTH, N.J.



*MVS-012307-002*

HEADQUARTERS, DEPARTMENT OF THE ARMY

JUNE 1968

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AR 385-63  
C 1

CHANGE

No. 1

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 4 November 1968

### SAFETY

## REGULATIONS FOR FIRING AMMUNITION FOR TRAINING, TARGET PRACTICE, AND COMBAT

AR 385-63, 17 June 1968, is changed as follows:

1. Make the following changes:

- a. Page 3-2, paragraph 3-2h(1). Change "HAVP-T" to "HVAP-T."
- b. Page 4-1, paragraph 4-1c. In line 1, add "not" between "will" and "be."
- c. Page 9-1, paragraph 9-1e, line 2. Delete "66 mm. and."
- d. Page 13-2, paragraph 13-2d. In line 6, change "(257 mils)" to read "(267 mils)."
- e. Page 15-2, paragraph 15-2n. In lines 3 and 4, delete "disconnect electrical connectors from the launcher."

2. File this change sheet in front of the publication for reference purposes.

The proponent agency of this regulation is the U.S. Army Materiel Command. Users are invited to send comments and suggested improvements to Commanding General, U.S. Army Materiel Command, ATTN: AMCAD-SN, Washington, D.C. 20315.

By order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM  
Major General, United States Army,  
The Adjutant General.

W. C. WESTMORELAND,  
General, United States Army,  
Chief of Staff.

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TAGO 518A—November 340-469\*—68

U. S. GOVERNMENT PRINTING OFFICE: 1968

\*AR 385-63

ARMY REGULATION

No. 385-63

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 17 June 1968

**SAFETY  
REGULATIONS FOR FIRING AMMUNITION FOR  
TRAINING, TARGET PRACTICE, AND COMBAT**

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\*This regulation supersedes AR 385-63, 5 December 1955, including all changes.

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## CHAPTER 11

### RECOILLESS WEAPONS

11-1. Recoilless weapons. *a.* Personnel will never stand or permit any portion of the body to be directly behind the rifle with ammunition in the chamber when opening or closing the breechblock.

*b.* For the 57mm rifle, the rear danger area due to blast and flying particles is defined as a triangle with apex at the breech, altitude an extension of the line of the axis of the bore 15 meters rearward, and with a 30 meter base, 15 meters on either side of the bore axis extension.

*c.* For the 75mm, 90mm, and 106mm rifles, the rear danger area due to blast and flying particles is defined as a triangle with apex at the breech, altitude an extension of the line of the axis of the bore 25 meters rearward, and with a 50 meter base, 25 meters on either side of the bore axis extension.

*d.* Such weapons will not be fired from within buildings or within 50 meters of a vertical or nearly vertical backstop.

*e.* All loose material including expended cartridge cases will be removed from area F.

*f.* The surface danger area when firing is conducted against fixed terrestrial targets (see figs. 11-1 and 11-2 consists of the impact area, areas A and B, and a rear danger area F. Values are given in table 11-1.

*g.* Recoilless weapons will not be fired over the heads of unprotected troops, except as stated in paragraph 18-2a(4).

11-2. Davy Crockett (M28 and M29). *a.* The surface danger zone (fig. 11-3) is applicable to both weapon systems using the M390 Series Practice, HE, projectile.

*b.* Overhead firing will not be permitted with this weapon.

*c.* Range to target is shown as distance X.

*d.* Area C, immediately forward of the firing position, is provided for the impact of the launching piston, and minimum range to target. The minimum lateral dimension of this area is 400 meters on either side of the line of fire.

*e.* The lateral width of 22 meters from the weapon, corresponding to the maximum length of the low explosive detonating cord (LEDC), will provide safety for the gun crew from blast of the recoilless weapon.

*f.* When range to target is more than 2100 meters, arcs AB and CD will be laid out as shown in figure 11-3. When range to target is less than 2100 meters, arc CD is not used; and points E and F will be directly connected to the full arc width of AB.

*g.* In firing at target within 900 meters of the firing point the gun crew will be located inside an M113 armored personnel carrier or equivalent protection. All other personnel will remain a minimum distance of 600 meters to the right, left and rear of the weapon.

*h.* Area F has a base of 200 meters and a height of 100 meters.

Table 11-1. Recoilless Rifle (See figs. 11-1 and 11-2)

Caliber	Dimensions of areas in meters					
	A	B	C <sup>1</sup>	X	Range 15°	F Height Base
57mm	250	300	250	4500	3200	15 30
75mm	300	350	300	6600	4300	25 50
90mm	300	350	300	2200	1500	25 50
106mm	300	350	300	6900	4800	25 50

<sup>1</sup> May be reduced 75 percent for short limit of target when firing nonexplosive projectile from unprotected positions or live projectile from protected positions.



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SURFACE DANGER ZONE

17 June 1968

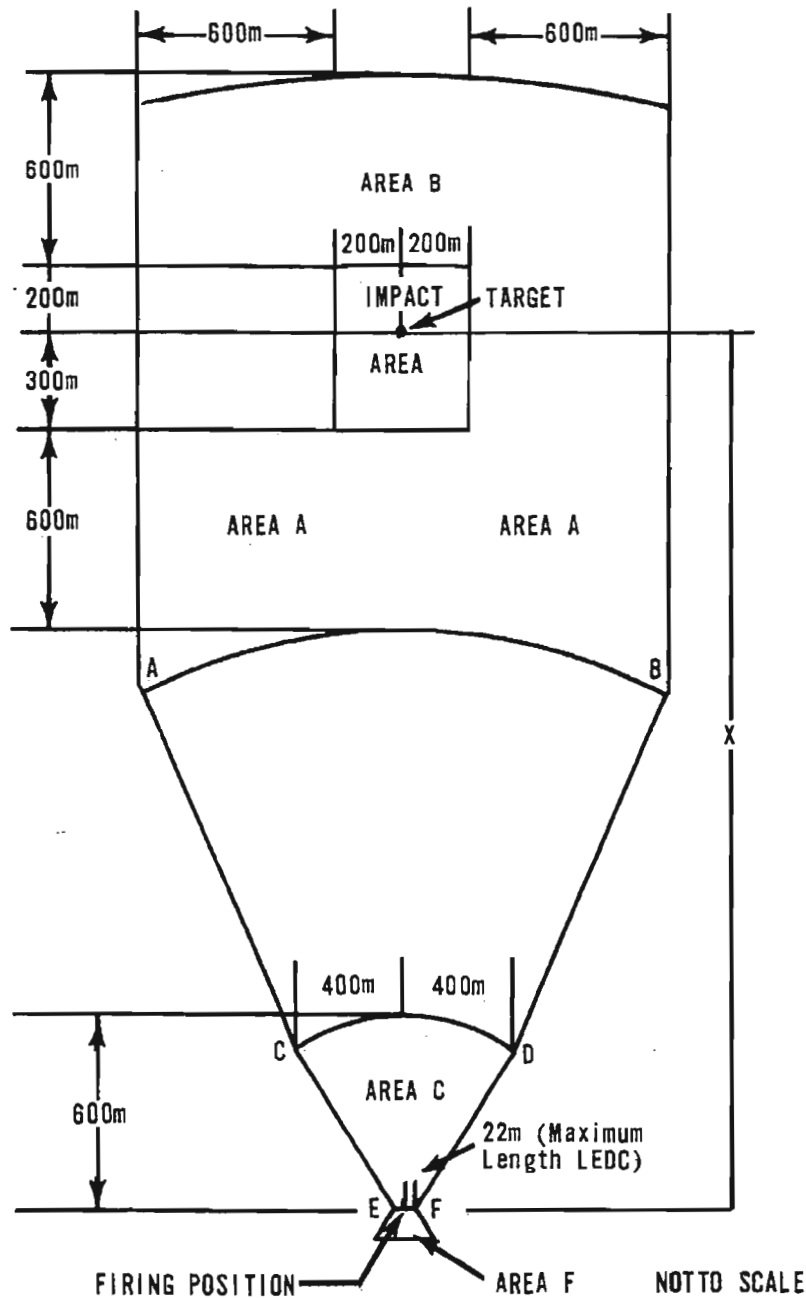


Figure 11-3. For M28 and M29 systems (Davy Crockett).

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## **APPENDIX C-9**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Headquarters Department of the Army  
Regulation AR 210-21 entitled *Installations  
Training Areas and Facilities for Ground Troops*,  
dated 18 December 1961, Ordnance and  
Technical Services Historic Manuals Library,  
MVS-031907-002.**

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No. 210-21

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HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 18 December 1964

## INSTALLATIONS

### TRAINING AREAS AND FACILITIES FOR GROUND TROOPS

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#### Section I. GENERAL LAYOUT AND CONSTRUCTION

1. **General.** This regulation outlines procedures for establishing the locations of training areas and facilities in relation to other land-use areas at command installations, and for proceeding with cost estimates, detailed plans, and construction of such training facilities. Instructions for investigating sites suitable for new installations are contained in AR 210-30. Airspace responsibilities and procedures affecting firing ranges and airfields are described in AR 95-50. Requirements for the preparation and submission of master plans and mobilization plans are described in AR 210-20 and AR 210-22. Requirements for preparation and submission of installation construction programs are contained in AR 415-15.

2. **General layout of site.** Master planning and/or mobilization planning procedures, as appropriate, will be followed in developing the general layout of any new or existing installation authorized for planning. Through these procedures the best functional arrangement of cantonment, training areas and facilities, tactical

maneuver areas, Army airfield, access and circulation roads, and any special facilities will be developed.

3. **Responsibility for development.** a. The Commanding General, United States Continental Army Command (CG, USCONARC) is responsible for the development of general specifications for new types of training areas and facilities. These will be furnished to the Chief of Engineers, Department of the Army, Washington, D.C., 20315, and will be the basis for the preparation of layout diagrams and plans.

b. When the need for a specific facility has become evident, representatives of CG, USCONARC, Army and installation commanders concerned, the Chief of Engineers (usually a district engineer), and the proponent service school should meet in conference to determine the exact requirements and the general site for the facility. Revised master-planning documents and general site plans reflecting the training facilities requirement will be submitted by the installation

\*This regulation supersedes SR 210-20-20, 12 May 1963.

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commander through command channels (fig. 1, AR 210-20) to the Chief of Engineers for review and approval.

c. When training facilities are to be programed for construction, the appropriate installation commander will submit the construction requirement in accordance with AR 415-15 and applicable

supplemental construction-program guidance issued for the specific fiscal year.

d. Upon authorization of design the appropriate district engineer will prepare necessary plans for submittal by the installation commander to CG, USCONARC for approval.

Section II. TRAINING FACILITIES FOR THE ARMY DIVISION

4. **General.** The training facilities indicated below are to be used as a guide in preparing plans for a specific installation for the training of divisional troops. No distinction is made between the infantry, armored, or mechanized division since the organic weapons are substantially the same for each, differing only in numbers rather than items. Modifications to meet the needs of other troops, such as those at replacement training centers, will be made as necessary.

5. **Ranges.** a. **General.** The layout of firing ranges for the Army division shown in figure 1 is considered highly desirable as the basis for planning and constructing new training installations, or as a guide for altering or extending existing division installations. This layout, which provides for a large common impact area and for simultaneous firing on the ranges, should be used to the fullest extent practicable. Firing points are located, for the most part, along the sides of combat firing or artillery ranges, so that the various danger areas extend toward a common center and overlap. This general arrangement is the most compact possible, unless protective embankments are used, to include all the required ranges and to permit their simultaneous use. Where availability of terrain permits, spacing of facilities could be increased. For an airborne division, the self-propelled anti-tank gun or the 106-mm recoilless rifle takes the place of the tank gun in determining range requirements. Where site conditions preclude placing the small arms ranges along the side of a unit combat range, as shown, or an artillery range, or where some of the small arms ranges cannot be so located, they should be placed in a suitable separate location. In such cases the most desirable arrangement usually would be along a line curved around a common impact area, so as to provide for the maximum overlap

of danger areas and the greatest possible economy in the use of land (fig. 2).

b. **Artillery.** For the artillery range there is need of an area adequate to meet the safety requirements of the weapons and ammunition authorized, and so located as to utilize, together with the tank ranges, a common impact area. The area selected should have varied terrain—gently rolling to hilly land, generally free from swamps or large rivers, and with few lakes; lightly wooded in some portions—open country, permitting observation. Suitable locations are required for gun emplacements to use in indirect firing and for ground observation posts. At least one of the firing positions should be capable of accommodating the Honest John and Little John missiles, though not necessarily at maximum range. As future artillery missiles are developed, with increased range capabilities, it will be necessary to enlarge the impact area to accommodate them or to establish appropriate operational controls, such as limitation of the angle of elevation. Direct firing, when scheduled, normally can be accommodated on the tank combat-firing range. In the event no tank range with superimposed moving-target range can be provided, a suitable artillery moving-target range may be required. This range may be similar to the track-type, moving-target range for tanks, modified to suit the artillery piece and powder charge to be used, or it may be a towed-target range. In the case of existing command installations, the firing of artillery weapons which cannot be conducted on the division range because of area limitations or the nature of the terrain will be accomplished at special locations equipped for the safe firing of large-caliber weapons. The artillery firing positions should accommodate not only the field artillery but also the air defense artillery (ADA),

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mortars, recoilless rifles, and rocket launchers. For recoilless-rifle firing, one observation post which allows continuous visibility of impact for a distance of 2,500 to 3,000 yards (2,286 to 2,743 meters) is desirable.

c. *Tank firing.*

- (1) *Common impact area.* While firing is in progress, the inner portion of the unit combat-firing range is required without interference by other weapons. Provision should be made for use of this range as needed to include the direct firing of ADA guns and direct firing by field artillery. Beyond a distance of 5,000 yards (4,572 meters) from the starting line for tank-gun firing, the extensive impact and danger areas of the unit combat-firing range should be shared by artillery and other weapons to the greatest practicable extent in the interest of efficient use of space.

- (2) *Extent of combat firing ranges.* Based on the 15-degree limit for the angle of elevation (10 degrees in the case of the 105-mm tank gun), the area required for a unit combat firing range, on which tank guns of 90-mm and 105-mm caliber can be fired safely, should be approximately 13 miles (20.9 km) long and 17½ miles (28.2 km) wide. Two such ranges are required for a training installation with an infantry, mechanized, or armored division. One is required for an installation with an airborne division. The firing of hyper-velocity armor-piercing discarding sabot ammunition (APDs) on the unit combat firing range generally is not possible for the standard division installation because of excessive ground space requirements. Firing of this ammunition is not provided for in the range dimensions given above. Firing of the 105-mm APDs ammunition may be accomplished from a stationary tank range under the provisions of AR 385-63. In laying out the unit combat firing range, a 15-degree angle should be provided to the firing limit on each side of the center line. Within the total 30-degree angle of fire, and near its apex, there should be provided a maneuver-and-firing area of

open and rolling land, about 4,000 yards (3,658 meters) wide and 2,000 yards (1,829 meters) deep. An area of this size is required for maneuverability in the conduct of battalion combat firing problems. Individual moving tank field firing and crew proficiency courses have similar layouts, except for the use of smaller maneuver and target areas. Combat ranges with smaller dimensions are possible where terrain background stoppage is available, or where a minor reduction in the firing angle is acceptable. In the case of existing command installations, the firing of tank guns which cannot be conducted on the division range, because of area limitations or the nature of the terrain, will be accomplished at special locations equipped for the safe firing of large-caliber weapons.

- d. *Separate.* If the firing of mortars, the M79 grenade launchers, and DAVY CROCKETT is not feasible from artillery firing positions, separate ranges must be provided. In the case of the M79 grenade launcher and DAVY CROCKETT, separate ranges usually are necessary due to the requirement for a secure impact area.

6. *Maneuver area.* Extensive maneuver areas are necessary to meet present-day tactical training requirements of division installations. Where available land on the reservation is not sufficient to meet these requirements, arrangements will be made, if possible, for the use of suitable Army or other public land, or private land, in the vicinity, instead of acquiring large, new areas. In order to accommodate necessary tactical maneuvers on the reservation to the greatest extent possible, as well as to promote all other phases of orderly development, it is essential that the most efficient arrangement of the installation's areas and facilities be accomplished in accordance with an approved master plan (see AR 210-20). To the extent practicable, all available terrain on the reservation not used for the cantonment, firing ranges (including impact and danger areas), permanently installed training facilities, and airfield, road, railroad, and service facilities will be utilized as maneuver area. It is desirable that the maneuver area contain streams or lakes suitable for training in construction of fixed and floating bridges and river-crossing expedients. Similarly,

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provisions should be made for deep fording of vehicles having this capability and float training with armored personnel carriers.

7. **Division review field.** A division review field, having a minimum area of 75 acres (30 hectares) (240 yards by 1,500 yards or 220 meters by 1,372 meters) is considered necessary. A larger area will be required for armored and mechanized divisions.

8. **Drill fields.** A drill field having a minimum area of 8 acres (3 hectares) (200 yards by 200 yards or 183 meters by 183 meters) should be conveniently located and readily available for each battalion or similar-sized unit.

9. **Airfield.** An area of sufficient size to accommodate the aviation facilities required to support all organic aircraft is necessary. A typical Army airfield, with adequate provision for fixed-wing and rotary-wing aircraft requires an area of at least 450 acres (182 hectares), with unobstructed airspace for runway approaches. The airfield should be located in such a position that aircraft may enter or leave the airfield without causing undue disturbance by passing over developed areas at low altitude, and without being endangered by any activity of the installation. Care should be taken to orient the runway so that the approach zones do not pass over firing-range danger areas. For an airborne division a landing field adequate for troop- and cargo-carrying aircraft is required. Information on planning, location, and design of Army airfields and heliports is contained in AR 210-20 (master planning), AR 415-31 (authorized space allowances for Army aviation facilities), AR 210-94 (airfield zoning of adjacent private property), AR 95-50 (navigable airspace and clearances), EM 1110-3-311 (pavement design), EM 1110-3-314 (operational and maintenance facilities), and other engineer manuals of the Corps of Engineers in the 1110 series (detailed engineering-design criteria). The directive establishing a new installation or use of an existing installation for an Air Force troop-carrier mission will specify the responsibility of the Army for accommodating troop-carrier aircraft and the design criteria to be used to provide facilities for such aircraft.

10. **Training area details.** a. In order to per-

mit their maximum use, facilities, such as bayonet and grenade courts, obstacle courses, gas chambers, and small-arms ranges should be located within reasonable marching distance from cantonment areas. A location requiring the use of transportation in moving troops to these areas should be avoided.

b. A central target-repair and range house (with additional range houses, if necessary) required to serve all ranges, a target-storage house, guard shelters, and a range-communications system should be provided. Telephone service to every range is necessary. The minimum essential telephone system should be installed, in accordance with standard plans, on ranges requiring such service and to the critical posts of the range-guard system.

c. Three drop zones are desirable for an airborne division. They should be located on flat or rolling terrain, free from ravines, cliffs, stumps, holes, rocks, and outcroppings. At least one zone of 2,000 yards by 5,000 yards (1,829 meters by 4,572 meters), disced to a depth of 5 inches (12.7 centimeters), should be located in the maneuver area and so oriented as to be of mutual support for a division exercise. One zone should be adjacent to the range areas to facilitate the conduct of combined arms problems and other firing exercises conducted by air-landed troops. On or near one drop zone there is a requirement for a landing zone for assault aircraft, providing adequate space for the maximum number of assault aircraft to be utilized at any one time. The landing zone should have a minimum area of 35 acres or 14 hectares (approx. 540 by 3,000 ft or 164 by 914 meters) and should be provided with a suitable access road.

d. Facilities are required for deep water fording and for float training with armored personnel carriers.

11. **List of facilities.** Currently required firing ranges and other training facilities are listed in tables I and II. They may be modified in number and type as necessitated by local conditions and variations in organization and armament. The drawing numbers in column 3 apply to drawings in the OCE Folio No. 1, "Training Facilities," dated 1 September 1952.

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Table I. Firing ranges

Item No.	Type of range	OCE Folio No. 1, 1 Sep 1962 Drawing No.	References (FM unless otherwise marked)	Ranges	Positions, points, or lanes per range <sup>1</sup>	Remarks
1	2	3	4	5	6	7
1	Rifle, Basic Marksmanship Course, TRAINFIRE I. Complex consists of:		23-71, 23-72			Used also for carbine. Division complex has 5-company capability. 2½ weeks required to fire each company.
	Basic 25-meter range	28-13-105		8	60	Ranges 1a, 1b, or 1c may be constructed on KD rifle ranges not to be retained for known-distance firing.
	Basic 25/75-meter range	28-13-105		3	110	
	Field Firing range	28-13-105		5	35	
	Record firing range	28-13-105		2	16	
	Target detection range	28-13-105		16		Nonfiring ranges included in complex.
2	Rifle, Known distance (KD) <sup>1</sup>	28-13-09	23-5 <sup>1</sup>	1	50	
3	Rifle, Transition		23-67	1	10	
4	Machine gun, Transition	28-13-04	23-67	1	10	
5	Machine gun, 12.7 meter	28-13-06	23-15, 23-67	1	10	
6	Machine gun, 25 meter, moving target.	28-13-06	23-55, 23-82, 23-67.	2	2	May have Item No. 41 superimposed.
7	Machine gun, field firing	28-13-05	23-55, 23-67, 23-15.	1	10	
8	Recoilless rifle, known distance, service practice.	28-13-10	23-82 <sup>1</sup>	1	6	
9	Recoilless rifle, known distance, subcaliber moving target.	28-13-16	23-82 <sup>1</sup>	1	3	May be superimposed on tank, subcaliber, moving target range.
10	Recoilless rifle, 25 meter, subcaliber.	28-13-06	23-82 <sup>1</sup>	1	4	
11	Recoilless rifle, field target.	28-13-11	23-82 <sup>1</sup>	1	6	
12	Pistol, known distance	28-13-12	23-35 <sup>1</sup>	2	50	
13	Submachine gun, caliber 45, dismounted course.	28-13-13	23-41	2	8	
14	Submachine gun, moving target.	28-13-14	23-41	2	1	
15	Submachine gun, moving vehicle.	28-13-21	23-41	2	1	
16	Mortar, training shell	28-13-17	23-85	1	8	
17	Mortar, field firing (60mm, 81mm, 4.2" mortar M30).	28-13-17	23-85, 23-90, 23-92	2		4 or more firing positions on artillery range.
18	Rocket launcher	28-13-19	23-32	1		
19	Tank, subcaliber, First-Round-Hit Exercise (table I, FM 17-12).		17-12	3	10	Each range may contain facilities for tables I, II, III, FM 17-12, thus reducing requirement to one range each type.
20	Tank, subcaliber, Primary and Alternate Method of Sensing Adjustment Exercise (table II, FM 17-12).		17-12	3	10	Each range may contain facilities for tables I, II, III, FM 17-12, thus reducing requirement to one range each type.

See footnotes at end of table.

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Table I. Firing ranges—Continued

Item No.	Type of range	OCR Folio No. 1, 1 Sep 1982 Drawing No.	References (FM unless otherwise marked)	Ranges	Positions, points, or lanes per range <sup>1</sup>	Remarks
1	2	3	4	5	6	7
21	Tank, subcaliber, Moving Target Exercise (table III, FM 17-12).	-----	17-12-----	3	10	Each range may contain facilities for tables I, II, III, FM 17-12, thus reducing requirement to one range each type. May have recoilless rifle, subcaliber moving target range superimposed.
22	Tank, Service Firing Exercise (Stationary Targets) (table IV, FM 17-12). <sup>2</sup>	-----	17-12-----	2	10	
23	Tank, Service Firing Exercise (Track Type Moving Target) (table V, FM 17-12). <sup>2</sup>	-----	17-12-----	2	10	May be utilized for direct fire of field artillery cannon. May be superimposed on the battalion combat firing range. 76mm, 90mm, 105mm tank guns and 7.62mm and .50 caliber machine guns used.
24	Tank crew machine gun exercise (Day) (table VI, FM 17-12).	-----	17-12-----	1	10	Not required for airborne division.
25	Tank Crew Field Firing, Moving Tank Exercise (Day and Night) (tables VII A and B respectively, FM 17-12). <sup>2</sup>	-----	17-12-----	2	-----	Until Folio No. 1 drawing is prepared, guidance for range construction is contained in fig. 139, FM 17-12. Not required for airborne division.
26	Tank Crew Proficiency, Moving Tank.	-----	17-12-----	2	-----	Until Folio No. 1 drawing is prepared, guidance for range construction is contained in fig. 140, FM 17-12. Not required for airborne division.
27	Unit Combat Firing <sup>3</sup>	-----	17-12-----	2	-----	
28	Grenade, hand, fragmentation-----	28-13-44	23-30 <sup>1</sup> -----	1	10	
29	Grenade, rifle, antitank-----	28-13-45	23-30 <sup>1</sup> -----	1	10	
30	Grenade launcher M79-----	-----	TC 23-3-----	1	8	Separate range required because of secure impact area requirements.
31	Field Artillery-----	-----	6-40, 64-101 <sup>1</sup> -----	1	10	Normally 10 or more firing positions, as terrain permits.
32	Artillery, moving target-----	-----	6-40, 64-101 <sup>1</sup> -----	1	6	Tank moving target range (item 23) used if separate range not possible.
33	Combat-in-cities course-----	28-13-01	21-75-----	1	-----	Accommodate one squadron.
34	Infiltration course-----	28-13-34	21-75-----	1	-----	Accommodate 40 individuals.
35	Close combat course-----	28-13-35	21-75, 7-10-----	1	-----	Accommodate one platoon.
36	Small arms fire course (non-live fire).	28-13-37	21-75-----	1	-----	No separate range required. Suitable, available terrain selected.

See footnotes at end of table.

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Table I. Firing ranges—Continued

Item No.	Type of range	OCE Folio No. 1, 1 Sep 1982 Drawing No.	References (FM unless otherwise marked)	Ranges	Positions, points, or lanes per range <sup>1</sup>	Remarks
1	2	3	4	5	6	7
37	Rifle squad attack course (live fire).	28-13-99	21-75-----	2	-----	Accommodate infantry, airborne infantry or mechanized infantry squad.
38	Rifle platoon attack course (live fire).	-----	21-75-----	1	-----	Accommodate infantry, airborne infantry or mechanized infantry platoon.
39	Field target course-----	28-13-18	23-5-----	1	-----	Technique of fire-squad firing.
40	Night firing-----	-----	23-5-----	1	-----	Individual and squad firing.
41	Landscape firing-----	28-13-06, 07	23-5, 23-55 <sup>2</sup> ----	1	-----	May be superimposed on 25-meter range, item No. 6.
42	Tank-Infantry platoon attack course (live fire).	-----	21-75-----	1	-----	
43	Mine-booby trap demolition area	28-13-36	5-31-----	1	-----	
44	Davy Crockett-----	-----	23-20-----	2	3	Separate range required because of secure impact area requirements.
45	Anti-tank guided missile ENTAC	-----	TC 23-2----- TC 23-6-----	1	3	
46	Aerial gunnery-----	-----	TB NOM 55-1520-20- 208-20 TB 55-1520-204- 10/1 and 20/1. TB 2.75 Rocket System H-34 and HU-1B.	-----	-----	Machine gun, rocket, and SS11 ATGM firing from helicopter and light fixed wing aircraft.

<sup>1</sup> Indicates number of positions, points, or lanes per range or facility.

<sup>2</sup> A requirement for a limited number of known-distance firing points exists under the TRAIN FIRE concept, to support the competitive marksmanship program, automatic-rifle marksmanship, and advanced rifle marksmanship. For a division, a minimum of 50 KD firing points are required at ranges of 200, 300, 400, and 600 meters.

<sup>3</sup> See TM 9-866.

<sup>4</sup> Where conditions dictate, moving target ranges may be superimposed on other ranges.

<sup>5</sup> The tank, service firing ranges, tables IV and V, FM 17-12, the tank crew field firing ranges, tables VII and VIII and battalion combat firing ranges (with maximum 15° elevation) are essential facilities and a training requirement for infantry, mechanized, and armored divisions, except at those stations where the availability and proximity of an established tank-firing center will permit such firing to be accomplished away from the home station.

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Table II. Other training facilities

Item No.	Type of training facility	OGE Folio No. 1, 1 Sep 1962 drawing No.	References (FM unless otherwise marked)	Number facilities <sup>1</sup>	Positions, points, or lanes per range	Remarks
1	2	3	4	5	6	7
1	Grenade course, practice.....		23-30 <sup>2</sup>	1		
2	Bayonet assault course.....	28-13-33	23-25 <sup>2</sup>	3	18	
3	Tank obstacle course.....	28-13-49	TM 21-300, -301	4		
4	Gas chamber.....	28-13-46	21-48.....	<sup>3</sup> 2		
5	Confidence course.....	28-13-95	21-20.....	3		
6	Machine gun square.....	28-13-27	23-55.....	3		
7	Ride (PRI) circle.....	28-13-28		3		
8	Parachute-landing, fall platform.....	28-13-62		<sup>4</sup> 4		
9	Camouflage demonstration area.....	28-13-63		1		
10	Demolition area.....		5-31.....	1		
11	Wheeled-vehicle driving course.....	28-13-50		1		
12	Tracked-vehicle driving course.....	28-13-51		1		
13	Sanitation display area.....	28-13-41	21-20, 31-70, TM 5-634, TB Med 229, 8-35, TB 34-9-64	1		
14	Litter obstacle course.....	28-13-39		1		
15	Bridging area.....	28-13-40, 97		1		
16	Rail movement mock-up.....	28-13-52, 100		1		
17	Suspended harness mock-up.....	28-13-61		1		
18	Mock-up tower.....	28-13-59		<sup>4</sup> 1		
19	Cargo net mock-up.....	28-13-32		3		
20	Air-transportability mock-ups (Airforce and Army Aircraft).....	28-13-31, 53, 54, 55, 28-13-38, 56, 57, 58, 28-13-60	TM 57-210.....	5 ea	C119, 123, 124, 130, 133	
21	Engineer rigging area.....			1		
22	Physical fitness test area.....		TM 21-200, TC 21-1	5		

<sup>1</sup> In establishing requirements for one division, consideration has been given to maximum use of facilities. Determination of the facilities needed for simultaneous use with more than one division normally requires merely an appropriate addition of the requirements stated in column 5 for one division. Ordinarily no reduction in stated facility requirements for any of the items

is accomplished by the grouping of two or more divisions of the same or different types.

<sup>2</sup> See TM 9-855.

<sup>3</sup> 4-phase.

<sup>4</sup> Airborne division only.

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### Section III. TRAINING FACILITIES FOR NONDIVISIONAL UNITS

12. **General.** The training facilities necessary for nondivisional units are, in general, those stated in sections I and II. Stated facilities will be modified as necessary to fit the needs of the using unit.

13. **Ranges. a. General.** The requirements for small arms, recoilless rifle, transition, tank, and rocket launcher ranges for nondivisional units are identical in type to those contained in section II.

b. **Combat firing.** The combat firing ranges must be predicated upon the type of tank gun assigned to the unit. The nondivisional battalion requirements are identical to those stated in paragraph 5c.

c. **Field artillery.**

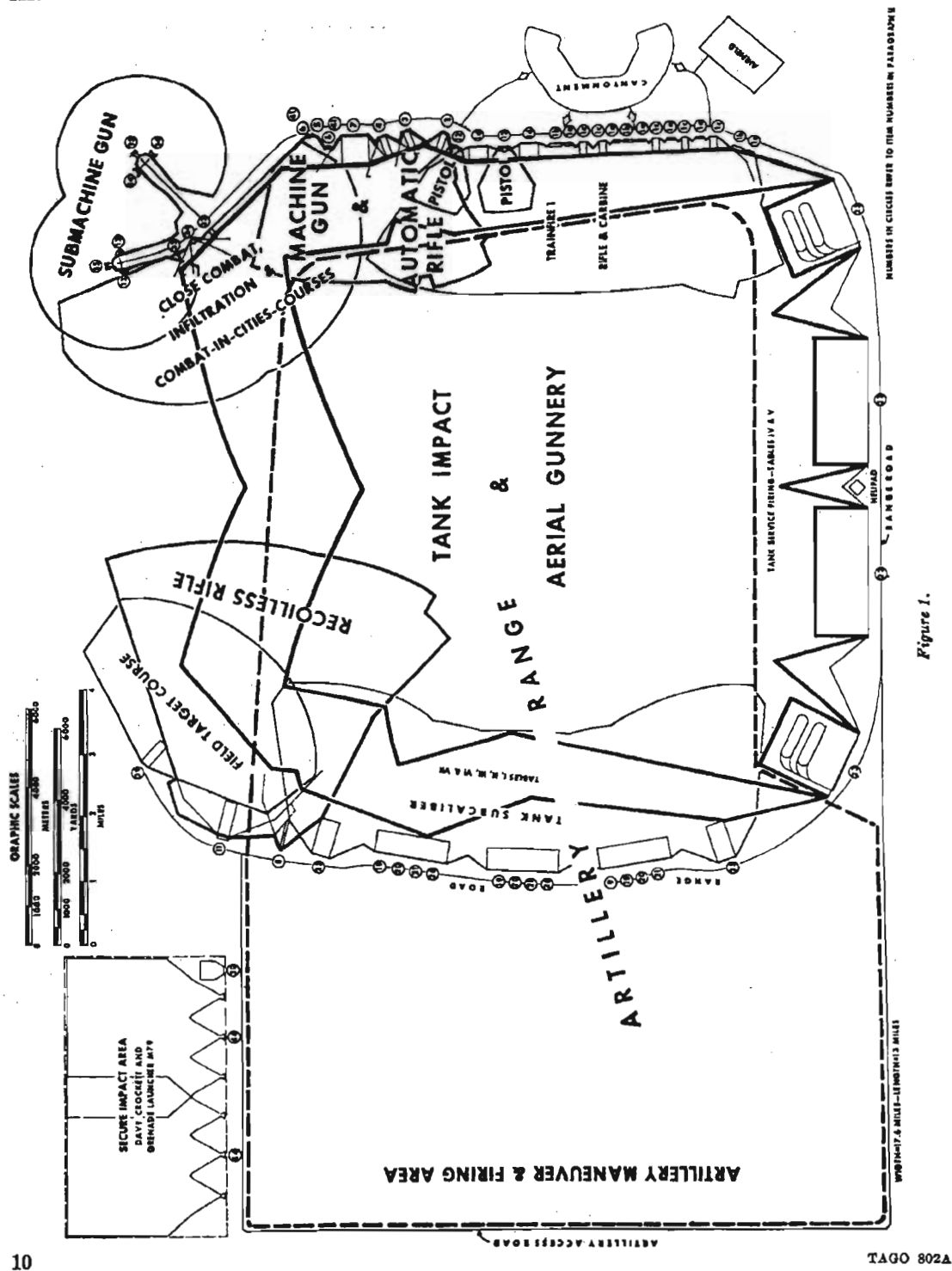
- (1) For field artillery units with armament having range and caliber not exceeding the range and caliber of any divisional field-artillery piece, see paragraph 5b.
- (2) For field artillery units other than those indicated in paragraph 5b, and (1) above, an area with dimensions not less than 12 miles by 26 miles (19.3 km by 41.9 km) should be selected on varied terrain, with suitable locations for ground observation. Landing and take-off facilities for high performance aircraft, of the minimum types used in long-range aerial adjustment of artillery, are desirable and should be located within 100 miles (161 kilometers) of the artillery range.

- (3) Installations of the type referred to in (2) above should be available, as necessary, with size and shape adequate to permit the safe firing of all artillery units not accommodated on division artillery ranges, including the Lacrosse, Corporal, Redstone, Hawk, and Nike weapons. Such installations will be subject to individual approval by the Department of the Army.

d. **Air defense artillery.**

- (1) Land area requirements may be determined for any given ADA cannon-firing point by analysis of AR 385-63 (fig. 3 and table XI). The range should be constructed to provide a field of fire of 65°.
- (2) In the selection of air-defense-artillery firing sites, primary consideration should be given to the proximity of other ground installations, air lanes, water bodies, and hilly terrain. The proximity of air lanes and water bodies may well reduce the usable safe field of fire. Consideration must also be given to drone towed-craft flight patterns. Mountains, high hills, or peaks interfere with radar operation and tow-craft flight patterns and should be avoided in site selection, wherever possible.

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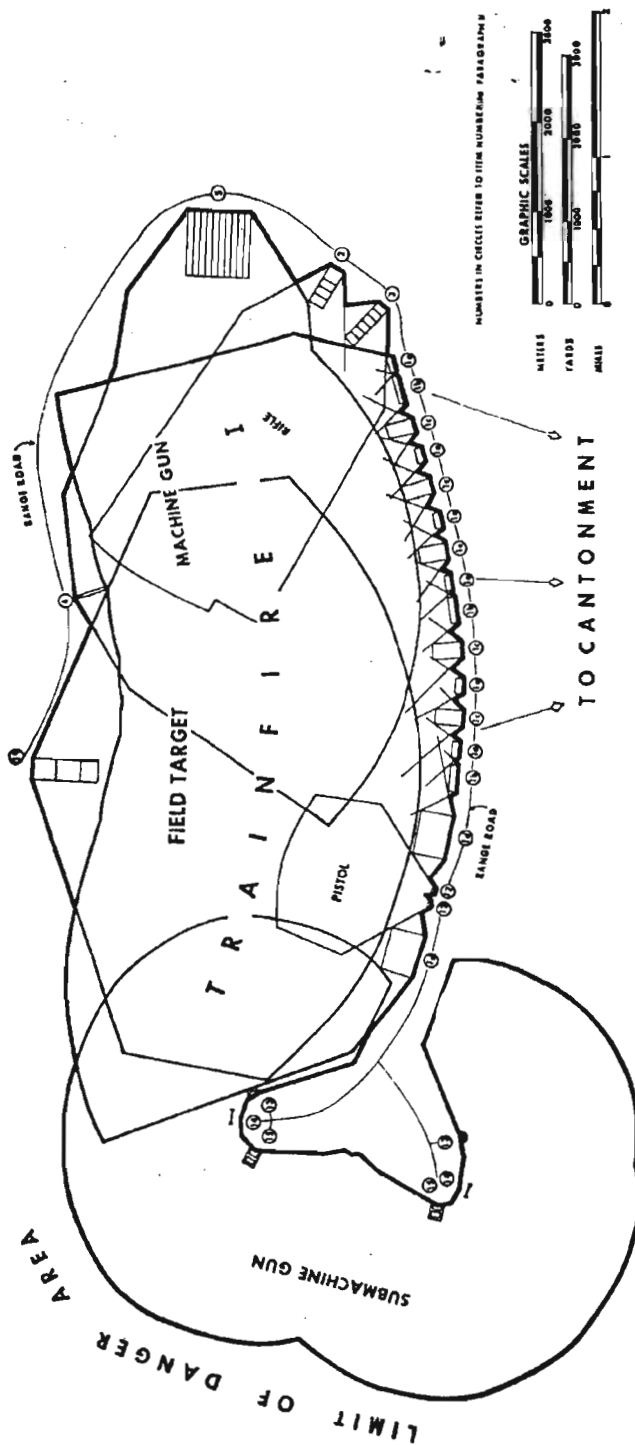


Figure 2.

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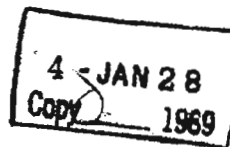
## APPENDIX C-10

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Headquarters Department of the Army  
Regulation AR 210-21 entitled *Installations  
Training Areas and Facilities for Ground Troops*,  
dated 18 November 1968, Ordnance and  
Technical Services Historic Manuals Library,  
MVS-031907-003.**

ARMY REGULATION

AR 210-21

MHI  
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INSTALLATIONS

# TRAINING AREAS AND FACILITIES FOR GROUND TROOPS



HEADQUARTERS, DEPARTMENT OF THE ARMY

NOVEMBER 1968

MVS-031907-003

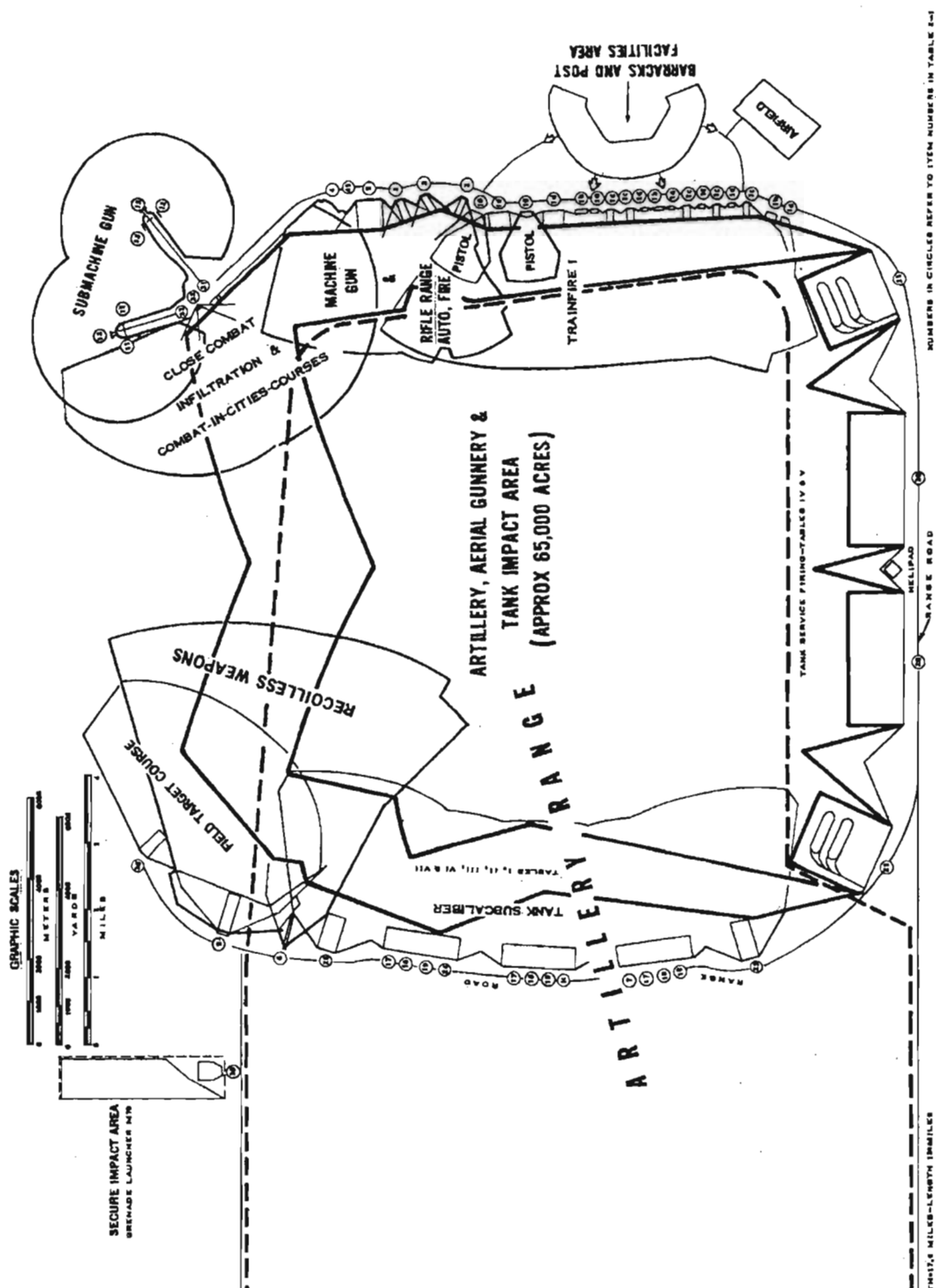


Figure 2-1



\*AR 210-21

ARMY REGULATION }  
NO. 210-21 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 18 November 1968

## INSTALLATIONS

### TRAINING AREAS AND FACILITIES FOR GROUND TROOPS

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## APPENDIX C-11

**Defense Technical Information Center (DTIC),  
Report entitled *Uranium Alloys for Critical  
Ordnance Components*, AD609896,  
dated 23 October 1961, DTIC-011607-003.**

**UNCLASSIFIED**

**AD609896**

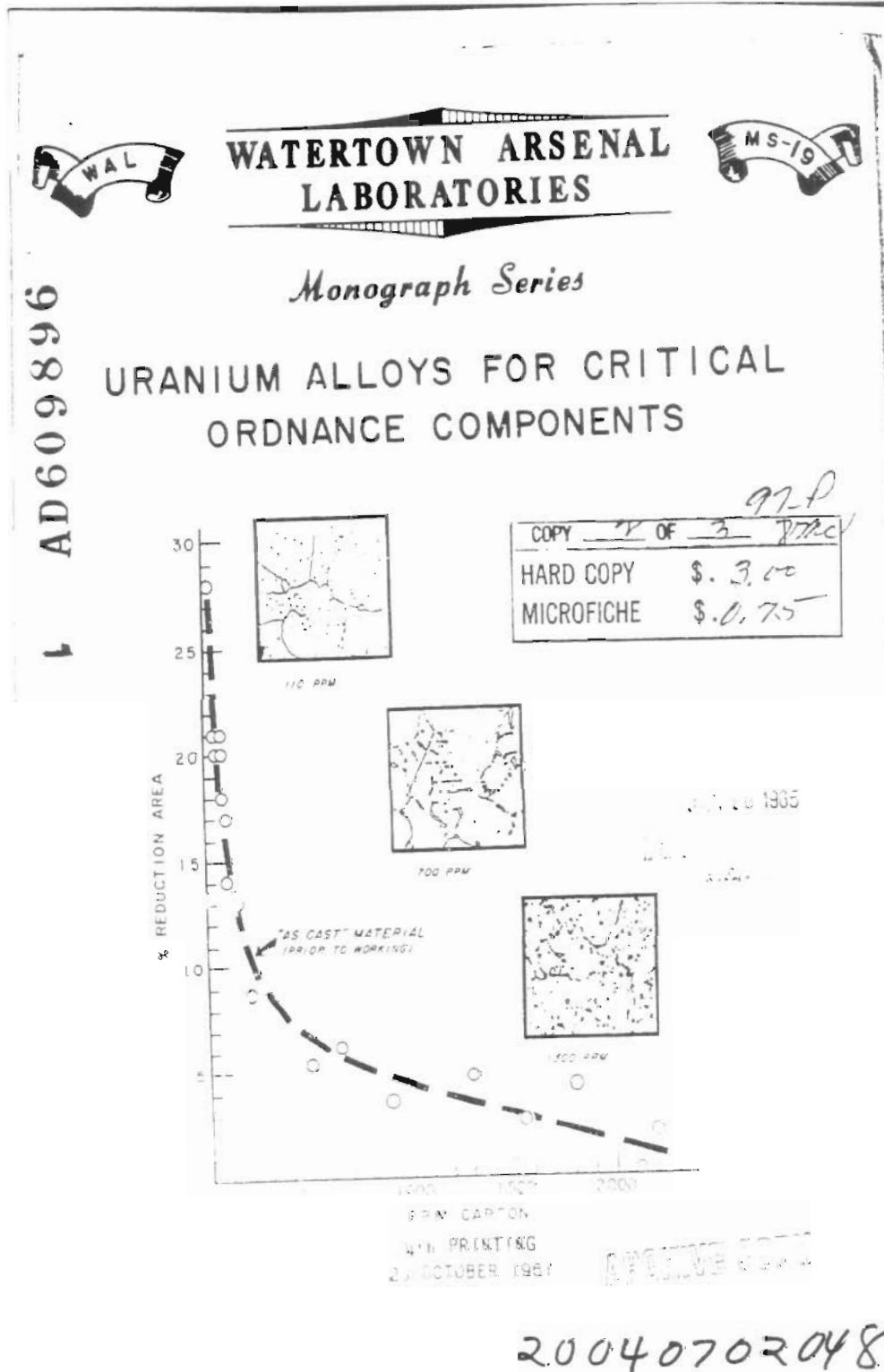
**URANIUM ALLOYS FOR CRITICAL ORDNANCE COMPONENTS**

**WATERTOWN ARSENAL LABS MA**

**23 OCT 1961**

**Availability: Document partially illegible.**

**UNCLASSIFIED**



ASSUMPTION REQUIREMENTS

by

M. Bornstein

There shall be presented some of the primary considerations for selecting depleted uranium as the basic material for the XM201 20MM spotting cartridge and a brief review of:

- a. The background for selecting this material.
- b. The development time scales permitted by the Davy Crockett program.

Picatinny Arsenal, as the research and development systems manager for the Davy Crockett system has, during the past two years, aggressively pursued the development of a 20MM spotting cartridge for use in conjunction with the major caliber round. Frankford Arsenal and the Diamond Ordnance Fuze Laboratories were assigned the basic development program by Picatinny Arsenal, and a member of Lake City Arsenal will discuss the materials requirements in greater detail later in the program.

In order to achieve the desired range and accuracy in the 20MM spotting cartridge and to achieve a ballistic co-efficient of approximately 1, a highly dense material was required for the 20MM shell body. The material selected during the initial research and development phases was Mallory-1000, basically a tungsten alloy. This material, while meeting the military requirements for the spotting projectile, was considered exceedingly costly, and difficult to machine. A study was conducted by Watertown Arsenal during the Second and Third Quarters of Fiscal Year 1959 which indicated that depleted uranium with approximately 8% molybdenum could be used as a promising alternative material for the Mallory-1000 previously approved by the Research and Development System Manager.

A brief comparison of the two materials indicates the following:

	<u>Mallory-1000</u>	<u>Depleted Uranium Alloy</u>
a. Density	16.5 to 17 gm/cc	18.5 - 19.9 gm/cc
b. Cost	\$10.00 lb.	\$4.50 lb.

While the density of uranium is slightly greater than Mallory metal, (approximately 200 grains more per projectile) the cost of the depleted uranium is 50% lower than Mallory material.

Ballistic tests conducted during March of 1960 indicated that the uranium projectile behaved satisfactorily under interior and exterior ballistic conditions.

For those who are not familiar with the physical characteristics, the XM101 20MM projectile will be described briefly at this time (Figure 1). The projectile consists of the following:

- a. A cartridge case (steel or aluminum)
- b. Projectile body (uranium)
- c. Fuse (point detonating)
- d. A plastic rotating band which is assembled to the body to prevent "blowby" of the propelling gases.

To emphasize further the necessity for the availability of uranium processing and fabricating facilities there has been prepared a chart outlining the time scales available to the research and development agency for the development, testing and industrial engineering of the XM101 20MM spotting projectile (Figure 2).

It will be noted that the engineering design phase was initiated during the Fourth Quarter of 1958 and has been progressing for approximately two years. The final engineering test phase was initiated in the Second Quarter of 1960 and is due to be completed during the Second Quarter of 1961, a period of slightly over eight months. It will be noted further that the industrial engineering program, which was initiated during the Second Quarter of Fiscal Year 1959, will likewise be completed in the Second Quarter of Fiscal Year 1961.

Due to the exceedingly telescoped nature of the Davy Crockett program, it becomes necessary to initiate the production of war reserve quantities of spotting ammunition during October, 1960 or the Second Quarter of Fiscal Year 1961.

A brief summary of the material requirements for the next five years, which is of prime interest is as follows:

<u>Fiscal Year</u>	<u>Material Requirements in lbs.</u>
FY61	39,000
FY62	93,000
FY63	36,000
FY64	31,000
FY65	33,000
Total - 232,000 lbs.	

In addition, a quantity of uranium will also be required for a special round and these quantities are as follows:

<u>Year</u>	<u>Material Requirements in Lbs.</u>
FY63 (starting July, 1962)	7,875

The afore-mentioned limited time scales make it apparent that sources for the processing of depleted uranium and fabrication of this material must of necessity be fully operational no later than the Second Quarter of 1961 (October 1960) if the Ordnance Corps is to meet its commitments to the user, the Continental Army Command.

In conclusion, it is well to re-emphasize the importance and necessity for the continued support and cooperation of industrial organizations in developing the facilities and production "know-how" for providing the Ordnance Corps with depleted uranium alloy to support the Davy Crockett program.

7 June 1960  
PICATINNY ARSENAL

URANIUM ALLOY BAR FOR M101 PROJECTILE

by

J. Pliskorski

About one year ago the Industrial Engineering Division at Lake City Arsenal was introduced to the Navy Crockett program and assigned the responsibility for industrial engineering of that segment of the program having to do with M101 20mm ex-caliber spotting cartridge. Because of the desired military characteristics and ballistics, many unique design considerations were required. Among these was the necessity for an extremely heavy projectile within the tight dimensional limits required of the heavy metals for the basic material of the shell body. During development of this item by research and development personnel at Frankford Arsenal, initial investigation considered an alloy of 90% tungsten, 6% nickel, 4% copper, which resulted in a material possessing a specific gravity of 17. This material was thoroughly investigated and tested and proved to be adequate insofar as physical properties and ballistic performance were concerned. There were some objections from a production machining standpoint. These were not considered overly serious and, all in all, the shell body could very well have been manufactured of this tungsten alloy had the costs of the raw slugs been more within reason.

Research and development investigations at Watertown Arsenal established that equivalent or better shell bodies could be manufactured of a depleted uranium alloy at a much less cost per cartridge. Thus, after numerous tests and discussions a uranium alloy, in accordance with the recommendation of Watertown Arsenal, was adopted as the shell body material and the process to manufacture these in quantity evolved about this material. This, of course, involved such problems as accountability, health physics, scrap handling, etc., but they have all been resolved, and Lake City Arsenal is currently tooling up to cut bar stock. Bar stock will be provided by Watertown Arsenal to requirements for automatic screw machine operation. Watertown Arsenal, it may be presumed, purchases the uranium alloy from a commercial source in accordance with requirements of the proposed military specification to be discussed later. Basically, our requirements called for a bar 12-feet long and sufficiently straight to pass freely through a 31/32" I.D. tube. The bar diameter specified should be .844" - .006" and any ellipticity must be within diameter tolerance.

Minimum physical properties\* should be: Yield Strength - 90,000 psi, Ultimate Tensile Strength - 100,000 psi, Elongation - 2%, Reduction of Area - 4%, V-Notch Charpy at -40°F - 2 ft-lbs. There is listed in Table I an approximation of the amount of uranium alloy bar which will be required for delivery to Lake City Arsenal for the next five fiscal years. The schedules have fluctuated in the past and may very likely do so in the future; therefore, these figures represent what is currently in the plans.

\*Chairman's footnote: Minimum in this case referring to the lowest mechanical properties of sintered tungsten alloys that withstood a ballistic firing.



TABLE I

URANIUM ALLOY BAR REQUIRED FOR SCHEDULE

<u>Schedule</u>	<u>12' Bars Req'd</u>	<u>Approx. Lin. Ft.</u>	<u>Approx. Wt. at 53 lbs/bar</u>
July 1960	30	360	1,590
August 1960	66	792	3,500
September 1960	32	384	1,700
October 1960	54	648	2,860
November 1960	135	1,620	7,155
December 1960	223	2,676	11,820
January 1961	210	2,520	11,130
February 1961	210	2,520	11,130
March 1961	210	2,520	11,130
April 1961	<u>156</u>	<u>1,872</u>	<u>8,270</u>
Total FY61	1,326	15,912	70,285
Total FY62	2,124	25,488	112,572
Total FY63	819	9,828	43,407
Total FY64	701	8,412	37,153
Total FY65	<u>767</u>	<u>9,204</u>	<u>40,651</u>
5-Year Total	5,737	68,844	304,068

For this current plan all of this uranium bar is to be delivered to Lake City Arsenal since this Arsenal will manufacture, assemble, load and pack all of the components of the XM101 cartridge except the fuze. A machined projectile is shown in the attached figure.

7 June 1960  
LAKE CITY ARSENAL

SECTION C

URANIUM ALLOYS FOR ORDNANCE COMPONENTS

by

J. A. Misencik

Introduction

During the past several years the Ordnance Corps has generated a requirement for a structural engineering material that possesses high strength, high density, and a reasonable amount of ductility and toughness for use in the production of critical Ordnance components. Under the sponsorship of Picatinny Arsenal, wrought uranium alloys (unclassified, depleted) have been developed at Watertown Arsenal to meet this requirement. The following gives the history and fabrication of the uranium melting stock to be supplied contractors. Also discussed is the Ordnance Corps alloy-development program, including alloy development, preliminary extrusion, heat treatment, and metallographic techniques.

Preparation of Melting Stock

The depleted unclassified uranium used in Army Ordnance is obtained from the Atomic Energy Commission on joint programs.

The uranium salt that is used to produce the uranium metal is  $UF_4$  (uranium tetrafluoride) which has been reduced from  $UF_6$  (uranium hexafluoride). This preliminary reduction operation is conducted at the Atomic Energy Commission installation at Paducah, Kentucky. The uranium tetrafluoride ( $UF_4$ ) is the high-purity green salt. This is then shipped to the Mallinckrodt Chemical Corp., St. Louis, Missouri, for bomb reduction of the green salt with magnesium to give a uranium "dingot" and a slag of magnesium fluoride. The name "dingot" is used rather than "ingot" to indicate that the uranium resulted from a direct reduction from the salt to uranium metal. The resultant dingot and slag are separated and the dingot is machined (scalped) to remove any slag and refractory that may adhere to the surface. The dingot weighs approximately 1800 lbs. and is the yield from 3000 lbs. of charged green salt.

Chemical analysis of the resultant dingot material as supplied by the Atomic Energy Commission is approximately as follows:

C <100 ppm	Ca 10 ppm
Fe 15 ppm	Mn 2 ppm
Ni 30 ppm	Co 4 ppm
Cr 2 ppm	Cu 15 ppm
V 20 ppm	Mg 2 ppm
Si 30 ppm	Li 0.2 ppm
Al 10 ppm	Ba 0.2 ppm
H <1 ppm	B 0.1 ppm
N 10 ppm	O 20 ppm

Note that the amounts of all elements fall below that specified in the specification. Further processing of the dingot is dependent upon the melting and alloying facilities available. The dingot may be extruded and rolled to give 1-1/2" diameter bar stock suitable for melting or the entire dingot may be re-melted and alloyed.

The dingot or melting stock that will be furnished to industrial processing facilities to meet the uranium military specification requirements will be supplied as described above.

#### Co-Reduction Process

Attempts have been made to eliminate the alloying step by co-reduction of the  $UF_4$  with molybdenum in the bomb reduction process. Several dingots have been reduced using this technique; however, the last dingot contained extensive porosity.

Rolling tests conducted with co-reduced stock were not successful. The billet cracked extensively during the rolling operation.

Extrusion to bar stock using co-reduced stock has been successful.

Use of co-reduction process to produce melting stock that will be supplied to the contractors is not planned at this time.

#### Ordinance Corps Alloy Development

Melting and Alloying - During the alloy development program at Watertown Arsenal, 1-1/2" diameter bar stock is used as melting stock. Small laboratory size ingots each weighing 30-40 lbs. are melted of binary, ternary, and quaternary alloys of uranium. The alloying elements studied included varying amounts of columbium, zirconium, molybdenum, tantalum, and vanadium. Extensive use is made of published phase diagrams in the binary systems to determine melting points, solid solubility limits, presence of inter-metallic compounds and low melting eutectics; however, little or no data is to be found concerning the ternary or quaternary systems.

The melting is accomplished in a vacuum-induction furnace which can be evacuated to at least .8 micron. The induction heating of uranium does not necessarily promote good mixing, and to minimize segregation which can be a problem when melting materials of extensive density difference such as uranium and titanium, the melt is super-heated 100 - 200°F above the melting point. In the laboratory heats, the melt is contained in a stabilized zirconia crucible during melting and is lip poured into a graphite mold. In order to minimize carbon pickup, the mold is washed with zirconia

mixed with water and water glass. It was determined early in the program that carbon in excess of 150 parts per million is detrimental to the ductility of the resultant material and is to be avoided. Low-carbon melt stock is used in all-alloy studies and will be used by the contractor to produce the required shapes (See Table I).

The as-cast metallurgical and mechanical properties are determined from the ingot, and the remaining part of the ingot is further processed to obtain as-extruded properties and heat-treatment stock.

#### Extrusion

Extrusion of the alloy study ingots is accomplished by heating the ingots to 1650°F for approximately 2-1/2 hours in an evacuated copper container. Billet is extruded from 2.8" dia. to approximately .75" dia. The copper cladding serves four purposes:

1. Permits the heating of billets to be carried out in an ordinary furnace and still protect the surface of the uranium.
2. Separates the uranium from the steel die, thus preventing the formation of a low temperature eutectic between the uranium and the iron in the die.
3. Serves as a lubricant during extrusion.
4. Acts as an insulator to maintain uranium surface temperatures high enough to prevent surface tears.

The copper forms a thin protective coating over the extruded bar stock. The as-extruded properties were obtained.

#### Heat-Treatment Studies

Blanks cut from the extruded bar stock are used in the heat-treatment studies. These heat-treatment studies have resulted in obtaining a wide variation in properties on one alloy. The properties of L93 are presented in Table II.

Limited heat-treatment studies of U-8%Mo and U-8%Mo-1%Ti have shown that heat treatment will not appreciably increase the mechanical properties above those presented in Tables III and IV since this alloy is single phase.

To date, 134 ingots of 70 different alloys have been melted at Watertown Arsenal; 38 of these remain to be tested in the as-extruded condition and heat treated.

This program has led to the development of at least two uranium alloys which have properties which make them usable engineering materials. There may be others developed before completion of the program. The two alloys are: U-8%Mo and U-8%Mo-1%Ti. These alloys are currently being used in the prototype manufacture of components in the research and development stage and also were used, evaluated, and tested for the M101 spotting round.

Many alloys have been developed which will meet the mechanical properties as required in the specification at the different strength levels; however, the corrosion resistance of all but the U-8%Mo and the U-8%Mo-1%Ti will not meet the specification requirement. Further studies are in progress to overcome this deficiency. Mr. Jacobson will later report on the corrosion resistance of the uranium alloys.

#### Gas Elimination

It has been determined that hydrogen in excess of the amounts given in the specification will adversely affect the ductility as measured by the percent elongation and reduction of area.

The following heat treatment has been developed to remove hydrogen in the uranium 8%Mo alloys:

900°F - 4 hours (time depending upon section size)

1650°F - 2 hours WQ

This treatment will result in a reduced yield strength but will remove the excess gases and restore the ductility to acceptable levels.

Most heats during the alloy-development program contain less than 1 part per million hydrogen and less than 100 ppm oxygen.

#### Metallographic

Limited metallographic studies have been conducted on the U-8%Mo and U-8%Mo-1%Ti alloys. Results indicate that both of these alloys are single phase. Typical microstructures are presented in Figures 3, 4, and 10 and show structures of as-cast, extruded, and "cold worked" alloys respectively. (Note the reduced grain size in the extruded condition).

Further metallographic studies will be made on these and other alloys in the heat-treated conditions as well as material worked below the recrystallization temperatures.

7 June 1960  
WATERLOO ARSENAL LABORATORIES

HEALTH PHYSICS STUDY DURING FIRING  
OF URANIUM XM101 PROJECTILES

A. Manufacture of XM101 Projectiles

The potential hazards in the manufacturing, i.e., melting, alloying, machining, etc., of the components of the uranium XM101 have been taken care of by the existing standard operating procedures as specified by the Watertown Arsenal Health Physics Office based on the limits as delineated by the Atomic Energy Commission in the Federal Register, 10 CFR, Part 20.

These procedures have been provided to Lake City Arsenal, Aberdeen Proving Ground, and Frankford Arsenal. This cooperative effort has materially expedited the alloy development, manufacturing and application of uranium material. Briefly, health physics studies conducted during melting and machining operations during the past year at Watertown Arsenal have demonstrated that the procedures implemented have effectively controlled the potential hazards to within small fractions of the permissible tolerances.

B. Tactical Use of XM101 Projectiles

1. Handling and Loading of the Projectile

Wipe tests performed on the projectile to evaluate that which could be picked up in handling showed that only extremely minute amounts of radioactive material could be wiped off. The data fall well below the minimum permissible tolerances. Our concern, however, is not for this surface radiation, but from the possibility during handling of it becoming part of the atmosphere. The wiping tests indicate that this is not a problem. The results of these tests are in Graph I. There is no health hazard involved in the handling of the uranium components in the tactical use of the round.

2. Firing of the Weapon

The circumstances of firing are no different from any conventional weapon. Normal operating procedures observed in testing and tactical use of conventional weapons are completely satisfactory for the uranium XM101 projectiles.

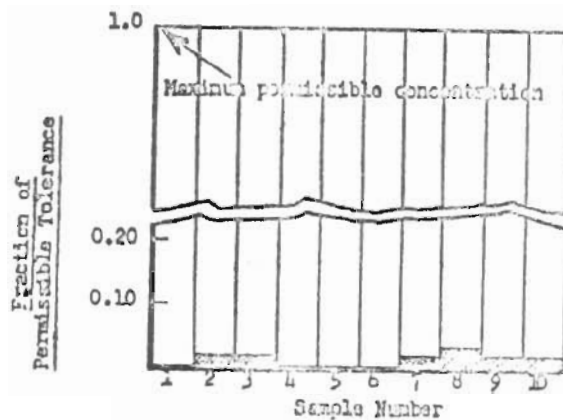
3. Post-Firing Environment and Points of Contact

a. Breathing Zone of Personnel Using the Weapon

The Watertown Arsenal Health Physics Laboratory has experimentally measured the amount of radiation resulting from particles of uranium given off during actual firing. The results as shown in Table I and the bar graph II

(shown below) clearly demonstrate that the amount of radiation and hence the amount of uranium particles (dust) given off is negligible. In four out of ten samples taken, no uranium dust could be measured with even the most sensitive instruments, and in all other cases was less than 0.6% (1/160) of maximum permissible tolerance.

In addition, there is no problem of cumulative concentrations in successive firing because of the extremely small amount of uranium material released to the atmosphere.(1)



GRAPH II

b. Bore Cleaning

Wipe tests were made on the bore surface of the gun barrel after firing of one round and after firing four consecutive rounds. One cleaning (wipe) removed all traces of radioactivity after firing one round, and only two cleanings (wiping passes) were required to remove all traces of radioactivity after firing four rounds. Test results are given in Table 2. The data shows that all traces of radioactivity were easily cleaned out.

No epidemiological hazard exists from cleaning the weapon, and the cleaning rags are not active enough to be considered a disposal problem.

(1) Recommended limits of exposure to airborne uranium dust as accepted by the Atomic Energy Commission and required under license in accordance with Atomic Energy Commission Regulation 10 CFR, Part 20. 70 dpm/m<sup>3</sup> (disintegration per minute per cubic meter of air) or 50  $\mu$ gr/m<sup>3</sup> (micrograms per cubic meter of air).

The rags are below that amount which the Atomic Energy Commission would consider contaminated. The recommendations of this author would be to dispose of the rags in any waste container and use standard bore cleaning procedures.

#### 4. Impact Area

Earth samples were taken from Lake City Arsenal and Aberdeen Proving Ground where testing of the uranium XM101 was performed. The earth samples were leached of their uranium with nitric acid solution and evaluated fluorometrically. All concentrations did not vary significantly from what would be expected anywhere on the earth's crust (3 to 9 micrograms of uranium per gram of soil). It has been suggested that the permissible concentration level for soil might safely be set at 100 times the value for water.<sup>(2)</sup> This suggestion was given by the Health and Safety Laboratory, Atomic Energy Commission, New York Operations Office. It is worth noting that no limit for ground contamination is given in Atomic Energy Commission Regulation 15 CFR, Part 20. It is the recommendation of the Watertown Arsenal Health Physicist that all spotting rounds be left in the impact area and that the impact area not be considered a radiation area. This suggestion was favorably considered by the above-mentioned Atomic Energy Laboratory.

#### 5. Conclusions

The results of the evaluated test data demonstrate that the use of the uranium in the XM101 is not an epidemiological health hazard. The standard operating procedures as exercised in the use of any conventional weapon will be adequate.

#### 6. Technical Addendum

**Sampling and Counting Techniques:** All air samples were taken, using breathing zone, constant volume air samplers designed by Watertown Arsenal's Health Physics Laboratory. Samples were evaluated with an internal proportional counter on a 2π basis using an argon and methane gas mixture. In order to improve upon the reliability of the measurements extremely long counting times had to be resorted to because of the very low level of radiation encountered in these tests.

Field monitors included geiger counters with antontubes which incorporate thin-walled geiger tubes which use a halogen quencher. Eberline gas flow, alpha survey meters were also used.

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(2) 1040 micrograms of uranium per gram of soil (parts per million, ppm).



## **APPENDIX C-12**

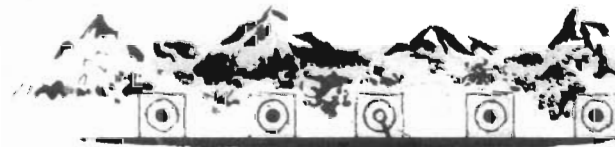
**National Personnel Records Center, St. Louis,  
MO (NPRC), Regulation prepared by HQ  
Schofield Barracks entitled *25th Infantry Division  
Range Regulations*, dated 25 May 1955, RG 338,  
Records of U.S. Operational, Tactical, and  
Support Organizations (World War II and  
Thereafter), Entry 61L-6091, Box 1,  
NPRC-020107-002A and NPRC-020107-002B.**



~~RECORD SET~~

Hq. Schofield Bn, File COPY

# RANGE REGULATIONS



HEADQUARTERS

S C H O F I E L D B A R R A C K S

25 May 1955

NPRC-020107-002 A & B

25/79 PROCEEDING STANDARDIZATION FILES  
(Range Regulations - H. SB) (1957)  
Permanent

Range Regulations #1, Hq 25th Inf Div and Hq Scho Bks, 25 May 1955

Annexes (Cont'd)

21. Range WR (1000-inch General Purpose Range)
22. Range WS (Recoilless Rifle Range)
23. Ranges WT and VU (Pistol Ranges)
24. Range WX (60mm, 81mm, and 4.2-inch Mortar Range)
25. Ranges WY-1, WY-2, WY-3, WY-4, and WY-5 (Individual Squad Problem Ranges except WY-1 which is a 1000-inch General Purpose Range and WY-5 which may also be used as Practice Mortar Training Range)
26. Range BB (Squad and Platoon Combat Range)
27. Makua Training Area Range
28. Kaena Point Military Reservation
29. Mokuleia Training Area
30. Kahuku Training Area
31. East Range Training Area
32. Kawaihoa Training Area (To be published)
33. Scheduling and coordination of ranges

DISTRIBUTION:

"A" plus  
50 each Regiment  
25 Div Arty  
150 Adj Gen, Hawaiian National Guard: ATTN: G3  
50 USAR Advisor Group  
50 4th RCT, USMC  
25 Deputy Post Commander, Fort Shafter, ATTN: S3  
100 USARPAC, ATTN: G3 (Service Distribution other than indicated above, i.e.,  
Air Force, Navy, USMCR, etc)  
100 Deputy Post Commander, Schofield Barracks, ATTN: S3  
20 G3

APPENDIX "B" TO  
ANNEX 2 TO  
RANGE REGULATIONS NUMBER 1

25 May 1955

ARTILLERY RANGE RESPONSIBILITIES

1. General:

a. The Commanding General, Division Artillery, is designated Artillery Range Safety Control Officer.

b. Requests to use the range will be submitted to the Commanding General, Schofield Barracks, ATTN: S3, not later than the 1st day of every month to cover the period of 30 through 60 days following the date submitted.

c. The CO of the unit firing is responsible for compliance with AR 305-63, and Post Range Regulations, Schofield Barracks.

2. The Artillery Range Safety Control Officer is responsible for directing safety on the range and for the following particular functions:

a. Establishing Survey Control (UTM) throughout the areas utilized by units of the Division Artillery. He will assign numbers to Firing Points, OP's and targets, maintaining in the Division Artillery SIC a map showing all existing survey control in these areas.

b. Preparing and maintaining in the Division Artillery SIC, safety strip maps for all position areas showing safety limits for firing from each firing point in accordance with AR 305-63.

c. Preparing Range Cards for use by the firing unit. These cards will show right, left, and intermediate limits in UTM Grid Azimuth, all maximum and minimum ranges in yards from the firing point marker and any other data and restrictions to firing as directed by existing regulations.

3. The officer-in-charge of firing is responsible for safety within his unit and for the following particular functions:

a. Insuring that communication is established between Range Central (Building 1191) and the Firing Unit FDC or the OP. There will be an operator in constant attendance at each end and firing will cease immediately upon failure of communications with Range Central.

b. Insuring that wire communications is established between the operator of the Air Distress Net and the Firing Unit FDC. There will be an operator in constant attendance and firing will cease immediately upon call from the Air Distress Operator only.

c. That Range Safety Cards are obtained from the Division Artillery SIC 24 hours prior to firing.

d. That firing is not allowed prior to obtaining clearance by telephone or radio from Range Central.

e. That only position areas and impact areas as described on the range safety card are used.

- f. That a qualified Safety Officer is appointed for each firing position who will be responsible that the weapons fire all rounds within the safety limits prescribed; His duties are prescribed and explained in FM 6-40, Appendix VI, para 7, dated June 1950 and AR 385-63. He will construct a safety diagram of the impact area showing the deflections corresponding to the right, left, and intermediate limits and the quadrant elevations and time fuse settings for the minimum and maximum ranges for each charge used. Current metres and/or registration corrections must be applied. He will modify the deflection limits and minimum and maximum ranges by the value of eight (8) probable errors as prescribed Note I, Table I, AR 385-63, prior to registrations, and include all intervening crests in determining the minimum quadrant elevation. The officer-in-charge of firing will assure that the safety officer is not "rushed or in any way harassed" when he is determining safety of the battery or rounds to be fired.
- g. That firing is not started until the Safety Officer has checked the safety diagram and cleared the unit to fire. The scarlet streamer will be displayed from a prominent point on all ranges and at all times during firing.
- h. That the battery center is within 100 yards of the designated firing point.
- i. That no VT or WP ammunition nor direct fire is fired without prior approval of the Artillery Range Safety Control Officer.
- j. That firing is suspended immediately upon discovery that unauthorized entry has been made into the impact area or when aircraft are seen operating over the impact area or in your line of fire.
- k. That any fires are reported immediately to the Range Officer and assistance to the Range Officer will be rendered if required.
- l. That any accident or malfunction of weapons or ammunition is reported immediately to the Range Officer (Building 1191) and the Post S3 giving details surrounding the incident; and that firing ceases immediately until aid has been rendered or action to be taken is determined.
- m. That all data is checked immediately when a round fired by his unit is lost or seen to land outside the prescribed Danger Area and that all available details are reported immediately to the Range Officer and to the Post S3, verbally, following a written report to the Commanding General, Schofield Barracks. Firing is to be suspended until action to be taken is determined.
- n. That prior to departure from the range all trail holes are filled, the area used thoroughly policed and any damages to existing facilities have been reported to the Range Officer.
- o. That the Range Officer be notified prior to departure from the range or the removal of the telephone from the range lines.
- p. That all duds are reported to the Range Officer to include the coordinates as accurately as known.
- q. That existing Firing Points are not removed or destroyed.
- r. That for units firing across a road from a position within 200 yards of the road, necessary road guards and communications are provided to insure that units do not fire over vehicles using the road. Traffic may be temporarily delayed.
- h. Before any close support training exercises, demonstrations and combined arms training exercises may be started, artillery safety measures must have the approval of the Post S3.

ANNEX 3 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WA (Major General Robert H Soule)  
Rifle Grenade and Rocket Launcher Range  
(INERT AMMUNITION ONLY)

THE OFFICER IN CHARGE OF FIRING ON RANGE WA WILL:

1. Be familiar with all safety regulations and rules for the weapons to be fired as proscribed in SR 385-310-1, FM 23-6, and FM 23-32.
2. Coordinate with the Range Officer at least 24 hours prior to scheduled firing for special instructions.
3. Use inert ammunition only.
4. Insure that an appropriate back blast area in rear of the rocket launcher is provided for and observed.
5. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
6. Insure that no firing is permitted until the red streamer is in place.

NOTE: No personnel will be permitted on Range WA when HE hand grenades are used on Range WB.

1

ANNEX 4 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WB (Major General Orlando C Hood)  
Hand and Rifle Grenade and Rocket Launcher Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WB WILL:

1. Be familiar with all safety regulations and rules for the weapons to be fired as prescribed in SR 385-310-1, FM 23-30, and FM 23-32.
2. Coordinate with the Range Officer at least 24 hours prior to scheduled firing for special instructions.
3. When using WB Range for HE hand grenades, post a guard adjacent to range guard post #1 at intersection of Trimble and the Cable Car Roads with a field telephone on the line connected to the range tower. This guard will coordinate with the officer in charge when persons request to visit the area when firing is in progress.
4. Inspect all ammunition to insure that the proper ammunition and fuzes are used.
5. Insure that HE ammunition (rockets, rifle grenades, and hand grenades) is placed at least 200 feet from troop concentrations and sufficiently in rear of the firing line to protect the ammunition from fragmentation or sympathetic detonation.
6. Require that all personnel within 200 yards of the target wear steel helmets.
7. Insure that an appropriate back blast area in rear of the rocket launchers is provided for and observed.
8. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
9. Insure that no persons throw or fire HE hand grenades, rifle grenades or rocket launchers that have not had instruction utilizing practice grenades and/or rockets.
10. Insure that all personnel are cautioned concerning the potential hazard involved in handling hand grenades.
11. Insure that no firing is permitted until the red streamer is in place.

NOTE: No personnel will be permitted on Range WA when HE hand grenades are used on Range WB.

ANNEX 5 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WC-1 (Brigadier General Claudius Easley)  
Sub-Machine Gun Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WC-1 WILL:

1. Be familiar with all safety regulations for the weapon fired and the operation of the course as proscribed in SR 385-310-1 and FM 23-41.
2. Coordinate with the Range Officer at least 24 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Insure that no firing is permitted until the red streamer is in place.
5. Require that a coach stand in rear of the firer in order to control his movements.
6. Issue loaded magazines to firer on the firing point only.
7. Require all weapons to be pointed down range at all times. Bolts will be forward at all times except when loading or firing.

NOTE: This range will not be scheduled when firing is to be conducted on Range WC-2.



ANNEX 6 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WC-2 (Brigadier General Claudius Basely)

Close Combat Course

THE OFFICER IN CHARGE OF FIRING ON RANGE WC-2 WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SR 385-310-1, Pl 23-5 and TC 17 dated 29 July 1953.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to insure availability of targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require that all men negotiating the course wear steel helmets.
5. Have one responsible NCO negotiate each lane to assist in keeping the personnel aligned on the course.
6. Prevent diagonal firing and firing into adjacent lanes.
7. Clear all weapons twice on completion of the course, once in the draw at the end of the course and for the second time when the men cross the starting line on the return.
8. Insure that no firing is permitted until the red streamer is in place.

NOTE: This range will not be scheduled when firing is to be conducted on Ranges WC-1 and/or WD.

(25 Jan 56)

ANNEX 7 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE 'D' (Private First Class Herbert K. Fililaau)  
Machine Gun Demonstration and Familiarization Range

THE OFFICIAL DUTIES OF FIRING OFFICER RANGE 'D' WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SA 385-310-1, FM 23-55 and FM 23-65.
2. Coordinate with the Range Officer at least 24 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Issue ammunition only on the firing line.
5. Insure that, after machine guns are fired and prior to dismounting or removing them from the firing positions, each gun is inspected by an officer to see that it is cleared. As part of the inspection, a cleaning rod will be passed through the barrel of each gun from the muzzle. The cover will be raised and a wooden block will be inserted and remain in the receiver until the machine gun is placed in action or disassembled for cleaning.
6. Limit fire to the impact area below the Fire Break Trail.
7. Insure that no firing is permitted until the red streamer is in place.

NOTES: 1. This range will not be scheduled when firing is to be conducted on WC-2.

2. Firing on this range will be done in such a way that no rounds will hit the berm located 300 yards in front of the range.

(25 Jan 56)

ANNEX 8 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WE (Lieutenant Hugh B Casey)  
BAR Transition - - - Table VIII

THE OFFICER IN CHARGE OF FIRING ON RANGE WE WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SR 385-310-1 and FM 23-15.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Permit no firing into adjacent lanes. Diagonal firing will not be allowed.
5. Allow no ammunition to be issued except on the starting point.
6. Insure that all weapons are cleared before they are removed from the firing line.
7. Require firers to keep alignment while advancing. Coaches will accompany firers to assist in maintaining alignment.
8. Coordinate with officer in charge of firing on Ranges WJ, WF-1 and WF-2 when it is necessary to change or move the pit detail forward of the firing line. These ranges will be requested by telephone to cease firing until the WE pit detail is either in their pits or in rear of the firing line.
9. Insure that no firing is permitted until the red streamer is in place.

CONDUCT OF LIVE FIRE SQUAD AND PLATOON PROBLEMS:

1. Live firing squad and platoon problems may be conducted on WE Range within the limits indicated in Appendix A.
2. Flank safety limits and the limit of advance MUST be observed to insure the safety of problem personnel.
3. The range cannot be used for live fire problems when WJ Range, Range WF-1 and/or WF-2 are being used.

APPENDIX:  
"A" Overlay of WE Range

ANNEX 9 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE "F-1 (Sergeant Leray A Mendonca)  
Carbine Transition Range - - - Table VII

THE OFFICER IN CHARGE OF FIRING OF RANGE "F-1 WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SR 385-310-1 and FM 23-7.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all men in pits to wear steel helmets.
5. Permit no firing into adjacent lanes. Diagonal firing will not be allowed.
6. Allow no ammunition to be issued except on the firing points. Permit loading only on the command "LOCK AND LOAD."
7. Insure that all weapons are cleared before they are removed from the firing line.
8. Insure that weapons are locked and kept pointing down range when moving from lane to lane.
9. Insure that no firing is permitted until the red streamer is in place.

NOTES: 1. This range will not be scheduled when tactical problems are to be conducted on Range "E."

2. This range will cease firing on telephone request from Range "E" (Bar Transition), until all members of the pit detail on Range "E" are either in the pits or on the firing line.

(25 Jan 56)

ANNEX 10 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WF-2 (Sergeant Leroy A Mendonca)  
Carbine Transition Range - - - Table VIII

THE OFFICER IN CHARGE OF FIRING ON RANGE WF-2 WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SR 385-310-1 and FM 23-7.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all firers to fire from a numbered firing point to the corresponding numbered target.
5. Issue ammunition on the firing line only.
6. Require firers to keep aligned while advancing and employ coaches to assist in maintaining alignment.
7. Require all personnel negotiating the course to wear steel helmets.
8. Insure that no firing is permitted until the red streamer is in place.

NOTES: 1. This range will not be scheduled when tactical problems are to be conducted on Range WE.

2. This range will cease firing on telephone request from Range WE (BAR Transition), until all members of the pit detail on Range WE are either in the pits or on the firing line.

ANNEX 11 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WG (Corporal Oliver A. Schott)  
500-Inch and 1000-Inch General Purpose Tanks

THE OFFICER IN CHARGE OF FIRING ON RANGE WG WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SR 385-310-1, FM 23-5, FM 23-7, FM 23-41, FM 23-55, FM 23-80, FM 23-81 and FM 23-35.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all firers to fire from a numbered firing point to the corresponding numbered target.
5. Issue ammunition on the firing line only.
6. Insure that, after machine guns are fired, and prior to dismounting or removing them from the firing positions, each gun is inspected by an officer to see that it is unloaded. As part of this inspection, a cleaning rod will be passed through the barrel of each gun from the muzzle. The cover will be raised and a wood block will be inserted into the receiver. The wood block will remain in the receiver until the gun is placed in action or disassembled for cleaning.
7. Insure that all weapons are cleared before allowing anyone to move forward of the firing line.
8. Insure that no firing is permitted until the red streamer is in place.

ANNEX 12 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WH-1 (Lieutenant General Hugh A. Drum)  
BAR Transition Range - - - Table VII

THE OFFICER IN CHARGE OF FIRING ON RANGE WH-1 WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SR 385-310-1 and FM 23-15.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all men in pits to wear steel helmets.
5. Permit no firing into adjacent lanes. Diagonal firing will not be allowed.
6. Allow no ammunition to be issued except on the firing point. Permit loading only on the command "LOCK AND LOAD."
7. Insure that all weapons are cleared before they are removed from the firing line.
8. Insure that weapons are locked and kept pointing down range when moving from lane to lane.
9. Coordinate with Range WJ before advancing pit details. Range WJ will have to cease firing until all members of the pit details on WH-1 are either in their pits or in rear of the firing line.
10. Insure that no firing is permitted until the red streamer is in place.

NOTE: This range will not be scheduled when firing is to be conducted on the moving target tank range (Range H-3) and/or Range WI.

(25 Jan 56)

ANNEX 13 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE WH-2 (Lieutenant General Hugh A. Drum)  
Portable Flamethrower Qualification Range

THE OFFICER IN CHARGE OF FIRING ON WH-2 RANGE WILL:

1. Be familiar with all safety regulations for the portable flamethrower and the operation of the course as prescribed in SR 385-310-1 and appropriate Field Manuals and Technical Manuals.
2. Coordinate with the Range Officer at least 24 hours prior to scheduled firing for special instructions.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Insure that no firing is permitted until the red streamer is in place.
5. Insure that adequate equipment is on hand for fire fighting.
6. Insure that NO SMOKING is permitted in the flamethrower storage and servicing area.
7. Provide an ambulance equipped with proper first-aid equipment for burns which will be available in the immediate vicinity of the firing. The stretcher will be removed from the ambulance and placed beside it. The driver will remain close by. All firing is to cease in case the ambulance leaves the vicinity for any reason whatsoever.



ANNEX 1A TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGE MH-3 (Lieutenant General Hugh A. Drum)  
Tank Gunnery Range - Moving Targets, Sub-caliber

THE OFFICER IN CHARGE OF FIRING ON RANGE MH-3 WILL:

1. Be familiar with all safety regulations and rules for the weapon to be fired as prescribed in SR 385-310-1 and appropriate Field Manuals and Technical Manuals.
2. Coordinate with the Range Officer at least 24 hours prior to scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Insure that, after machine guns are fired, and prior to moving from the firing position, each gun is inspected by an officer or noncommissioned officer to see that it is unloaded.
5. Insure that no firing is permitted until the red streamer is in place.

NOTE: This range will not be scheduled when firing is to be conducted on Ranges MH-1, VI and/or VII.

ANNEX 15 TO  
SAFETY REGULATIONS  
NUMBER 1

25 May 1955

RANGE VII  
Mortar Field Target Firing Range

THE OFFICER IN CHARGE OF FIRING AT RANGE VII WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SR 385-310-1, FM 23-90 and FM 23-92..
2. Coordinate with the Range Officer at least 24 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Inspect barrels and propelling charges for presence of moisture. If moisture is detected, the mortar will not be fired until moisture is removed.
5. Not permit firing outside of marked Sector of Fire nor at a range of less than 700 yards or more than 3500 yards; no rounds will be fired that fall less than 200 yards from the Fire Break Trail.
6. Insure that no obstructions are in the line of flight of the shell.
7. Require all ammunition be kept covered until it is fired.
8. Require misfires to be removed only under the close supervision of a qualified officer or noncommissioned officer. A wait of one (1) minute is required between malfunction and removal of a misfire.
9. Require all mortars be inspected by a qualified NCO prior to firing to insure proper set up, mask clearance, and lay of piece.
10. Require all personnel on the range to wear steel helmets during firing.
11. Require that all firing is conducted within the area outlined by the lines of white poles (on either side of the range) indicating flank safety limits.
12. Insure that no firing is permitted until the red streamer is in place.
13. Require that all personnel not actually engaged in the conduct of firing stay at least 300 yards from the mortars being fired, when M52 series fuzes are used for the 60mm Mortar, unless an appropriate protective wall or bunker is available.

NOTE: This range will not be scheduled when Ranges 'B-1, 'M-3 and/or 'WJ are scheduled to be in use.

(25 Jan 56)

AN EX 16 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

RANGES WJ, WK, WL AND WM (Colonel Anna G Clarke)  
M1 Rifle, Carbine and BAR Known Distance Ranges

THE OFFICER IN CHARGE OF FIRING OF RANGES WJ, WK, WL AND WM WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in SR 385-310-1, TM 23-5, FM 23-7 and FM 23-15.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the ranges.
4. Orient and appoint a Pit Officer.
5. Permit no firing until a red streamer is at full staff.
6. Require all firing to be from numbered firing points to the corresponding numbered target only. Diagonal firing will not be allowed.

NOTES: 1. Range WJ will cease firing on telephone request from Ranges WE and/or Range WH-1. This request will be coordinated by the officers in charge of firing.

2. Range WJ will not be scheduled when tactical problems are to be conducted on Range WE or when firing is to be conducted on Ranges WH-3 and/or WI.

3. Range WM will cease firing on telephone request from Range WN, until all members of the pit detail on Range WN are either in the pits or in the rear of the firing line.

4. Range WM will not be scheduled when tactical problems involving movement of personnel forward of the firing line are to be conducted on Range WN.

THE PIT OFFICER WILL:

1. Remain in the pits at all times during firing and be responsible to the officer in charge of firing for the efficient and safe operation of the pits.
2. Enforce the following safety precautions:
  - a. Wearing of steel helmets of all personnel in pits.
  - b. Allow no one in rear of the line of targets while firing is in progress.
  - c. Allow no vehicles in the pit area during firing other than maintenance vehicle with Range Personnel.
3. Keep all targets, spotters, and pasters in the pit house when not in use. Targets are to be removed from the rack and stored in the pit house when firing is not conducted during inclement weather.
4. Insure the pits are policed and return all equipment to its proper storage place.
5. Insure cleanliness of and wash down all latrines.

25 May 1955

ANNEX 27 TO  
RANGE REGULATIONS  
NUMBER 1

MAKUA TRAINING AND RANGE AREA

1. Reference: Map, Makua Training Area, 1:20,000.
2. The beach road (extension of Farrington Highway) will be posted with sentries by service using the area while firing is in progress. See Appendix "A".
3. Firing range flags will be hoisted by the using service on flagpoles established at entrances of the beach road leading to Makua Valley and plainly visible to road traffic and seaward while range firing is in progress. See map for location of flagpoles.
4. The "Area to be Kept Clear of Duds" will be scouted for any trespassers prior to any firing exercises by the service using the area.
5. All roads leading off the "Area to be Kept Clear of Duds," 1,000 yards distant from the beach road toward Makua Valley, will be barricaded when not in use. Using unit will be held responsible that barricades are put in place upon completion of training. Appropriate metal signs at entrances will be observed.
6. The "Area to be Kept Clear of Duds" will be checked regularly by a range clearance team to ascertain compliance of these regulations by using service. Units detecting duds will report immediately the location and type thereof to AC of S, G3, this headquarters.
7. Range clearance team, this headquarters, will check conditions of "warning signs" at both beach road entrances to Makua Valley and "dud area" signs marking limits of dud area.
8. Officers in charge of firing will insure that no ammunition or aerial ordnance, impact on or near the Tank Crew Proficiency Course as outlined in Appendix "A".
9. If a fire starts in the impact area, this headquarters, AC of S, G3, will be notified. No troops will enter the impact area to put out fires. If a fire starts in the area cleared of duds or adjacent thereto troops will be moved a minimum of 200 yards from the fire and will not approach the area until the fire is extinguished and until such time as the possibility of a dud being exploded by the heat of the fire has elapsed. Only the officer in charge of firing can make this decision based on his personal observation of the fire, its intensity and its location with respect to cleared areas to be used by troops.

APPENDIX:  
"A" Overlay Makua Training Area

ANNEX 27A TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

ADDITIONAL REGULATIONS GOVERNING 76MM AND 90MM TANK GUN  
FIRING AT MAKUA RANGE

1. The Officer in Charge of Tank Firing will comply with the provisions of basic regulation and Annex 27.

2. The OIC will enforce strictly the following restrictions on firing 76mm and 90mm tank guns:

a. No tank will fire from any position outside the designated tank firing position area shown on Appendix "A". Signs posted on the Beach Road (extension of Farrington Highway) indicate the northwest corner and the southwest corner of this tank firing position area.

b. High explosive and smoke shells only will be fired.

c. Tanks will not fire on any target from any position at a gun-target range of less than 2000 yards (At 2000 yards and over, the angle of fall of the projectile is increased so as to decrease the possibility of a ricochet.).

d. Tanks will not fire with a tube elevation (from horizontal) greater than 147 mils on the 90mm gun, or 170 mils on the 76mm gun. A qualified officer or noncommissioned officer will check the tube elevation with the M-1 gunner's quadrant before each round is fired to ascertain that the tube elevation does not exceed these figures.

e. Tanks will fire between the following azimuths only, regardless of their position within the firing position area:

Grid azimuth of 93° (1654 mil) and 110° (1956 mil)

or

Magnetic azimuth of 82° (1454 mil) and 99° (1756 mil)

A qualified officer or noncommissioned officer will verify the lay of the gun prior to each round fired to ascertain that the direction of the tube is within these limits. This verification should be made with the azimuth indicator or other equally accurate method such as individual range stakes.

NOTE: (Paragraphs 2a, 2d, and 2e above are designed to insure that all rounds fall and detonate within the impact area shown on Appendix "A". Range officers will take any additional precautions which will assist in attaining this goal.)

3. Prior to moving any vehicles or personnel into the impact area on the cleared trails shown on Appendix "A", the OIC will have the trail visually checked for duds. If duds are found on the trail, the OIC will allow no troops or vehicles to move on it and will report the dud(s) as prescribed in par 3d(3), basic regulation.

4. The officer in charge will insure that:

a. While in the firing position area, each tank displays flags according to the following code:

(1) RED Indicates firing is in progress, guns loaded.

ANNEX 27A TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955

ADDITIONAL REGULATIONS GOVERNING 76MM AND 90MM TANK GUN  
FIRING AT TARUA RANGE

1. The Officer in Charge of Tank Firing will comply with the provisions of basic regulation and Annex 27.

2. The OIC will enforce strictly the following restrictions on firing 76mm and 90mm tank guns:

a. No tank will fire from any position outside the designated tank firing position area shown on Appendix "A". Signs posted on the Beach Road (extension of Farrington Highway) indicate the northwest corner and the southwest corner of this tank firing position area.

b. High explosive and smoke shells only will be fired, with fuze super quick. Shells will not be fired with fuze delay.

c. Tanks will not fire on any target from any position at a gun-target range of less than 2000 yards (At 2000 yards and over, the angle of fall of the projectile is increased so as to decrease the possibility of a ricochet.).

d. Tanks will not fire with a tube elevation (from horizontal) greater than 147 mils on the 90mm gun, or 170 mils on the 76mm gun. A qualified officer or noncommissioned officer will check the tube elevation with the M-1 gunner's quadrant before each round is fired to ascertain that the tube elevation does not exceed these figures.

e. Tanks will fire between the following azimuths only, regardless of their position within the firing position area:

Grid azimuth of 93° (1654  $\mu$ ) and 110° (1956  $\mu$ )

or

Magnetic azimuth of 82° (1454  $\mu$ ) and 99° (1756  $\mu$ )

A qualified officer or noncommissioned officer will verify the lay of the gun prior to each round fired to ascertain that the direction of the tube is within these limits. This verification should be made with the azimuth indicator or other equally accurate method such as individual range stakes.

NOTE: (Paragraphs 2a, 2d, and 2e above are designed to insure that all rounds fall and detonate within the impact area shown on Appendix "A". Range officers will take any additional precautions which will assist in attaining this goal.)

3. Prior to moving any vehicles or personnel into the impact area on the cleared trails shown on Appendix "A", the OIC will have the trail visually checked for duds. If duds are found on the trail, the OIC will allow no troops or vehicles to move on it and will report the dud(s) as prescribed in par 3d(3), basic regulation.

4. The officer in charge will insure that:

a. While in the firing position area, each tank displays flags according to the following code:

(1) RED Indicates firing is in progress, guns loaded.

(15 Feb 56)

- (2) ORANGE Indicates tank out of action not due to malfunction of ammunition.
- (3) RED and ORANGE Indicates a misfire or other malfunction involving ammunition.
- (4) GREEN Indicates that all guns are clear (Breech of tank guns open; a T-block inserted in receiver of all machine guns.)

b. Tanks or personnel do not take position in the line of fire of another tank. This requires that tanks remain abreast of each other and that no dismounted personnel go forward of the rear of any tank except when the green flag is flying.

c. When any guns on the tank are not clear, they will be pointed down range.

d. That all guns are cleared, checked, and reported before tanks leave firing position area.

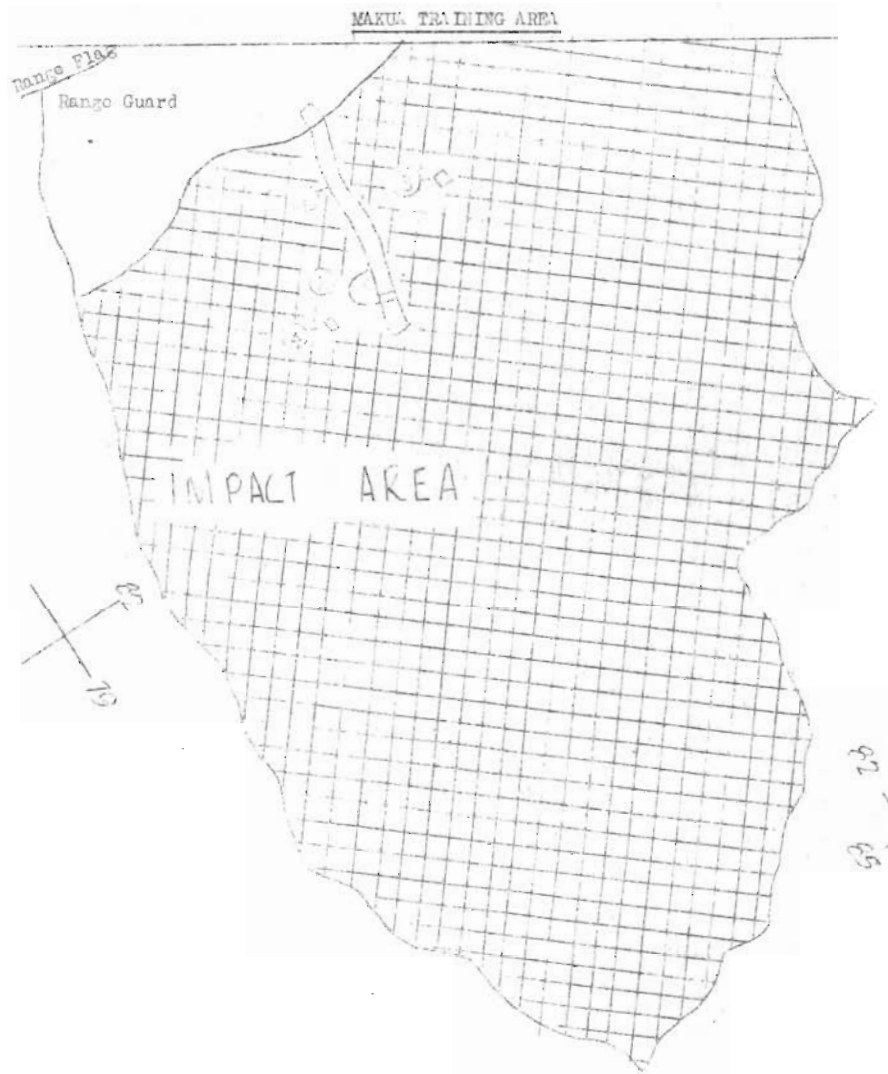
5. The OIC will post one range guard and hoist one range flag at each location shown on Appendix "A". He will instruct the guards to halt all traffic entering the range area and to inform them that firing is in progress, not to stop in area, not to get off the beach road, and to watch out for the tanks on the road. The guard will inform military personnel where the Officer in Charge may be found.

6. In case of combat firing problems, OIC will consult A/C of S, G-3 for suspension of such of these administrative restrictions as may be permitted in the interests of combat realism.

7. The OIC will establish telephone communication with the Schofield switchboard, report into the Air Distress Warning net, and obtain clearance from the AG of S, G-3, this Headquarters (55-2269), before firing.

APPENDIX "A" TO  
ANNEX 27 TO  
RANGE REGULATIONS  
NUMBER 1

25 May 1955



MAP: HAWAIIAN ISLANDS, 1:25,000, SHEETS 3 and 7

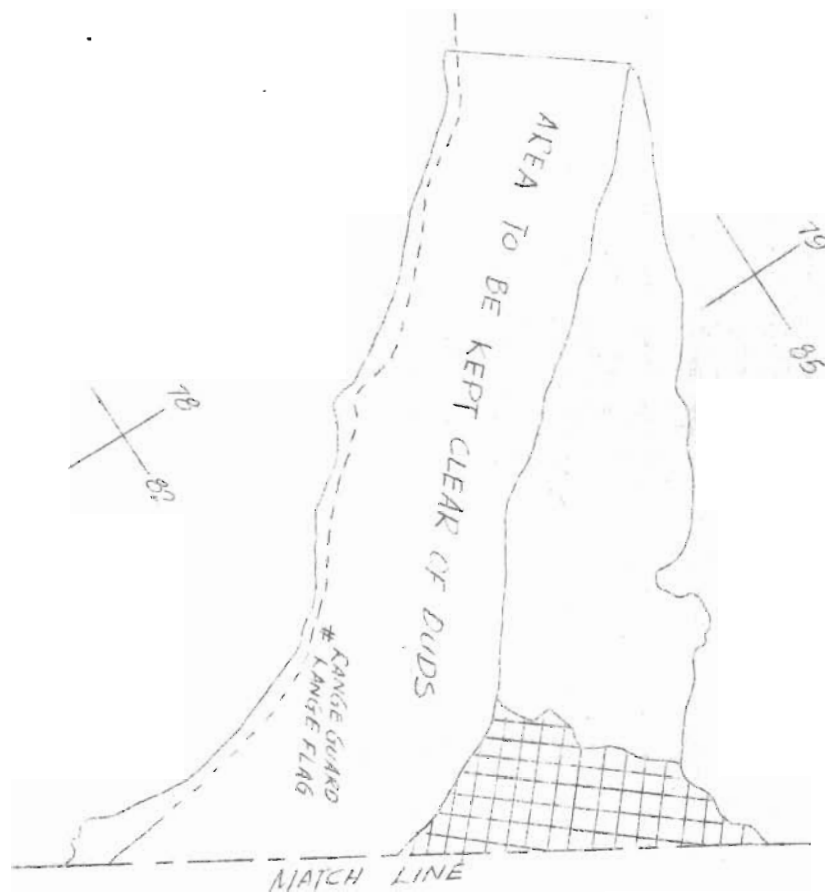
Items numbered 1 through 4 are installations which are a part of the Tank Crew Proficiency Course. No ammunition or aerial ordnance will be fired which will impact on these installations.



APPENDIX "A" TO  
ANNEX 27 TO  
RANGE REGULATIONS  
NUMBER 1 (Cont'd)

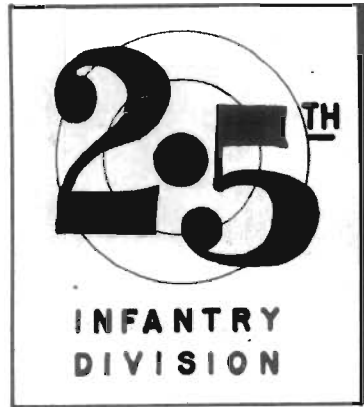
25 May 1955

MAKUA TRAINING AREA



## **APPENDIX C-13**

**National Personnel Records Center, St. Louis,  
MO (NPRC), Regulation prepared by HQ  
Schofield Barracks entitled *25th Infantry Division  
Range Regulations*, dated 31 May 1957, RG 338,  
Records of U.S. Operational, Tactical, and  
Support Organizations (World War II and  
Thereafter), Entry 61L-6091, Box 1,  
NPRC-013107-001.**



# RANGE REGULATIONS



HEADQUARTERS

S C H O F I E L D B A R R A C K S

250/19 PROCEDURAL STANDARDIZATION FILES  
(Range Regulations - H, 3B)  
(1957)  
Permanent

NPAC-013107-001

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APPENDIX 2 TO  
ANNEX B TO  
RANGE REGULATIONS NUMBER 1

ARTILLERY RANGE RESPONSIBILITIES

1. General:

a. The Commanding General, Division Artillery, is designated Artillery Range Safety Control Officer.

b. Requests to use the range will be submitted to the Commanding General, 25th Infantry Division, ATTN: AC of S, G3, not later than the 1st day of every month to cover the period of 30 through 60 days following the date submitted.

c. The CO of the unit firing is responsible for compliance with AR 385-63, and Post Range Regulations, Schofield Barracks.

2. The Artillery Range Safety Control Officer is responsible for directing safety on the range and for the following particular functions:

a. Establishing Survey Control (UTM) throughout the areas utilized by units of the Division Artillery. He will assign numbers to Firing Points, OP's and targets, maintaining in the Division Artillery SIC a map showing all existing survey control in those areas.

b. Preparing and maintaining in the Division Artillery SIC, safety strip maps for all position areas showing safety limits for firing from each firing point in accordance with AR 385-63.

c. Preparing Range Cards for use by the firing unit. These cards will show right, left, and intermediate limits in UTM Grid Azimuth, all maximum and minimum ranges in yards from the firing point marker and any other data and restrictions to firing as directed by existing regulations.

3. The officer-in-charge of firing is responsible for safety within his unit and for the following particular functions:

a. Insuring that communication is established between Range Central (Building 1191) and the Firing Unit FDC or the OP. There will be an operator in constant attendance at each end and firing will cease immediately upon failure of communications with Range Central.

b. Insuring that wire communications is established between the operator of the Air Distress Net and the Firing Unit FDC. There will be an operator in constant attendance and firing will cease immediately upon call from the Air Distress Operator only.

c. That Range Safety Cards are obtained from the Division Artillery SIC 24 hours prior to firing.

d. That firing is not allowed prior to obtaining clearance by telephone or radio from Range Central.

e. That only position areas and impact areas as described on the range safety card are used.

f. That a qualified Safety Officer is appointed for each firing position who will be responsible that the weapons fire all rounds within the safety limits prescribed. His duties are prescribed and explained in FM 6-40, Appendix VI, para 7, dated June 1950 and AR 385-63. He will construct a safety diagram of the impact area showing the deflections corresponding to the right, left, and intermediate limits and the quadrant ele-

P-B-1

uations and time fuze settings for the minimum and maximum ranges for each charge used. Current metros and/or registration corrections must be applied. He will modify the deflection limits and minimum and maximum ranges by the value of eight (8) probable errors as prescribed Note I, Table I, AR 385-63, prior to registrations, and include all intervening crests in determining the minimum quadrant elevation. The officer-in-charge of firing will assure that the safety officer is not "rushed or in any way harassed" when he is determining safety of the battery or rounds to be fired.

g. That firing is not started until the Safety Officer has checked the safety diagram and cleared the unit to fire. The scarlet streamer will be displayed from a prominent point on all ranges and at all times during firing.

h. That the battery center is within 100 yards of the designated firing point.

i. That no VT or WP ammunition nor direct fire is fired without prior approval of the Artillery Range Safety Control Officer and the AC of S, G3.

j. That firing is suspended immediately upon discovery that unauthorized entry has been made into the impact area or when aircraft are seen operating over the impact area or in your line of fire.

k. That any fires are reported immediately to the Range Officer and assistance to the Range Officer will be rendered if required.

l. That any accident or malfunction of weapons or ammunition is reported immediately to the Range Officer (Building 1191) and the AC of S, G3, giving details surrounding the incident; and that firing ceases immediately until aid has been rendered or action to be taken is determined.

m. That all data is checked immediately when a round fired by his unit is lost or seen to land outside the prescribed Danger Area and that all available details are reported immediately to the Range Officer and to the AC of S, G3, verbally, following a written report to the Commanding General, Schofield Barracks. Firing is to be suspended until action to be taken is determined.

n. That prior to departure from the range all trail holes are filled, the area used thoroughly policed, trash hauled to sanitary fill, and any damages to existing facilities have been reported to the Range Officer.

o. That the Range Officer be notified prior to departure from the range or the removal of the telephone from the range lines.

p. That all duds are reported to the Range Officer to include the coordinates as accurately as known.

q. That existing Firing Points are not removed or destroyed.

r. That for units firing across a road from a position within 200 yards of the road, necessary road guards and communications are provided to insure that units do not fire over vehicles using the road. Traffic may be temporarily delayed.

4. Before any close support training exercises, demonstrations and combined arms training exercises may be started, artillery safety measures must have the approval of the AC of S, G3.

ANNEX C TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WA (Major General Robert H Soule)  
Rifle Grenade and Rocket Launcher Range  
(INERT AMMUNITION ONLY)

THE OFFICER IN CHARGE OF FIRING ON RANGE WA WILL:

1. Be familiar with all safety regulations and rules for the weapons to be fired as prescribed in AR 385-63, FM 23-5, and FM 23-32.
2. Coordinate with the Range Officer at least 24 hours prior to scheduled firing for special instructions.
3. Use inert ammunition only.
4. Insure that an appropriate back blast area as indicated in AR 385-63 in rear of the rocket launcher is provided for and observed.
5. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
6. Insure that no firing is permitted until the red streamer is in place.

NOTE: No personnel will be permitted on Range WA when HE hand grenades are used on Range WB.

ANNEX D TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WB (Major General Orlando C Mood)  
Hand and Rifle Grenade  
and Rocket Launcher Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WB WILL:

1. Be familiar with all safety regulations and rules for the weapons to be fired as prescribed in AR 385-63, FM 23-30, and FM 23-32.
2. Coordinate with the Range Officer at least 24 hours prior to scheduled firing for special instructions.
3. When using WB Range for HE hand grenades, post a guard at range guard post #1, intersection of Trimble and the Cable Car Roads, with a field telephone on the line connected to the range tower. This guard will coordinate with the officer in charge when persons request to visit the area when firing is in progress.
4. Inspect all ammunition to insure that the proper ammunition and fuzes are used.
5. Insure that HE ammunition (rockets, rifle grenades, and hand grenades) is placed at least 200 feet from troop concentrations and sufficiently in rear of the firing line to protect the ammunition from fragmentation or sympathetic detonation.
6. Require that all personnel within 250 yards of the target wear steel helmets.
7. Insure that an appropriate back blast area in rear of the rocket launchers is provided for and observed.
8. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
9. Insure that no persons throw or fire HE hand grenades, rifle grenades, or rocket launchers that have not had instruction utilizing practice grenades and/or rockets.
10. Insure that all personnel are cautioned concerning the potential hazard involved in handling hand grenades.
11. Insure that no firing is permitted until the red streamer is in place.
12. Permit no personnel within 100 yards of point of burst to be exposed at any time while hand fragmentation and offensive grenades are being thrown or for 10 seconds after grenades have impacted. This includes personnel in the control tower.

NOTE: No personnel will be permitted on Range WA when HE hand grenades are used on Range WB.

ANNEX E TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WC-1 (Brigadier General Claudius Easley)  
Sub-Machine Gun Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WC-1 WILL:

1. Be familiar with all safety regulations for the weapon fired and the operation of the course as prescribed in AR 385-63 and FM 23-41.
2. Coordinate with the Range Officer at least 24 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Insure that no firing is permitted until the red streamer is in place.
5. Require that a coach stand in rear of the firer in order to control his movements.
6. Issue loaded magazines to firer on the firing point only.
7. Require all weapons to be pointed down range at all times. Bolts will be forward at all times except when loading or firing.

NOTE: This range will not be scheduled when firing is to be conducted on Range WC-2, or when 60mm or 81mm mortars are being fired on WD Range.



ANNEX F TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WC-2 (Brigadier General Claudius Easely)  
Close Combat Course

THE OFFICER IN CHARGE OF FIRING ON RANGE WC-2 WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63, FM 23-5 and TC 17 dated 29 July 1953.
2. Coordinate with the Range Officer at least 24 hours in advance of scheduled firing for special instructions and to insure availability of targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require that all men negotiating the course wear steel helmets.
5. Have one responsible NCO negotiate each lane to assist in keeping the personnel alined on the course.
6. Prevent diagonal firing and firing into adjacent lanes.
7. Clear all weapons twice on completion of the course, once in the draw at the end of the course and for the second time when the men cross the starting line on the return.
8. Insure that no firing is permitted until the red streamer is in place.

NOTE: This range will not be scheduled when firing is to be conducted on Ranges WC-1 and/or WD.

ANNEX G TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WD  
(Private First Class Herbert K Pililaau)  
Machine Gun Demonstration  
and Familiarization Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WD WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63, FM 23-55, and FM 23-65.
2. Coordinate with the Range Officer at least 24 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Issue ammunition only on the firing line.
5. Insure that, after machine guns are fired and prior to dismounting or removing them from the firing positions, each gun is inspected by an officer to see that it is cleared. As part of the inspection, a cleaning rod will be passed through the barrel of each gun from the muzzle. The cover will be raised and a wooden block will be inserted and remain in the receiver until the machine gun is placed in action or disassembled for cleaning.
6. Limit fire to the impact area below the Fire Break Trail.
7. Insure that no firing is permitted until the red streamer is in place.
8. The officer in charge of firing will comply with the Air Distress Cease Fire Instructions as indicated in Annex KK when the trajectory of any projectile being fired exceeds a maximum ordinate of 150 feet.

NOTES: 1. This range will not be scheduled when firing is to be conducted on WC-2. WC-1 Range will not be scheduled when 60mm and 81mm mortars are firing.

2. Firing on this range will be done in such a way that no rounds will hit the berm located 300 yards in front of the range.

ANNEX H TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WE (Captain Hugh B Casey)  
BAR Transition -- - Table VIII

THE OFFICER IN CHARGE OF FIRING ON RANGE WE WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63 and FM 23-15.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Permit no firing into adjacent lanes. Diagonal firing will not be allowed.
5. Allow no ammunition to be issued except on the starting point.
6. Insure that all weapons are cleared before they are removed from the firing line.
7. Require firers to keep alignment while advancing. Coaches will accompany firers to assist in maintaining alignment.
8. Coordinate with officer in charge of firing on Ranges WJ, WF-1 and WF-2 when it is necessary to change or move the pit detail forward of the firing line. These ranges will be requested by telephone to cease firing until the WE pit detail is either in their pits or in rear of the firing line.
9. Insure that no firing is permitted until the red streamer is in place.

CONDUCT OF LIVE FIRE SQUAD AND PLATOON PROBLEMS:

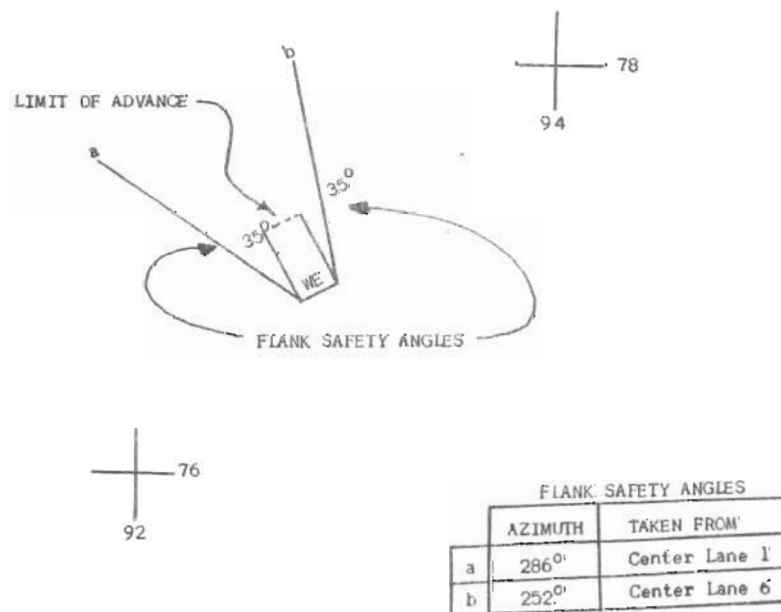
1. Live firing squad and platoon problems may be conducted on WE Range within the limits indicated in Appendix I.
2. Flank safety limits and the limit of advance MUST be observed to insure the safety of problem personnel.
3. The range cannot be used for live fire problems when WJ Range, Range WF-1 and/or WF-2 are being used.

APPENDIX:

1. Overlay of WE Range

APPENDIX 1 TO  
ANNEX H TO  
RANGE REGULATIONS  
NUMBER 1

OVERLAY = WE RANGE



H-1-1.

ANNEX I TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WF-1 (Sergeant Leroy A Mendonca)  
Carbine Transition Range - - - Table X

THE OFFICER IN CHARGE OF FIRING ON RANGE WF-1 WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63 and FM 23-7.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all men in pits to wear steel helmets.
5. Permit no firing into adjacent lanes. Diagonal firing will not be allowed.
6. Allow no ammunition to be issued except on the firing points. Permit loading only on the command "LOCK AND LOAD".
7. Insure that all weapons are cleared before they are removed from the firing line.
8. Insure that weapons are locked and kept pointing down range when moving from lane to lane.
9. Insure that no firing is permitted until the red streamer is in place.

NOTES: 1. This range will not be scheduled when tactical problems are to be conducted on Range WE.

2. This range will cease firing on telephone request from Range WE (BAR Transition), until all members of the pit detail on Range WE are either in the pits or on the firing line.

ANNEX J TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WF-2 (Sergeant Leroy A Mendonca)  
Carbine Transition Range - - - Table XI

THE OFFICER IN CHARGE OF FIRING ON RANGE WF-2 WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63 and FM 23-7.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all firers to fire from a numbered firing point to the corresponding numbered target.
5. Issue ammunition on the firing line only.
6. Require firers to keep aligned while advancing and employ coaches to assist in maintaining alignment.
7. Require all personnel negotiating the course to wear steel helmets.
8. Insure that no firing is permitted until the red streamer is in place.

NOTES: 1. This range will not be scheduled when tactical problems are to be conducted on Range WE.

2. This range will cease firing on telephone request from Range WE (BAR Transition), until all members of the pit detail on Range WE are either in the pits or on the firing line.

ANNEX K TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WG (Corporal Oliver A Schott)  
500-Inch and 1000-Inch General Purpose Tanks

THE OFFICER IN CHARGE OF FIRING ON RANGE WG WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63, FM 23-5, FM 23-7, FM 23-41, FM 23-55, FM 23-80, FM 23-81 and FM 23-35.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all firers to fire from a numbered firing point to the corresponding numbered target.
5. Issue ammunition on the firing line only.
6. Insure that, after machine guns are fired, and prior to dismounting or removing them from the firing positions, each gun is inspected by an officer to see that it is unloaded. As part of this inspection, a cleaning rod will be passed through the barrel of each gun from the muzzle. The cover will be raised and a wood block will be inserted into the receiver. The wood block will remain in the receiver until the gun is placed in action or disassembled for cleaning.
7. Insure that all weapons are cleared before allowing anyone to move forward of the firing line.
8. Insure that no firing is permitted until the red streamer is in place.

ANNEX K TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WG (Corporal Oliver A Schott)  
500-Inch and 1000-Inch General Purpose Tanks

THE OFFICER IN CHARGE OF FIRING ON RANGE WG WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63, FM 23-5, FM 23-7, FM 23-41, FM 23-55, FM 23-80, FM 23-81 and FM 23-35.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all firers to fire from a numbered firing point to the corresponding numbered target.
5. Issue ammunition on the firing line only.
6. Insure that, after machine guns are fired, and prior to dismounting or removing them from the firing positions, each gun is inspected by an officer to see that it is unloaded. As part of this inspection, a cleaning rod will be passed through the barrel of each gun from the muzzle. The cover will be raised and a wood block will be inserted into the receiver. The wood block will remain in the receiver until the gun is placed in action or disassembled for cleaning.
7. Insure that all weapons are cleared before allowing anyone to move forward of the firing line.
8. Insure that no firing is permitted until the red streamer is in place.



ANNEX L TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WH-1 (Lieutenant General Hugh A Drum)  
BAR Transition Range - - - Table VII

THE OFFICER IN CHARGE OF FIRING ON RANGE WH-1 WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63 and FM 23-15.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Require all men in pits to wear steel helmets.
5. Permit no firing into adjacent lanes. Diagonal firing will not be allowed.
6. Allow no ammunition to be issued, except on the firing point. Permit loading only on the command "LOCK AND LOAD".
7. Insure that all weapons are cleared before they are removed from the firing line.
8. Insure that weapons are locked and kept pointing down range when moving from lane to lane.
9. Coordinate with Range WJ before advancing pit details. Range WJ will have to cease firing until all members of the pit details on WH-1 are either in their pits or in the rear of the firing line.
10. Insure that no firing is permitted until the red streamer is in place.

NOTE: This range will not be scheduled when firing is to be conducted on Range WI.

ANNEX M TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WH-2 (Lieutenant General Hugh A Drum)  
Portable Flamethrower Qualification Range

THE OFFICER IN CHARGE OF FIRING ON WH-2 RANGE WILL:

1. Be familiar with all safety regulations for the portable flamethrower and the operation of the course as prescribed in AR 385-63 and appropriate Field Manuals and Technical Manuals.
2. Coordinate with the Range Officer at least 24 hours prior to scheduled firing for special instructions.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Insure that no firing is permitted until the red streamer is in place.
5. Insure that adequate equipment is on hand for fire fighting.
6. Insure that NO SMOKING is permitted in the flamethrower storage and servicing area.
7. Provide an ambulance equipped with proper first-aid equipment for burns which will be available in the immediate vicinity of the firing. The stretcher will be removed from the ambulance and placed beside it. The driver will remain close by. All firing is to cease in case the ambulance leaves the vicinity for any reason whatsoever.

ANNEX O TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WI  
Mortar Field Target Firing Range  
(81mm Mortars And 4.2" Mortars)

THE OFFICER IN CHARGE OF FIRING ON RANGE WI WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63, FM 23-90 and FM 23-92. .
2. Coordinate with the Range Officer at least 24 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
4. Inspect barrels and propelling charges for presence of moisture. If moisture is detected, the mortar will not be fired until moisture is removed.
5. The firing position for 4.2" mortar firing will be surveyed by using unit prior to firing.
6. Not permit firing outside of Marked Sector of Fire nor at a range of less than 1000 yards or more than 3500 yards; no rounds will be fired that fall more than 200 yards below Fire Break Trail.
7. Insure that no obstructions are in the line of flight of the shell.
8. Require all ammunition to be kept covered until it is fired.
9. Require misfires to be removed only under the close supervision of a qualified officer or noncommissioned officer. A wait of one (1) minute is required between malfunction and removal of a misfire.
10. Require all mortars to be inspected by a qualified NCO prior to firing to insure proper set up, mask clearance, and lay of piece.
11. Require all personnel on the range to wear steel helmets during firing.
12. Require that all firing is conducted within the area outlined by the lines of white poles (on either side of the range) indicating flank safety limits.
13. Insure that no firing is permitted until the red streamer is in place.
14. Insure that when using M52 series fuses for the 81mm mortar, only the gunner, and, when necessary, one additional person serving in a safety or supervisory capacity occupy the mortar emplacement when firing is in progress. All other mortar crewmen and safety or KL personnel will occupy fox holes during firing. Personnel not actually engaged in the conduct of firing will stay at least 300 yards from mortars being fired or in the protective bunker in rear of firing positions.
15. Insure that when using M52 series fuses for 81mm mortars, the mortars are not emplaced nearer to adjacent mortars or other weapons than 35 yards.

ANX O TO RANGE REGULATIONS NR 1

16. The officer in charge of firing will comply with the Air Distress Cease Fire Instructions as indicated in Annex KK when the trajectory of the projectile being fired exceeds 150 feet in height.

NOTE: This range will not be scheduled when Ranges WH-1 and/or WJ are scheduled to be in use.

ANNEX P TO  
RANGE REGULATIONS  
NUMBER 1

RANGES WJ, WK, WL AND WM (Colonel Adna G Clarke)  
M1 Rifle, Carbine and BAR Known Distance Ranges

THE OFFICER IN CHARGE OF FIRING ON RANGES WJ, WK, WL AND WM WILL:

1. Be familiar with all safety regulations for the weapons fired and the operation of the course as prescribed in AR 385-63, FM 23-5, FM 23-7 and FM 23-15.
2. Coordinate with the Range Officer at least 48 hours in advance of scheduled firing for special instructions and to arrange for targets.
3. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the ranges.
4. Orient and appoint a Pit Officer.
5. Permit no firing until a red streamer is at full staff.
6. Require all firing to be from numbered firing points to corresponding numbered targets only. Diagonal firing will not be allowed.

NOTES: 1. Range WJ will cease firing on telephone request from Ranges WE and/or Range WM-1. This request will be coordinated by the officers in charge of firing.

2. Range WJ will not be scheduled when tactical problems are to be conducted on Range WE or when firing is to be conducted on Range WI.

3. Range WM will cease firing on telephone request from Range WN, until all members of the pit detail on Range WN are either in the pits or in the rear of the firing line.

4. Range WM will not be scheduled when tactical problems involving movement of personnel forward of the firing line are to be conducted on Range WN.

THE PIT OFFICER WILL:

1. Remain in the pits at all time during firing and be responsible to the officer in charge of firing for the efficient and safe operation of the pits.
2. Enforce the following safety precautions:
  - a. Wearing of steel helmets of all personnel in pits.
  - b. Allow no one in rear of the line of targets while firing is in progress.
  - c. Allow no vehicles in the pit area during firing other than maintenance vehicle with Range Personnel.
3. Keep all targets, spotters, and pasters in the pit house when not in use. Targets are to be removed from the rack and stored in the pit house when firing is not conducted.
4. Insure that the pits are policed and return all equipment to its proper storage place.
5. Insure cleanliness of and wash down all latrines.

P-1

ANNEX Q TO  
RANGE REGULATIONS  
NUMBER 1

RANGE WM-1 (Mohokia Gulch)  
81mm and 4.2" Mortar Field Target Range

THE OFFICER IN CHARGE OF FIRING WILL:

1. Be familiar with all safety regulations for the weapon fired as prescribed in FM 23-90, FM 23-92 and AR 385-63.
2. Coordinate with the Range Officer at least 24 hours in advance of scheduled firing for special instructions.
3. See that firing is conducted from prescribed positions only.
4. Remain on the range while firing is in progress and be responsible for the safe and efficient operation of the range.
5. Inspect barrels and propelling charges for presence of moisture. If moisture is detected, the mortar will not be fired until moisture is removed.
6. Not permit firing outside of Marked Section of Fire nor at less than 1500 yards or more than 3800 yards; no rounds will be fired that fall less than 200 yards from the Fire Break Trail.
7. Insure that no obstructions are in the line of flight of the shell.
8. Require all ammunition to be kept covered until it is fired.
9. Require misfires to be removed only under the close supervision of a qualified officer or non-commissioned officer. A wait of one (1) minute is required between malfunction and removal of a misfire.
10. Require all mortars be inspected by a qualified NCO prior to firing to insure proper set up, mask clearance, and lay of piece.
11. Require all personnel on the range to wear steel helmets during firing.
12. Require that all firing is conducted within the area outlined by the line of white poles (on either side of the range) indicating flank safety limits.
13. Insure that no firing is permitted until red streamer is in place.
14. Require that all personnel not actually engaged in the conduct of firing stay at least 300 yards from the mortars being fired, when M52 series fuzes are used for the 81mm mortar, unless an adequate protective wall or bunker is available.
15. Comply with the air distress cease fire instructions as described in Annex KK.

NOTE: This range will not be scheduled when Range WN is scheduled to be in use.

ANNEX BB TO  
RANGE REGULATIONS  
NUMBER 1

MAKUA TRAINING AND RANGE AREA

1. Reference: Map HAWAII, 1:25000.
2. The beach road (extension of Farrington Highway) will be posted with sentries by service using the area while firing is in progress. See Appendix 1.
3. Firing range flags will be hoisted by the using service on flagpoles established at entrances of the beach road leading to Makua Valley and plainly visible to road traffic and seaward while range firing is in progress. See map for location of flagpoles.
4. The "Area to be Kept Clear of Duds" will be scouted for any trespassers prior to any firing exercises by the service using the area.
5. All roads leading off the "Area to be Kept Clear of Duds," 1,000 yards distant from the beach road toward Makua Valley, will be barricaded when not in use. Using unit will be held responsible that barricades are put in place upon completion of training. Appropriate metal signs at entrances will be observed.
6. The "Area to be Kept Clear of Duds" will be checked regularly by a range clearance team to ascertain compliance of these regulations by using service. Units detecting duds will report immediately the location and type thereof to AC of S, G3, this headquarters.
7. Range clearance team, this headquarters, will check conditions of "warning signs" at both beach road entrances to Makua Valley and "dud area" signs marking limits of dud area.
8. Officers in charge of firing will insure that no ammunition or aerial ordnance, impact on or near the Tank Crew Proficiency Course as outlined in Appendix 1.
9. If a fire starts in the impact area, this headquarters, AC of S, G3, will be notified. No troops will enter the impact area to put out fires. If a fire starts in the area cleared of duds or adjacent thereto troops will be moved a minimum of 200 yards from the fire and will not approach the area until the fire is extinguished and until such time as the possibility of a dud being exploded by the heat of the fire has elapsed. Only the officer in charge of firing can make this decision based on his personal observation of the fire, its intensity and its location with respect to cleared areas to be used by troops.
10. The following specific instructions will apply to all 76mm and 90mm tank gun firing in this area:
  - a. No tank will fire from any position outside the designated tank firing position area shown on Appendix 1. Signs posted on the Beach Road (extension of Farrington Highway) indicate the northwest corner and the southwest corner of this tank firing position area.
  - b. High explosive and smoke shells only will be fired.
  - c. Tanks will not fire on any target from any position at a gun-target range of less than 2000 yards. (At 2000 yards and over, the angle of fall of the projectile is increased so as to decrease the possibility of a ricochet.)

BB-1

ANX BB TO RANGE REGULATIONS NR 1

d. Tanks will not fire with a tube elevation (from horizontal) greater than 147 mils on the 90mm gun, or 170 mils on the 76mm gun. A qualified officer or noncommissioned officer will check the tube elevation with the M-1 gunner's quadrant before each round is fired to ascertain that the tube elevation does not exceed these figures.

e. Tanks will fire between the following azimuths only, regardless of their position within the firing position area:

Grid azimuth of 93° (1654 μ) and 110° (1956 μ)

or

Magnetic azimuth of 82° (1454 μ) and 99° (1756 μ)

A qualified officer or noncommissioned officer will verify the lay of the gun prior to each round fired to ascertain that the direction of the tube is within these limits. This verification should be made with the azimuth indicator or other equally accurate method such as individual range stakes.

f. Prior to moving any vehicles or personnel into the impact area on the cleared trails shown on Appendix 1, the OIC will have the trail visually checked for duds. If duds are found on the trail, the OIC will allow no troops or vehicles to move on it and will report the dud(s) as prescribed in par 3e(3), basic regulation.

g. The officer in charge will insure that:

(1) While in the firing position area, each tank displays flags according to the following code:

- |                    |   |
|--------------------|---|
| (a) RED            | Indicates firing is in progress, guns loaded.   |
| (b) ORANGE         | Indicates tank out of action not due to malfunction of ammunition.  |
| (c) RED and ORANGE | Indicates a misfire or other malfunction involving ammunition.  |
| (d) GREEN          | Indicates that all guns are clear (Breech of tank guns open; a T-block inserted in receiver of all machine guns.) |

(2) Tanks or personnel do not take position in the line of fire of another tank. This requires that tanks remain abreast of each other and that no dismounted personnel go forward of the rear of any tank except when the green flag is flying.

(3) When any guns on the tank are not clear, they will be pointed down range.

(4) That all guns are cleared, checked, and reported before tanks leave firing position area.

h. The OIC will post one range guard and hoist one range flag at each location shown on Appendix 1. He will instruct the guards to halt all traffic entering the range area and to inform them that firing is in progress, not to stop in area, not to get off the beach road, and to watch out for the tanks on the road. The guard will inform military personnel where the Officer in Charge may be found.

BB-2



ANX BB TO RANGE REGULATIONS NR 1

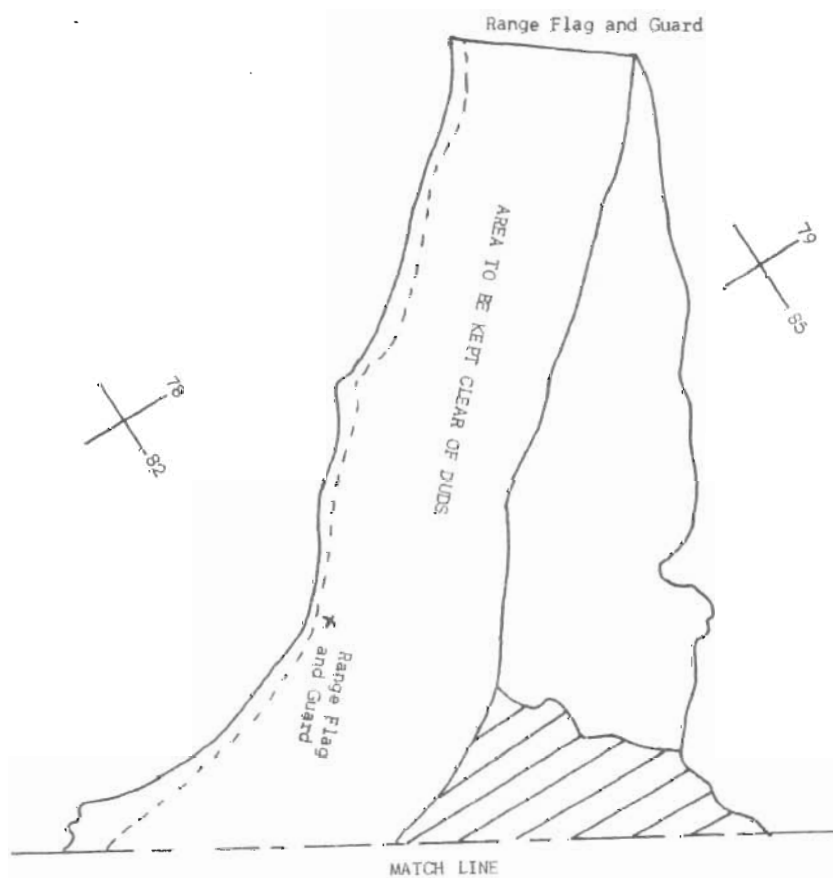
i. The OIC will establish telephone communication with the Schofield Barracks switchboard, report into the Air Distress Warning net, and obtain clearance from the AC of S, G3, this headquarters (55-2269), before firing.

APPENDIX:

1. Overlay Makua Training Area

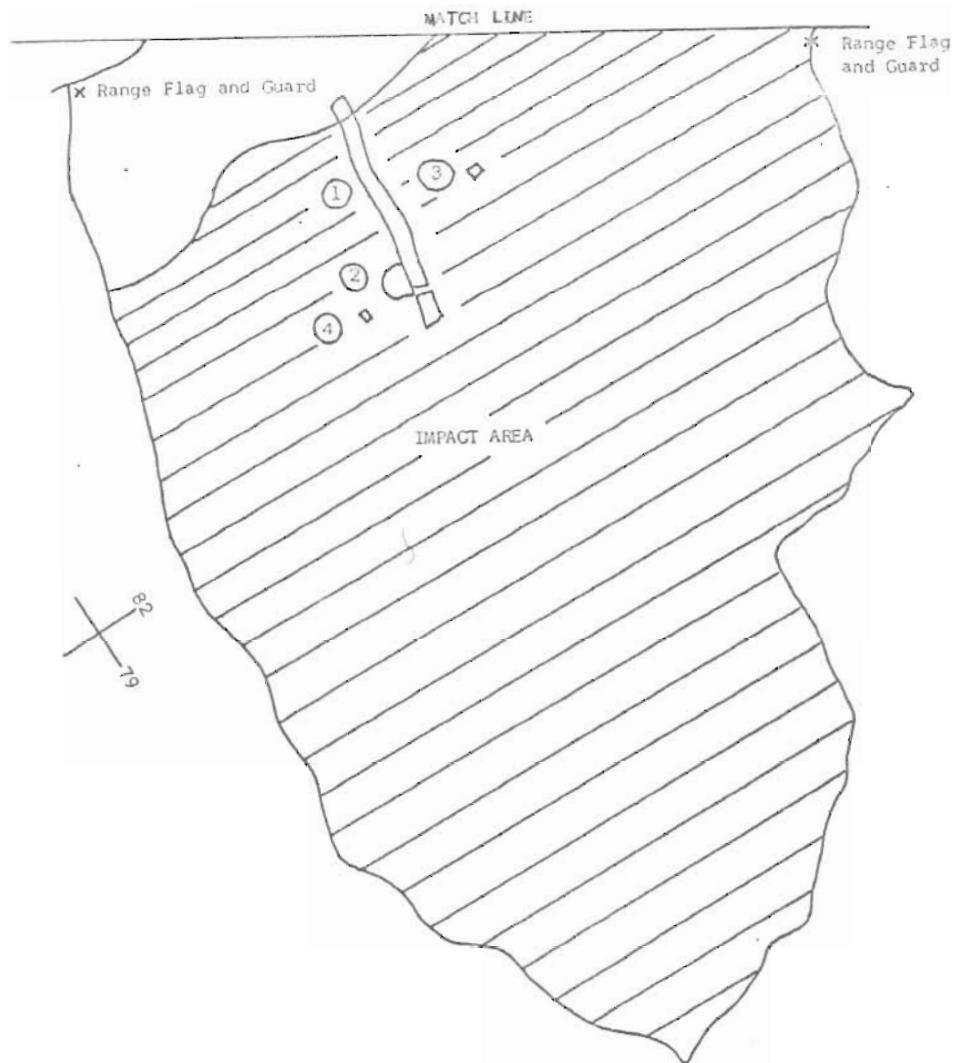
APPENDIX 1 TO  
ANNEX BB TO  
RANGE REGULATIONS  
NUMBER 1

OVERLAY - MAKUA TRAINING AREA



BB-1-1

APP 1 TO ANX BB TO RANGE REGULATIONS NR 1



Items numbered 1 through 4, above, are installations which are a part of the Tank Crew Proficiency Course. No ammunition or aerial ordnance will be fired which will impact on these installations.

BB-1-2

ANX KK TO RANGE REGULATIONS NR 1

thence to lat 21° 34' 45"N long 158° 17' 20"W

thence to lat 21° 35' 15"N long 158° 14' 30"W

thence to lat 21° 35' 30"N long 158° 11' 30"W

thence to point of beginning.

c. Dillingham AFB (Mokuleia): AAA firing from surface to an altitude of 40,000 feet. Time of use: 0700-1700 hours.

Danger area beginning at lat 21° 35' 00"N long 158° 13' 00"W

thence to lat 21° 38' 00"N long 158° 18' 00"W

thence clockwise along the arc of a circle with  
a 6.8 mile radius centered on: lat 21° 35' 00"N  
long 158° 13' 00"W point of origin to:

lat 21° 39' 00"N long 158° 08' 00"W

thence to lat 21° 35' 00"N long 158° 13' 00"W

thence to point of beginning.

d. Kaena Danger Area: AAA firing from surface to a maximum altitude of 40,000 feet. Time of use: 0700-1700 hours and 1930-2000 hours.  
No firing can be conducted from Kaena Point to sea at present.

Danger area beginning at lat 21° 35' 00"N long 158° 16' 00"W

thence to lat 21° 38' 00"N long 158° 32' 00"W

thence clockwise along the arc of a circle with a  
16.5 mile radius centered on:

lat 21° 35' 00"N long 158° 16' 00"W

point of beginning to:

lat 21° 44' 00"N long 158° 04' 00"W

thence to lat 21° 35' 00"N long 158° 16' 00"W

thence to point of beginning.

e. Schofield Danger Area (Central Range): Artillery and heavy weapons practice from surface to a maximum altitude of 16,000 ft. Time of use: unlimited.

Danger area beginning at lat 21° 32' 25"N long 158° 10' 30"W

thence to lat 21° 31' 36"N long 158° 04' 45"W

thence to lat 21° 30' 00"N long 158° 04' 33"W

thence to lat 21° 29' 11"N long 158° 07' 33"W

thence to lat 21° 30' 30"N long 158° 12' 30"W

KK-4

## **APPENDIX C-14**

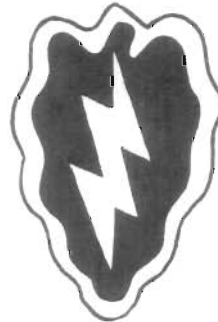
**NARA II College Park, Maryland (CP),  
Regulation prepared by Headquarters United  
States Army Hawaii entitled *25th Infantry  
Division Range Regulations*, dated 15 August  
1959, RG 550, Records of U.S. Army, Pacific,  
Entry 20 Organization Planning Files, Military  
Historians Files and Regulations of U.S. Army  
Hawaii 1957-1961, Box 1, CP-010907-006.**

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HEADQUARTERS  
UNITED STATES ARMY  
HAWAII



AND



25TH  
INFANTRY DIVISION

# RANGE REGULATIONS

CP-010907-006



ISLAND

OF

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ANNEX A TO  
RANGE REGULATIONS

DANGER AREA OF THE SCHOFIELD BARRACKS CENTRAL RANGE

1. The danger area of the Schofield Barracks Central Range is outlined and defined by the following coordinates (Map: HAWAIIAN ISLANDS, 1:25,000), as indicated in Appendix 1.

- a. 89307740
- b. 90257977
- c. 91888000
- d. 93568055
- e. 94508024
- f. 94227966
- g. 94367856
- h. 94847846
- i. 94847730
- j. 90227600
- k. 89307740

2. The danger area is outlined in paragraph 1 and Appendix 1 is "Off Limits" at all times. Violations will be reported to the Commanding General, USARHAW/25th Inf Div, for disciplinary action.

3. Entry into the danger area or forward of the firing line on any range is forbidden except when specific, controlled, and scheduled training is being conducted under command supervision, i.e., movement of personnel to the pits, movement of personnel forward on the range during tactical exercises, etc.

4. Entry into any danger area for EOD teams, signal, or other maintenance work is permitted only with the specific approval of the Range Officer. Clearance for entry can be obtained only through personal contact with the Range Officer at Building 1191, Central Range House, Schofield Barracks.

1 Appendix  
Overlay to the Danger Area of the  
Schofield Barracks Central Range

A-1

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ANNEX B TO  
RANGE REGULATIONS

RANGE	DESCRIPTION OF RANGES	POINTS/LANES
WA	Practice Rifle Grenades and 3.5 inch Rockets	20
WB	HE Hand Grenades, Rifle Grenades, and 3.5 inch Rockets	10
WC-1	Sub Machine Gun	9
WC-2	Close Combat Course	4
WD	Demonstration	-
WE	AR Transition (Table VIII) - Live Fire Problems	6
WF-1	Carbine Transition (Table X)	4
WF-2	Carbine Transition (Table XI)	4
WG	500 and 1000 inch General Purpose	62
WH-1	AR Transition (Table VII)	9
WH-2	Portable Flamethrower	-
WI	81mm and 4.2 inch Mortars	-
WJ	Known Distance (100, 200, 300, 400, 500, and 600 yards)	50
WJ-1	Known Distance (1000 yards)	10
WK	Known Distance (100, 200, 300, 400, and 500 yards)	50
WL	Known Distance (100, 200, and 300 yards)	50
WM	Known Distance (100 and 200 yards)	50
WM-1	81mm and 4.2 inch Mortars	-
WN	Machine Gun Transition (Table II) - Live Fire Problems	10
WO	M-1 Transition (Table X)	10
WP	M-1 Transition (Table XI)	4
WQ	Infiltration Course	-
WR	500 and 1000 inch General Purpose	35
WS	Recoilless Rifle	10
WT	Pistol	20
WU	Pistol	20
WV	National Match Course	28

E-1



REPRODUCED AT THE NATIONAL ARCHIVES

RANGE	DESCRIPTION OF RANGES	POINTS/LANES
WX	81mm Mortar	3
WY-1	1000 inch (Landscape)	27
WY-2	Fire Distribution (50 yards)	18
WY-5	Live Fire Problems - 81mm Mortar Training Shell	-
WZ	Demolition - Driver Training - Leader Reaction Course	-

SMALLBORE OUTDOOR RANGES

1st Battle Group, 14th Infantry  
2d Battle Group, 21st Infantry  
1st Battle Group, 27th Infantry  
1st Battle Group, 35th Infantry  
Division Artillery

SMALLBORE INDOOR RANGES

1st Battle Group, 14th Infantry  
2d Battle Group, 21st Infantry  
1st Battle Group, 27th Infantry  
1st Battle Group, 35th Infantry  
Division Artillery  
Division Trains  
Division Troops

REPRODUCED AT THE NATIONAL ARCHIVES

ANNEX C TO  
RANGE REGULATIONS

SCHEDULING AND COORDINATION OF RANGES AND AREAS

COLUMN 1 Range/Area	COLUMN 2 Scheduling	COLUMN 3 Coordination
	(Ranges indicated in Column 2 will not be scheduled concurrently with Ranges in Column 1)	(Coordination must be effected between or among ranges indicated in Columns 1 and 3 prior to movement of personnel down range)
WA	WB (only if it is desired to use HE ammunition on WB)	
WB	WA (only if HE ammunition is to be used on WB)	
WC-1	WD (only if it is desired to fire mortars on WD); WC-2	
WC-2	WC-1; WD	
WD	WC-1 (only if mortars are to be fired on WD); WC-2	
WE (AR Transition)		WJ, WJ-1, WF-1, WF-2
WE (Tactical Problems)	WJ; WJ-1; WF-1; WF-2	
WF-1	WE (only if it is desired to conduct tactical problems on WE)	WE (AR Transition)
WF-2	WE (only if it is desired to conduct tactical problems on WE)	WE (AR Transition)
WH-1	WI	WJ, WJ-1
WH-2	FP's 63 and 64	
WI	WH-1; WJ; WJ-1	
WJ	WE (only if it is desired to conduct tactical problems on WE) WI; WJ-1 (except when the 600 yard line only in WJ is being used)	WE (AR Transition), WH-1
WJ-1	WE (only if it is desired to conduct tactical problems on WE) WI; WJ (except when the 600 yard line only on WJ is to be used)	WE (AR Transition), WH-1, WK
WK		WJ-1

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COLUMN 1 Range/Area	COLUMN 2 Scheduling	COLUMN 3 Coordination
WM	WN (only if it is desired to conduct tactical problems on WN)	WN (MG Transition)
WM-1	WN	
WN (MG Transition)	WM-1	WM, WO
WN (Tactical Problems)	WM; WO; WM-1	
WO	WN (only if it is desired to conduct tactical problems on WN)	WN (MG Transition)
WP	WS (Only if it is desired to fire recoilless rifle service ammunition on WS)	
WQ	WS (only if it is desired to fire recoilless rifle service ammunition in WS); WS (Points 7 thru 10 if sub-caliber is fired); WX	
WS	WP and WQ (only if recoilless rifle service ammunition is fired on WS); WQ (when subcaliber is fired on Points 7 thru 10 in WS)	
WX	WQ	
WY-1	BB (only if it is desired to conduct live firing in BB); WY-5	WY-2
WY-2	BB (only if it is desired to conduct live firing in BB); WY-5	WY-1
WY-5	BB (only if it is desired to conduct live firing in BB); WY-1; WY-2	
WY	BB (only if it is desired to conduct live firing in BB); WY-1; WY-2; WY-5	
BB	WY area; WY-1; WY-2; WY-5; FP's 42A and 70 (only if live firing is conducted in BB)	

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ANNEX D TO  
RANGE REGULATIONS

RANGE WA  
Major General Robert H Soule  
Rifle Grenade and Rocket Launcher

THE OFFICER IN CHARGE OF FIRING ON RANGE WA WILL:

1. General.
  - a. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation.
  - b. Comply with the Air Distress Cease Fire Instructions as indicated in Annex YY when the trajectory of any projectile being fired exceeds a maximum ordinate of 150 feet.
  - c. Use practice ammunition only.
  - d. Post a guard at Range Guard Post #1 (intersection of Trimble and Cable Car Roads) with a field telephone on the line connected to the range tower. This guard will coordinate with the officer in charge of firing when persons request to visit the area while firing is in progress.
  - e. Inform all individuals of the safety limits of the range prior to firing.
  - f. Cause all weapons to be inspected by an officer or noncommissioned officer prior to firing to see that they are clear and that there are no obstructions in the bore.
  - g. Inspect all ammunition prior to firing to insure that only practice ammunition is being fired.
  - h. Require all personnel to wear steel helmets.
  - i. Permit no running on the range.
  - j. Permit no smoking on the firing line or near ammunition.
  - k. Permit ammunition to be drawn only on command from the control tower.
  - l. Permit weapons to be loaded and unloaded on the firing line only.
  - m. Permit loading only on command from the control tower.
  - n. Require that firing commence on command from the tower only.
  - o. Permit no one to move forward of or to the rear of the firing line unless the tower officer gives clearance.
  - p. Insure that all weapons have been cleared and that each one has been checked by an officer or noncommissioned officer before permission is granted to move from the firing line.
  - q. Require that all weapons are unloaded and cleared when the command to cease firing is given.

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REPRODUCED AT THE NATIONAL ARCHIVES

r. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the tower officer.

2. Rifle Grenades. The officer in charge of firing will insure compliance with the following procedures and instructions:

a. Keep grenades clean and dry, particularly the inside of the stabilizer tube.

b. See that there are no burrs on the rings of the grenade launcher, and that the rings are free from grit.

c. Inspect the wing nut on the clasp of the M8 launcher frequently to see that it is tight.

d. Never place a grenade on the launcher unless it is intended to be fired immediately. Never fire service ammunition or blank ammunition when a grenade is on the launcher.

e. Test each grenade to see that it moves freely on the launcher.

f. Insure that men not firing are at least 125 yards from the target.

g. In the event the rifle grenade cartridge (M3) or the carbine grenade cartridge (M6) does not fire and there are no other M3 or M6 cartridges available, lock the weapon, replace the grenade safety pin, and remove the grenade.

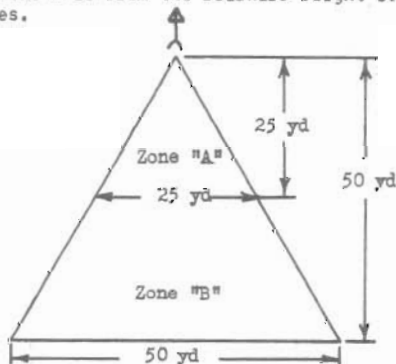
h. When firing antitank grenades, select target with a reasonably flat surface that is hard and rigid. The ideal angle of impact is a perpendicular hit. Changes from this angle of impact should not be greater than 20 degrees.

3. Rocket Launcher - 3.5 inch. The officer in charge of firing will insure compliance with the following specific procedures and instructions:

a. Before firing a rocket, clear the area to the rear of the launcher of personnel, materiel, and vegetation as indicated for Zones A and B in figure below. Zone A, the blast area, must be clear of all personnel, ammunition, materiel, and inflammables, such as dry vegetation. The danger in this zone is from the blast of flame to the rear. Zone B should be clear of all personnel and materiel unless protected by adequate shelter. The principal danger in Zone B is from the rearward flight of nozzle closures and/or igniter wires.

Zone "A" -- Danger in this area is from blast of flame and from flight of nozzle closures and/or igniter wires.

Zone "B" -- Danger in this area is principally from flight of nozzle closures and/or igniter wires.

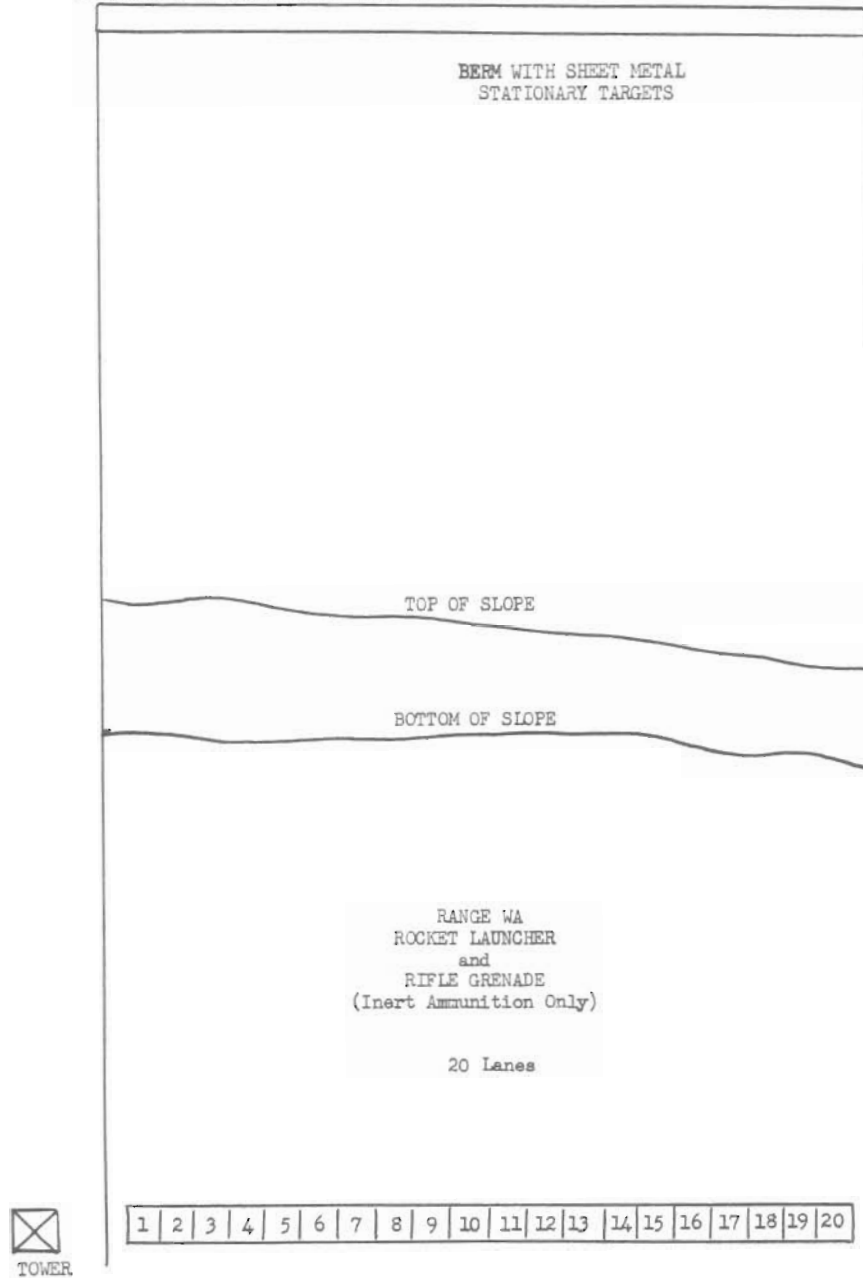


Danger zone to the rear of the 3.5 inch rocket launcher.

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APPENDIX 1 TO ANNEX D TO RANGE REGULATIONS



1-D-1

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ANNEX E TO  
RANGE REGULATIONS

RANGE WB  
Major General Orlando C Mood  
Hand Grenades, Rifle Grenades and Rocket Launcher

THE OFFICER IN CHARGE OF FIRING ON RANGE WB WILL:

1. General.
  - a. Comply with instructions printed in paragraphs 1, 2, and 3 of this regulation.
  - b. Comply with the Air Distress Cease Fire Instructions as indicated in Annex YY when the trajectory of any projectile being fired exceeds a maximum ordinate of 150 feet.
  - c. Insure that no persons throw or fire HE hand grenades, rifle grenades, or rocket launchers without first having undergone instruction utilizing practice grenades and/or rockets.
  - d. Post a guard at Range Guard Post #1 (intersection of Trimble and the Cable Car Roads) with a field telephone or the line connected to the range tower. This guard will coordinate with the officer in charge when persons request to visit the area while firing is in progress.
  - e. Insure that all personnel are cautioned concerning the potential hazard involved in handling grenades and rockets.
  - f. Inform all individuals of the safety limits of the range prior to firing.
  - g. Cause all weapons to be inspected by an officer or non-commissioned officer prior to firing to see that they are clear and that there are no obstructions in the bore.
  - h. Inspect all ammunition prior to firing to insure that the proper ammunition and fuzes are used.
  - i. Require that all personnel within 250 yards of the target wear steel helmets.
  - j. Insure that HE ammunition (rockets, rifle grenades, and hand grenades) is placed at least 200 feet from troop concentrations and sufficiently in rear of the firing line to protect the ammunition from fragmentation or sympathetic detonation.
  - k. Permit no running on the range.
  - l. Permit no smoking on the firing line or near ammunition.
  - m. Permit ammunition to be drawn only on command from the control tower.
  - n. Permit weapons to be loaded or unloaded on the firing line only.
  - o. Permit weapons to be loaded only on command from the control tower.

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REPRODUCED AT THE NATIONAL ARCHIVES

- p. Require that firing commence on command from the tower only.
- q. Permit no one to move forward of or to the rear of the firing line unless the tower officer gives clearance.
- r. Insure that all weapons have been cleared and that each one has been checked by an officer or noncommissioned officer before permission is granted to move from the firing line.
- s. Require that all weapons are unloaded and cleared when the command to cease firing is given.
- t. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the officer in charge of firing.

2. Hand Grenades. The officer in charge of firing will insure compliance with the following specific procedures and instructions:

a. Handle fuzes containing detonators with extreme care at all times. The detonator contains a charge of fulminate of mercury and is very sensitive to heat, shock, or friction. "Sensitive to heat" means such conditions as the direct rays of the sun or when the temperature is 70° F. or more. "Sensitive to shock" means such shock as is produced by carrying fuze assemblies loose in the pocket where detonators strike against each other, dropping them from any height, or striking a box of fuze assemblies with a hammer when opening the box. "Sensitive to friction" means any friction more than is generated during the ordinary careful handling of the fuze assembly.

b. Fuzing Grenades. HE grenades are usually filled with TNT and have detonating fuzes. Since the detonation of such fuzes will set off adjacent grenades, they are shipped, stored, and issued with the grenade body and fuze assembly separate. The grenade bodies have shipping plugs screwed into the fuze seats. Insure that grenades are fuzed as follows:

- (1) Clear the fuze cavity.
- (2) Examine the fuze cavity. If the cavity is not clear or is not large enough to receive the fuze without friction, use a wooden stick about  $\frac{1}{4}$  inch in diameter to enlarge the cavity.
- (3) Insert the fuze into the grenade body.
- (4) Hold the fuze in one hand and screw the grenade body into the fuze with the other hand. In this operation be sure the fuze is stationary and that the grenade body is the moving part. A wrench is packed in each box of detonating fuzes for use to seat the fuze firmly into the grenade.
- (5) Special precautions. Do not fuze grenades in ammunition dumps, storage magazines, or within 100 yards of buildings. Do not fuze more grenades than are needed for immediate use. Detonating fuzes and grenades containing white phosphorus are stored and transported separately from other explosives.

c. Any alteration of loaded ammunition, except as given in specific instructions from the Ordnance Officer, is prohibited.



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d. Permit no personnel within 100 yards of the point of burst to be exposed at any time while hand, fragmentation, and offensive grenades are being thrown for 10 seconds after grenades have impacted. This includes personnel in the control tower.

e. If the safety pin will not pull out, do not straighten the end of the pin until ready to throw. In the majority of cases, it will not be necessary to straighten the ends of the safety pins, as a twisting-pulling motion will readily remove them.

f. Do not pull the safety pin until ready to throw the grenade.

g. Do not release the lever before throwing.

h. Grenades should be thrown to obtain ground bursts.

i. Avoid striking the hand or the grenade against the barrier. After observing the strike of the grenade, do not expose any part of your body.

j. When throwing chemical grenades containing toxic or irritant gasses, all persons within 200 yards of the bursting point must wear protective masks.

k. When using gas grenades, no one should be directly downwind of the burst unless wearing protective masks.

l. Do not ignite burning type grenades (smoke or termite) within 5 feet of dry grass or other material that will burn.

m. With the exception of the termite (AN-M14) grenade, do not ignite burning grenades closer than 30 feet to other men.

n. Only those individuals who have clearly demonstrated proficiency in grenade throwing may be permitted to throw the WP hand grenade. This grenade is approximately fifty percent heavier than the fragmentation grenade, and cannot normally be thrown a distance greater than 35 yards. If WP grenades are thrown 25 yards or less, injury may result since WP grenades sometimes throw the burning white phosphorus particles as far as 25 yards when bursting.

o. Observe special precautions when throwing the CN riot hand grenade, M25 (baseball grenade). Throw it immediately after the safety pin has been pulled as detonation sometimes occurs two seconds after pulling the pin if finger pressure on the arming sleeve has been slightly relaxed.

p. If a grenade is dropped after the safety pin has been removed, or the striker functions accidentally, pick up the grenade immediately and throw it toward the target area; then, fall prone in the trench to the immediate rear of the firing line. If accident occurs away from the firing line, drop flat on the ground with helmet toward the grenade.

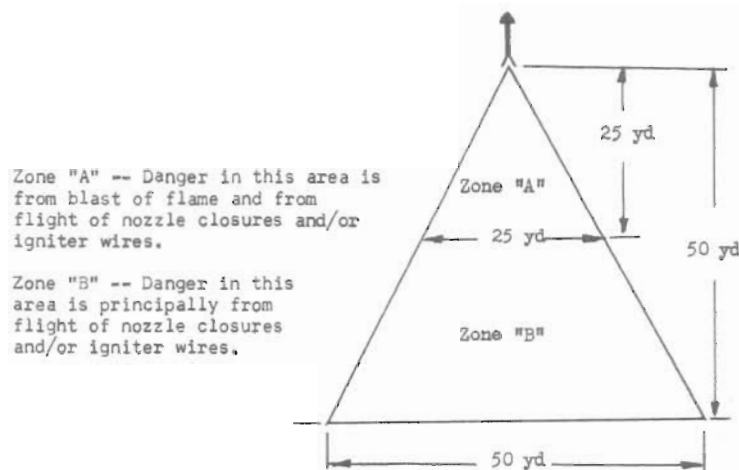
q. Do not recover or tamper with live grenades that fail to explode (duds).

3. Rifle Grenades. The officer in charge of firing will insure compliance with the following specific procedures and instructions:

a. Keep the grenades clean and dry, particularly inside of the stabilizer tube.

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- b. See that there are no burrs on the rings of the grenade launcher and that the rings are free from grit.
  - c. Inspect the wing nut of the clasp of the M8 Launcher frequently to see that it is tight.
  - d. Never place a grenade on the launcher unless it is intended to be fired immediately. Never fire service ammunition or blank ammunition when a grenade is on the launcher.
  - e. Test each grenade to see that it moves freely on the launcher.
  - f. Personnel not firing will remain at least 125 yards from the target.
  - g. In the event the rifle grenade cartridge (M3) or the carbine grenade cartridge (M6) does not fire and there are no other M3 or M6 cartridges available, lock the weapon, replace the grenade safety pin, and remove the grenade.
  - h. When firing antitank grenades, select targets with a reasonably flat surface that is hard and rigid. The ideal angle of impact is a perpendicular hit. Changes from this angle of impact should not be greater than 20 degrees.
4. Rocket Launchers 3.5 inch. The officer in charge of firing will insure compliance with the following specific procedures and instructions:
- a. Before firing a rocket, clear the area to the rear of the launcher of personnel, materiel, and vegetation as indicated for Zones A and B in figure below. Zone A, the blast area, must be clear of all personnel, ammunition, materiel, and inflammables, such as dry vegetation. The danger in this zone is from the blast of flame to the rear. Zone B should be clear of all personnel and materiel unless protected by adequate shelter. The principal danger in Zone B is from the rearward flight of nozzle closures and/or igniter wires.



Danger zone to the rear of the 3.5 inch rocket launcher

E-4

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b. Insure that the ready line is placed at least 50 yards behind the firing line to protect personnel from the backblast of the weapon.

c. Insure that no one passes through the area between the rear line and the firing line without permission of the Officer in Charge.

d. Insure that ammunition is not fired by temperatures outside of the safe temperature range for that particular type of ammunition.

e. Insure that ammunition is placed out of range of backblast.

f. Insure that all loading and unloading is done on the firing line with the launcher on the gunner's shoulder. The muzzle must be pointed down range, not toward the ground.

g. Insure that each team inspects its equipment before firing while on the ready line.

h. Insure that the gunner and loader wear face masks or goggles when firing. These are needed to protect the eyes against the backblast and against small particles of unburned propellant which may be blown from the rear of the rocket as it leaves the muzzle of the launcher.

i. Insure that the following procedure will be used on command from the officer in charge of firing when a misfire occurs:

(1) Attempt to fire two or more times.

(2) If launcher fails to fire, wait two minutes and then remove the rocket and replace the safety.

j. Insure that a noncommissioned officer is designated to count the number of rounds fired and the number of explosions to account for all duds when firing HE, AT, or WP rockets.

NOTES:

1. When HE hand grenades, HE rifle grenades, and HE 3.5 inch rockets are used on Range WB, Range WA will be closed.

2. The use of HE hand grenades, HE rifle grenades, and HE 3.5 inch rockets are prohibited on Range WB when Range WA is in use.

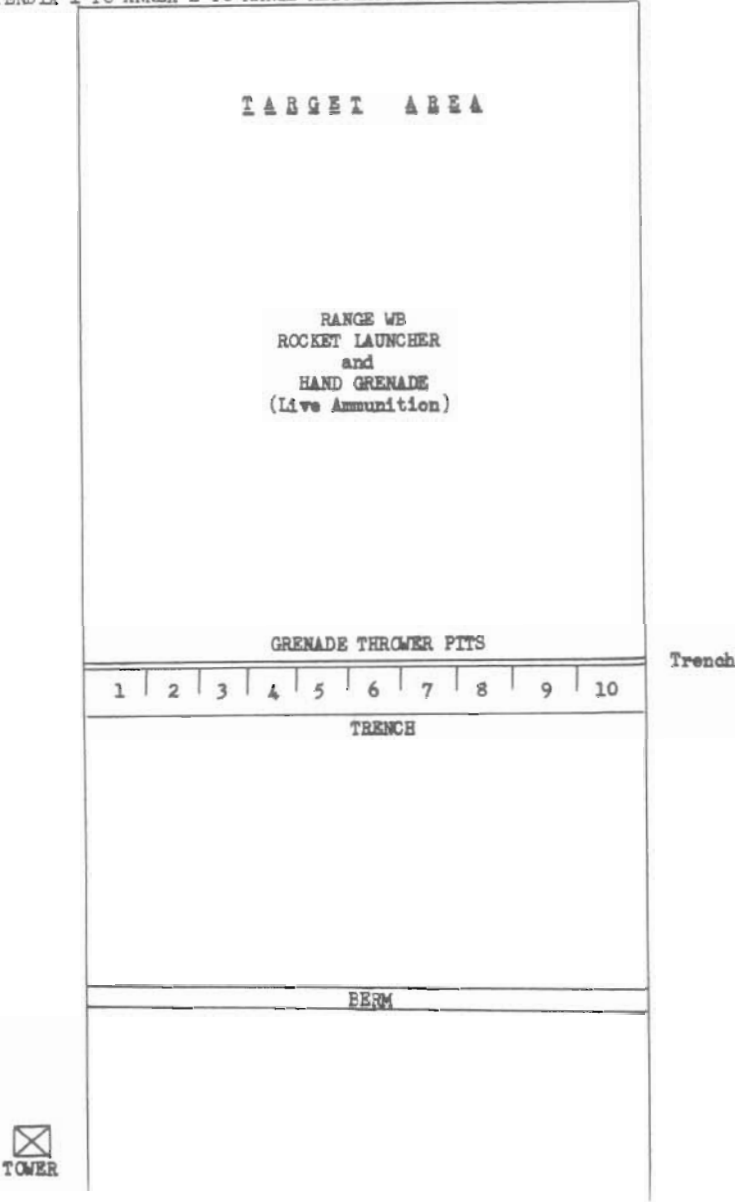
3. If a unit desires to use HE ammunition on Range WB, both Ranges WA and WB must have been allocated.

I Appendix:

Range WB: Rocket Launcher  
and Hand Grenade

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APPENDIX 1 TO ANNEX E TO RANGE REGULATIONS



1-E-1

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ANNEX F TO  
RANGE REGULATIONS

RANGE WC-1  
Brigadier General Claudius Easely  
Sub-Machine Gun

THE OFFICER IN CHARGE OF FIRING ON RANGE WC-1 WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation.
2. Inform all individuals of the safety limits of the range prior to firing.
3. Cause all weapons to be inspected by an officer or noncommissioned officer prior to firing to see that they are clear and that there are no obstructions in the bore.
4. Permit no running on the range.
5. Permit no smoking on the firing line or near ammunition.
6. Permit loaded magazines to be issued on firing points only.
7. Permit weapons to be loaded and unloaded on the firing line only.
8. Require all weapons to be pointed down range at all times. Bolts will be forward at all times except when loading or firing.
9. Require that a coach stand in rear of the firer in order to control his movements.
10. Permit no one to move forward of or to the rear of the firing line unless the tower officer gives clearance.
11. Insure that all weapons have been cleared and that each one has been checked by an officer or noncommissioned officer before permission is granted to move from the firing line.
12. Require that all weapons are unloaded and cleared when the command to cease firing is given.
13. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the tower officer.

NOTES:

1. When Range WC-1 is in use, Range WC-2 will be closed and the firing of mortars on Range WD is prohibited.
2. Range WC-1 will be closed when Range WC-2 is in use and/or when mortars are being fired on Range WD.
3. If a unit desires to use Range WC-1, both Ranges WC-1 and WC-2 must have been allocated.

1. Appendix  
WC-1 Sub Machine Gun

F-1



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WC-1

PROCEDURE

a. Preparation: Officer in charge and 4 scorers take up positions on FL. One scorer at starting point for each phase (point P, Q, S, U). Scorer accompany each man on each phase. The first gunner reports to scorer at FP P, with 4 Mag. of 15 rounds each. COMMAND: 15 rounds, ball ammunition, lock and load. At this command, gunner pulls bolt to rear, closes the cover, inserts a mag, and calls ready.

b. Phases: "Ready" -- gunner takes up sitting, standing, or kneeling position. COMMAND: Fire at will.

(1) PHASE A

(a) At command fire at will, the gunner fires ten aimed shots (shoulder) at National Match M target, then fires 5 shots at target from the standing or crouched position, without use of sights (hip or underarm). No time limit for phase A.

(b) Complete phase A, clear weapon - gunner and scorer move forward and take score. Score card is then given to scorer of phase B.

(2) PHASE B

(a) After completing phase A, gunner moves to position on FL for phase B (point Q). Second gunner moves to position for phase A.

(b) At command from officer, both men load and commence firing. First gunner walks along phase B FL and fires at group 3 and group 1 or 2 as they appear. Either group 1 or 2 will be exposed at the discretion of operator; group 3 will always be exposed. As a result, each man fires at two groups in phase B. First gunner clears gun and moves into no fire zone between B and C. Second gunner on phase A, clear gun. On order from officer, both men will accompany scorers to score targets.

(3) PHASE C

(a) Same procedure. As in phase B, each man fires at a total of five singular targets (2 groups). Group 4 will always be raised; also, group 5 and 6 will be operated (either one).

(4) PHASE D

(a) Same procedure. After first gunner has completed course, there will be 4 men firing at a time. As in phases B and C, each man fires at a total of 5 singular targets (2 groups). Group 9 will always be operated. Either group 7 or 8 will be operated.

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SLOW FIRE -- TARGET M (NATIONAL MATCH)

PHASE	TYPE FIRE	POSITION	RANGE	TIME	SHOTS
A	Single Shot or Auto	Standing, Kneeling, or Sitting	25 Yds	No Limit	15*

\* Five shots will be fired from an unorthodox position (hip or other form of unaimed fire)

QUICK FIRE--TARGETS E and F

PHASE	TYPE FIRE	POSITION	RANGE	TIME	SHOTS
B	Single Shot or Auto	Shoulder, Hip, or Underarm, While Walking	25-35 yds	Ea Grp of Tgts Exp. 2 Sec	15 3 per Singular Tgt (5ea)
C	Single Shot or Auto	Hip, or Underarm, While Walking	20-40 Yds	Sta Grp 2 Sec Mvng Grp 5 Sec	15 3 per Sing Tgt (5ea)
D	Single Shot or Auto	Hip, or Underarm, While Walking	15-30 Yds	Sta Grp 2 Sec Mvng Grp 5 Sec	15 3 per Sing Tgt (5ea)

SCORING VALUE

- a. An Olympic M-type, National Match facing is used in phase A in order to designate value of hits.
- b. In phases B, C, and D, the gunner gets 1 point for each singular target fired on. For example, if he fires at group 1 in phase B, he gets 2 points for the two singular targets.
- c. In addition, in phases B, C, and D, the gunner gets 5 points for each singular target that is hit, and 2 points for each bullet hole, not to exceed three hits on each singular target.
- d. Maximum possible score for each phase is shown below:

PHASE	POINTS
A	15 hits (for bulls-eye) X 10 points-----150
B	5 singular targets (2 groups) X 5 points (for each target struck)-----25
	15 hits (5 singular targets-not to exceed 3 hits per singular target X 2 points)-----30
	1 point for each singular target fired on (five singular targets)-----5
	Total Phase B-----60
C	Same phase B-----60
D	Same phase B-----60
	Expert-----180
	Sharpshooter-----160
	Marksmen-----140
	Total Possible-----330



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ANNEX G TO  
RANGE REGULATIONS

RANGE WC-2  
Brigadier General Claudius Easely  
Close Combat Course

THE OFFICER IN CHARGE OF FIRING ON RANGE WC-2 WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation.
2. Inform all individuals of the safety limits of the range prior to firing.
3. Permit no diagonal firing or firing into adjacent lanes.
4. Require firers to maintain alignment while advancing. A safety NCO will accompany each firer to assist in maintaining alignment.
5. Cause all weapons to be inspected by an officer or noncommissioned officer prior to firing to insure that they are clear and that there are no obstructions in the bore.
6. Require that all men wear steel helmets while negotiating the course.
7. Permit no running on the range.
8. Permit no smoking on the course or near ammunition.
9. Permit ammunition to be issued on command from the tower only.
10. Clear all weapons twice on completion of the course, once in the draw at the end of the course and again when the firers cross the starting line when returning.

NOTES:

1. When Range WC-2 is in use, Ranges WC-1 and WD will be closed.
2. Range WC-2 will be closed when Ranges WC-1 and WD are in use.
3. If a unit desires to use Range WC-2, Ranges WC-1, WC-2 and WD must have been allocated.

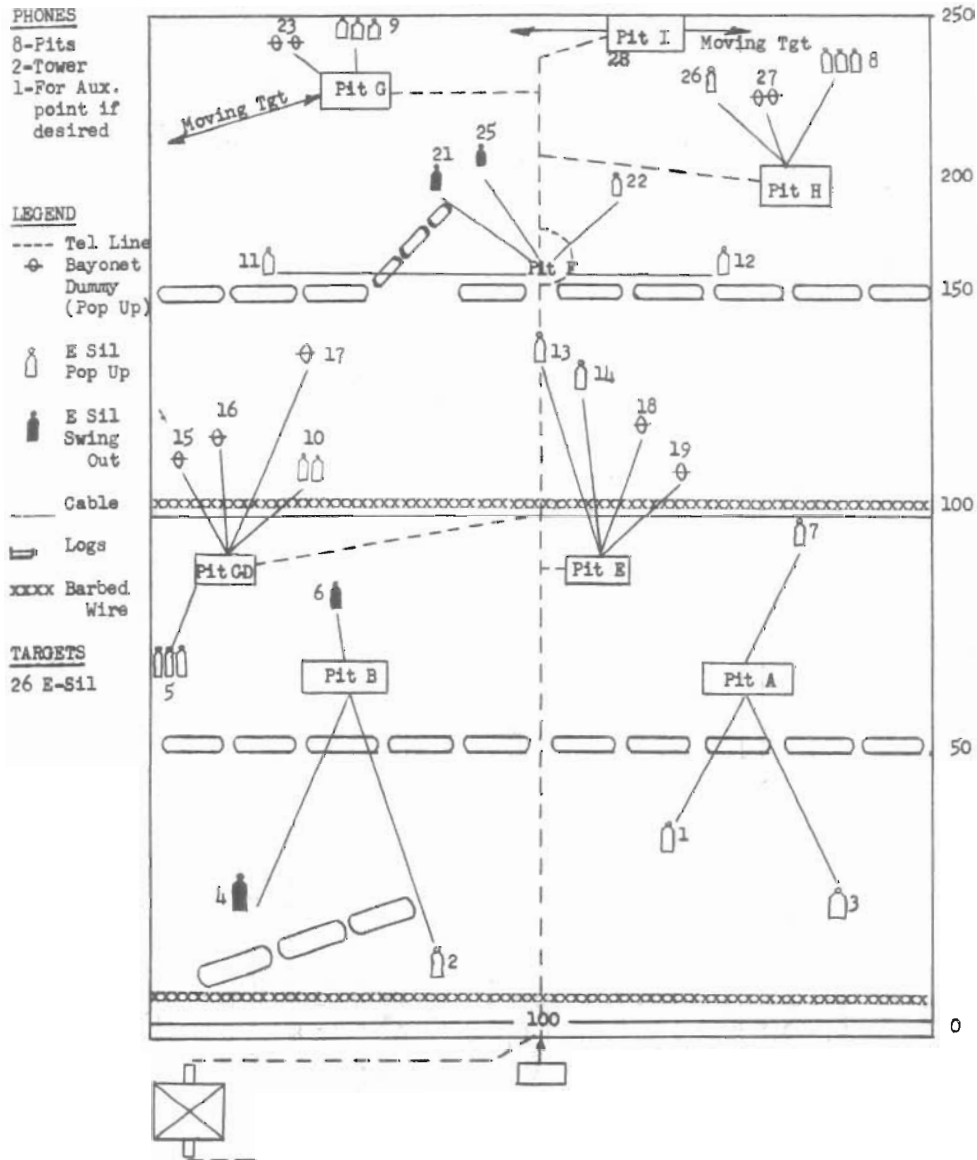
1. Appendix  
WC-2 Close Combat Course

G-1

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APPENDIX 1 TO  
 ANNEX G TO  
 RANGE REGULATIONS

WC-2 CLOSE COMBAT COURSE



1-G-1.

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METHOD OF CONDUCTING COURSE\*\*CLOSE COMBAT, RANGE MC-2

Organization: Six man squads #3, 5 left of range #2, 4, 6 right of range #1 (Sq ldr) center.

Ammunition: Three clips per man—two grenades (practice) per man—rifle grenade(practice) sq ldr w/grenade launcher.

NOTE: For further information see lesson plan.

POSITION OF SQUAD & MANEUVER		ammo	TARGET SEQUENCE	TARGET NUMBER
1. Start behind dirt road; bayonets fixed; bolts open; pieces locked				
2. Sq reaches dirt road. Load one clip. Move out.		1 clip		
3. Sq reaches dirt mound (in front of tower) tgt 28 moves. Entire sq engages tgt until tgt disappears (sq ldr points out tgt if necessary).				1 28
4. Tgt out of sight. Sq ldr commands move out. Sq reaches wire. Sq ldr commands 2, 4, 6 over wire. While 2, 4, 6 go over wire tgt 1 raised and 3, 5 engage. Tgts lowered when 2, 4, 6 have crossed wire.				2 1, 2
5. Tgt 3 & 4 exposed. 2, 4, 6 engage until 3 & 5 over wire. Each member will have fired one clip ammo. after all crossed wire.		1 clip expended		3, 4
6. Sq ldr commands reload. Move forward		2nd clip reloaded		4
7. As sq reaches first line of logs, tgt (stimulated MG position) exposed and MG fired from pit C & D. Tgt engaged by 2, 3, 4. Sq ldr sends 5 & 6 around to a position in front of pit C/D (not too close) where they toss hand grenades (practice) and knock out position.				5
8. Nr 5 & 6 back to original position and team advances over logs. As sq start to move, tgt 6 exposed and engaged by 2 & 3 (up 3-5 sec.). Tgt 7 exposed and engaged by 5 & 6.				5 6, 7
9. As sq moves forward tgt 8 and 9 exposed (this combination is a rifle grenade tgt). Entire sq engages and sq ldr fires rifle grenade neutralizing one of positions.				6 8, 9
10. As sq reaches vicinity of pit C/D, tgt 11 exposed and engaged by 2. Tgt 10 exposed and engaged by 3 & 4. Tgt 12 exposed and engaged by 5 & 6. (3-5 sec)				7 11, 10, 12
11. As sq reaches wire, tgt 13 exposed and engaged by 3 & 4 while 2, 5 & 6 over wire. As 3, 4 cross wire, tgt 14 exposed and engaged by 4.				8 13, 14
12. Immediately upon moving from wire, tgts 15, 16, 17, 18 & 19 appear and engaged by aimed fire by entire sq firing all remaining rounds in rifle.		clip expended		9 15, 16, 17 18, 19
13. When sq ldr ascertained that rifles are clear, he commands sq to assault the dummies with bayonets. These tgts engaged by 2, 3, 4, 5, & 6 respectively.				Bayonet tgts 15, 16, 17, 18, 19

1-9-2

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OBJECTIVE	CAPTURED	REORGANIZE	COMPLETE
14. Upon completing bayonet assault, sq ldr will give the command to reload and move forward.		reload g41g	
15. Upon reaching second line of logs, tgt 20 (moving) is started (5-7 sec) and fired upon by entire squad.		10	20 Moving
16. Upon crossing logs, tgt 21 exposed and engaged by 2 & 3, Tgt 20 exposed and engaged by 4, 5 & 6 (3-5 sec).		11	21 & 22
17. Sq continues to move forward and crosses ravine. When reaches bottom of ravine, tgts 23, 25, 27, 28, 8 (enemy strongholds) exposed. The entire squad fires and toss hand grenades (practice). Use assault fire.		12	23, 25, 9 27, 28, 8

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ANNEX H TO  
RANGE REGULATIONS

RANGE WD  
Private First Class Herbert K. Pililaau  
Demonstration

THE OFFICER IN CHARGE OF FIRING ON RANGE WD WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation, and the appropriate annex(es) on safety for the weapon(s) being fired.
2. Comply with the Air Distress Cease Fire Instructions as indicated in Annex YY when the trajectory of any projectile being fired exceeds a maximum ordinate of 150 feet.
3. Inform all individuals of the safety limits of the range prior to firing.
4. Cause all weapons to be inspected by an officer or noncommissioned officer prior to firing to see that they are clear and that there are no obstructions in the bore.
5. Insure that firing on this range is done in such a way that no rounds will hit the berm located 300 yards in front of the range firing line.
6. Permit no running on the range.
7. Permit no smoking on the firing line or near ammunition.
8. Permit ammunition to be issued on the firing line only.
9. Permit weapons to be loaded and unloaded on the firing line only.
10. Permit no one to move forward of or to the rear of the firing line unless the tower officer gives clearance.
11. Insure that all weapons have been cleared and that each one has been checked by an officer or noncommissioned officer before permission is granted to move from the firing line.
12. Insure that all weapons are unloaded and cleared when the command to cease firing is given.
13. Insure that, after machine guns have been fired and prior to dismounting or removing them from the firing positions, each gun is inspected by an officer or noncommissioned officer to see that it is cleared. As part of the inspection, a cleaning rod will be passed through the barrel of each gun from the muzzle and immediately removed. The cover will be raised and a wooden block will be inserted and will remain in the receiver until the machine gun is again placed in action or disassembled for cleaning.
14. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the tower officer.

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NOTES:

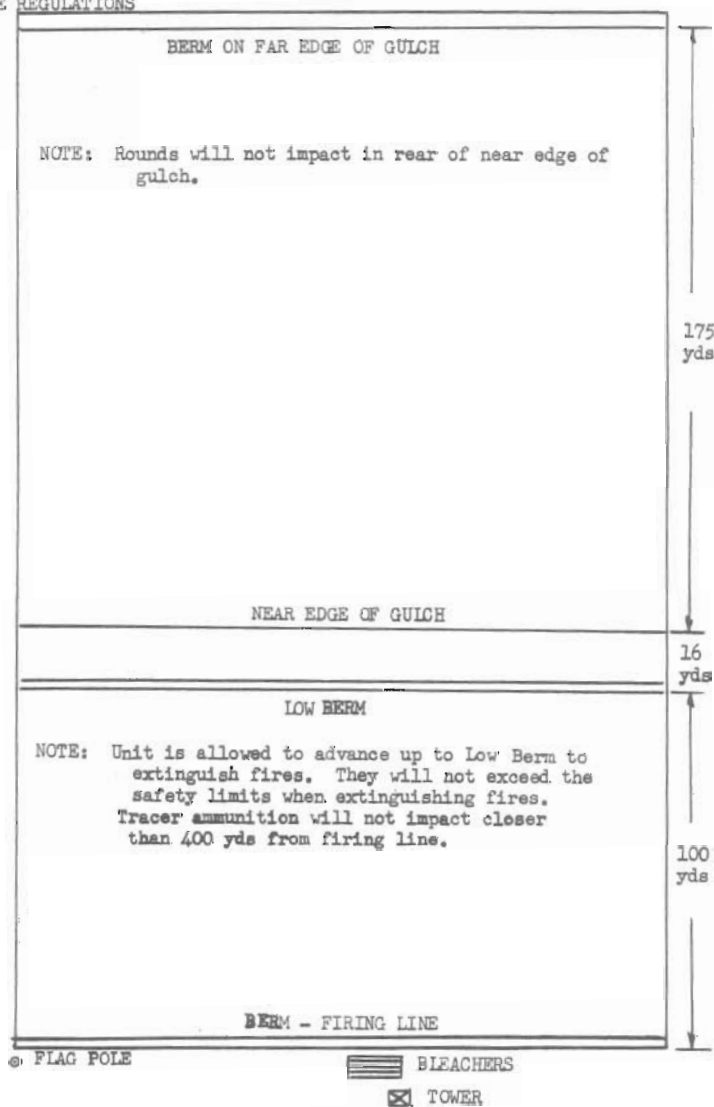
1. When mortars are being fired on Range WD, Ranges WC-1 and WC-2 will be closed.
2. When Range WD is in use (but mortars are not being fired) Range WC-2 will be closed.
3. Range WD will be closed when Range WC-2 is in use.
4. The firing of mortars on Range WD is prohibited when Range WC-1 is in use.
5. If a unit desires to use Range WD, both Ranges WD and WC-2 must have been allocated. In addition, if the unit intends to fire mortars in Range WD, Range WC-1 must have been allocated.

1. Appendix

WD Range Demonstration Utility

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APPENDIX I TO  
ANNEX H TO  
RANGE REGULATIONS



WM RANGE  
DEMONSTRATION  
UTILITY

1-H-1

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ANNEX I TO  
RANGE REGULATIONS

RANGE WE  
Captain Hugh B. Casey  
AR Transition - Table VIII

THE OFFICER IN CHARGE OF FIRING ON RANGE WE WILL:

1. AR Transition.
  - a. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation and in Annex BBB.
  - b. Coordinate with the officer in charge of firing on Ranges WJ, WJ-1, WF-1 and WF-2 when it is necessary to change or move the pit detail forward of the firing line. Ranges WJ, WJ-1 and WF-2 will be requested by telephone to cease firing until the pit detail of Range WE are either in their pits or in rear of the firing line.
  - c. Permit no diagonal firing or firing into adjacent lanes.
  - d. Require firers to maintain alignment while advancing. A safety NCO will accompany each firer to assist in maintaining alignment.
  - e. Allow no ammunition to be issued except on the starting point.
  - f. Insure that all weapons are cleared before they are removed from the firing line.
2. Musketry Problems.
  - a. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation.
  - b. Insure that firing will be in the area between the right and left limit signs only.

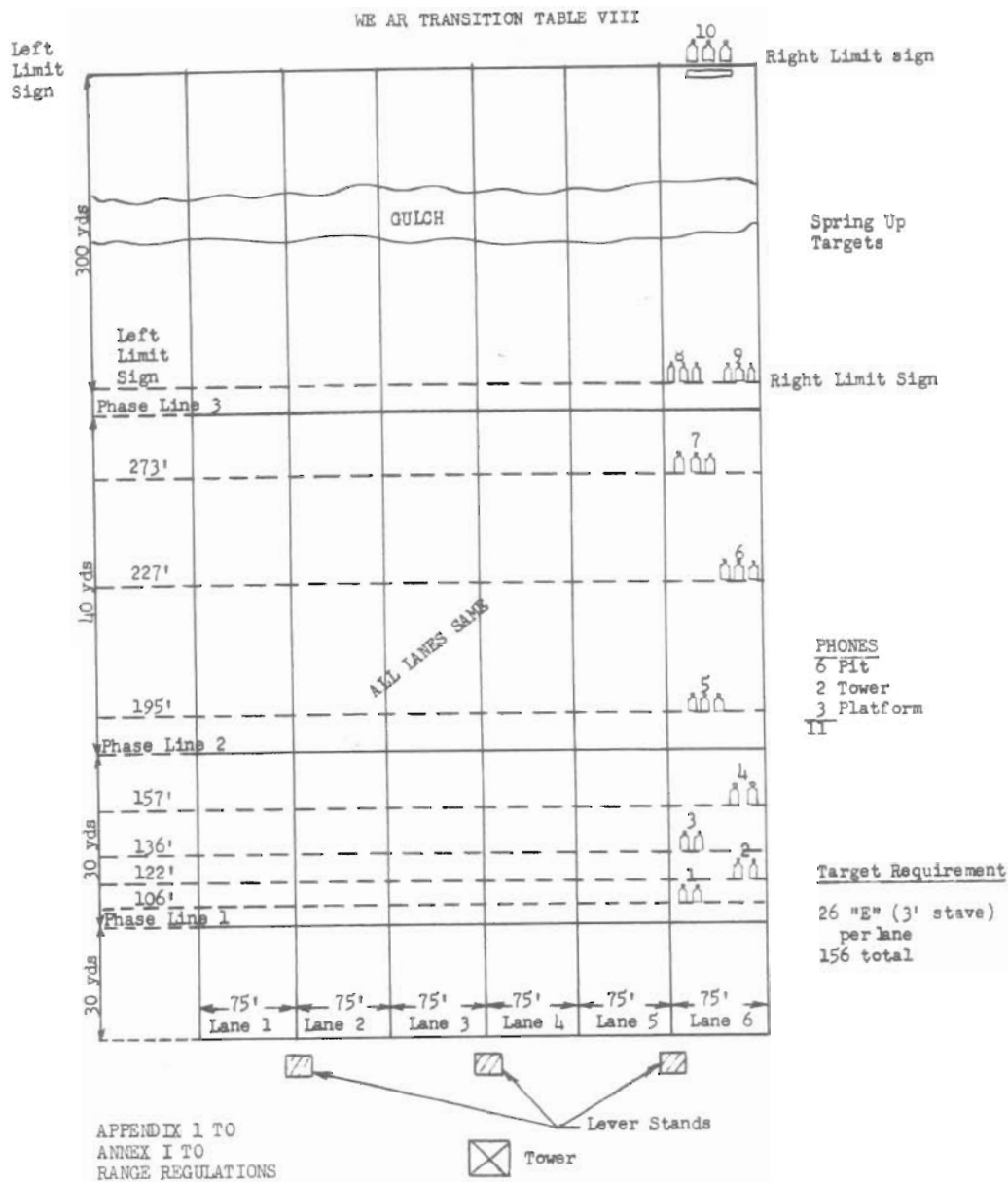
NOTES:

1. When Range WE is used for tactical problems, Ranges WJ, WF-1 and WF-2 will be closed.
2. Range WE cannot be used for live fire problems when Range WJ-1, WF-1 or WF-2 is being used.
3. When a unit desires to conduct tactical problems on Range WE, Ranges WE, WJ, WJ-1, WF-1 and WF-2 must have been allocated.

1 Appendix  
WE AR Transition Table VIII



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WE AR TRANSITION Table VIII

OPERATION OF RANGE

AR man starts w/3 magazines of 20 rounds each in belt. On order from control officer he adjusts sling for crouch position, load 1 magazine and moves down lane on alert. Men keep abreast. As targets are exposed, 5 rounds are fired at double silhouettes and 6 rounds at triple silhouettes in short 2 or 3 round bursts. Double silhouette targets are exposed for 3 seconds - triple silhouettes are exposed for 4 seconds. Targets 8 and 9 are exposed simultaneously and remain up for 6 seconds. Target 10 is exposed for 20 seconds. In firing at target 10, the AR man, having advanced beyond targets 8 and 9, assumes the prone position, adjusts sights, and fires the remaining ammunition from the 3rd magazine. This target is used to impress the AR man with the importance of taking a position to cover the reorganization of his squad, after capturing the objective.

SCORING-DISTANCE-TIME-TARGETS-ROUNDS FIRED

Phase Line	Range	Total Rounds	Time	Targets	Remarks
1.	30-60	20	3 sec per dble sil	4 sets of dble E sil	1 mag. 20 rnds bursts of 2 or 3
2.	30-70	20	4 sec per triple sil	3 sets of triple E Sil	1 mag. 20 rnds bursts of 2 or 3
3.	40-340	20	6 sec for tgts 8 & 9 20sec for tgt 10	3 sets of triple E Sil	1 mag. 20 rnds bursts of 2 or 3

POINTS

Each target hit(target group)-----5  
 Each hit up to 5 hits in targets 1,2,3, & 4-----1  
 Each hit up to 6 hits in targets 5,6,7,8,9, & 10-----1  
 Total possible Table VIII-----106  
 Ricochets are counted as hits  
 Points are not given for unexpended rounds

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ANNEX J TO  
RANGE REGULATIONS

RANGE WF-1  
Sergeant Leroy A. Mendonca  
Carbine Transition Range - Table X

THE OFFICER IN CHARGE OF FIRING ON RANGE WF-1 WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation and Annex CCC.
2. Order cease firing on telephone request from Range WE (AR Transition) until all members of the pit detail on Range WE are either in the pits or behind the firing line.
3. Require all men in pits to wear steel helmets.
4. Permit no firing into adjacent lanes and no diagonal firing.
5. Allow no ammunition to be issued except on the firing points.
6. Permit weapons to be loaded and unloaded on the firing line only.
7. Permit loading only on the command "LOCK AND LOAD."
8. Insure that weapons are locked and kept pointing down range when firers move from lane to lane.
9. Insure that all weapons have been cleared and that each one has been inspected by an officer or noncommissioned officer before permission is granted to move from the firing line.
10. Insure that all weapons are cleared before they are removed from the firing line.

NOTES:

1. When Range WF-1 is in use, the use of WE for tactical problems is prohibited.
2. Range will be closed when tactical problems are conducted on Range WE.

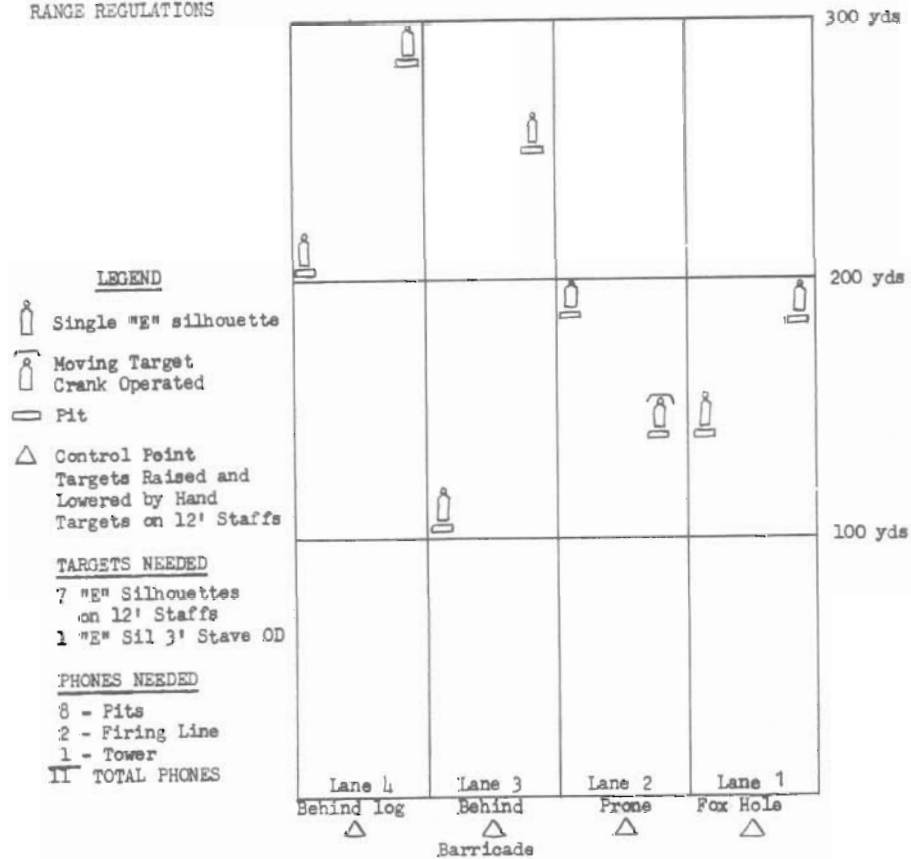
1 Appendix  
WF-1 Carbine Transition Table X

J-1

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APPENDIX I TO  
 ANNEX J TO  
 RANGE REGULATIONS

WF-1 CARBINE TRANSITION TABLE X



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WF-1 CARBINE TRANSITION TABLE X

TABLE X STANDARD COURSE, INSTRUCTION AND RECORD, TRANSITION

LANE	RANGE (Yds)	TIME (Sec)	ROUNDS	FIRING	
				POSITION	TARGET
1	150-200	30 Per tgt	4	Standing Fox Hole	2E
2	150-200	30 per tgt	4	Prone	2E
3	125-250	30 Per tgt	4	Behind Barricade	2E
4	175-275	30 Per tgt	4	Behind Log	2E

SCORING NOTES

POINTS

For each target hit	5
For each unexpended round if both targets in lane hit	5
Total possible for table	80
Ricochet hits are scored	

Suggested Method of Range Control

Battle sights used (zero for 200 yards)  
Non-com supervises each point and acts as scorer  
Two rounds per target (if target not hit with first round)

4 men per order line up behind firing points-- command --lock  
4 rounds load--ready on right--left--firing line--commence firing.

At command--commence firing, operator asuses either of two tgts in lane to be exposed. As soon as tgt hit, pit man twirls tgt and lowers. If firer does not hit tgt with first round, he fires one more round.

After completing lane 1, firer moves to lane 2. Firer on lane 2 moves to lane 3. Firer on lane 3 moves to lane 4. Firer on lane 4 moves to lane 1 until each man has fired on all lanes.

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ANNEX K TO  
RANGE REGULATIONS

RANGE WF-2  
Sergeant Leroy A. Mendonca  
Carbine Transition Range - Table XI

THE OFFICER IN CHARGE OF FIRING ON RANGE WF-2 WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation and Annex CCC.
2. Order cease firing on telephone request from Range WE (AR Transition) until all members of the pit detail on Range WE are either in the pits or behind the firing line.
3. Require firers to maintain alignment while advancing. A safety NCO will accompany each firer to assist in maintaining alignment.
4. Permit no firing into adjacent lanes.
5. Require all personnel negotiating the course to wear steel helmets.
6. Issue ammunition on the firing line only.
7. Insure that all weapons are cleared immediately following completion of the course prior to returning.

NOTES:

1. When Range WF-2 is in use, the use of Range WE for tactical problems is prohibited.
2. Range WF-2 will be closed when tactical problems are conducted on Range WE.

1 Appendix  
WF-2 Carbine Transition Table XI

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APPENDIX I. TO  
 ANNEX K TO  
 RANGE REGULATIONS

WF-2 CARBINE TRANSITION TABLE XI

TARGETS REQUIRE

Per Lane 11 "E" (3' stave)  
 3 "P" (1½' stave)

TOTAL FOR 4 LANES

44 "E" (3' stave)  
 12 "P" (1½' stave)

PHONES REQUIRE

2 - Tower  
 2 - Platform  
 2 - Pits  
 6 TOTAL

LEGEND

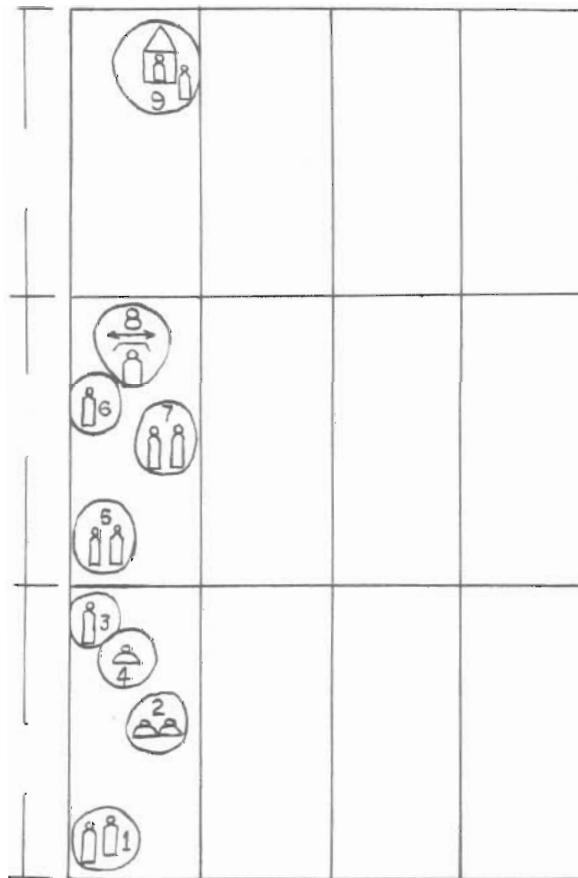
 Control levers

 Moving Target

FINISH LINE  
 NO ROUNDS FIRED  
 BEYOND THIS LINE

2D PHASE

1ST PHASE



1-K-I

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TABLE XI STANDARD COURSE, INSTRUCTION AND RECORD, TRANSITION  
(QUICK) FIRING

Suggested Method of Operation

Four men each firing order. Command-look and load 1 mag. 10 rounds and take prone position. An additional mag. containing 27 rounds is carried in firer's belt. On signal from control officer, the firer rises, unlocks carbine and advances down lane on alert. As targets are exposed, the firer fires one round at each individual silhouette using semiautomatic fire. No rounds fired when firer reaches phase line 2. Upon completion of phase 1, firer reloads 1 mag. of 27 rounds and sets carbine for auto fire. As targets are exposed, firer fires 3 rounds at each silhouette. He fires from the standing (shoulder) or hip position and is required to move forward after engaging target. No rounds may be fired after he reaches finish line. The firer is followed by a non-com who guides and critiques him and by a scorer who scores targets and pastes or marks targets.

Note: Battle sights are used (zero for 200 yards).

Phase	Range (Yds)	No. Rounds	Tgt	Type Fire	Position	Time (Sec)
1	15-35	10	2E	Semi-auto	Shoulder/Hip	4
			2F			4
			1E			4
			1F			4
			2E			4
2	15-45	27	1E	Auto Burst	Shoulder/Hip	3
			2E			4
			1E			4
			2E			4

Each firer issued 2 magazines, one containing 10 rounds and one containing 27 rounds. Extra rounds may be used in each lane at the discretion of the firer. It takes approximately 5 minutes to run one order thru course.

SCORING	POINTS
Phase 1: For each target hit-----	2
For each unexpended round if all targets are hit-----	2
Total possible phase 1-----	20
Phase 2: For each target hit-----	2
For each hit on targets up to maximum of 3-----	1
For each unexpended round if all targets in phase have 3 hits (max. for scoring)-----	2
Total possible phase 2-----	48
Total phase 1 (20) and phase 2 (48)-----	68

Range WF-2, Carbine Transition, Table XI

Phase 1-15 to 35 yards

Target 1	A	43'	14 1/3 yds
	B	47'	15 2/3 yds
Target 2	A	60'	20 yds
	B	76'	25 1/3 yds
Target 3		105'	35 Yds
Target 4		54'	18 yds
Target 5	A	65'	21 2/3 yds
	B	59'	19 2/3 yds

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Phase 2-15 to 45 yards

Target 6		72'	24 yds
Target 7		45'	15 yds
Target 8	Center	75'	25 yds
Target 9	A	127'	42 1/3 yds
	B	135'	45 yds

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ANNEX L TO  
RANGE REGULATIONS

RANGE WG  
Corporal Oliver A. Schott  
500 Inch and 1000 Inch

THE OFFICER IN CHARGE OF FIRING ON RANGE WG WILL:

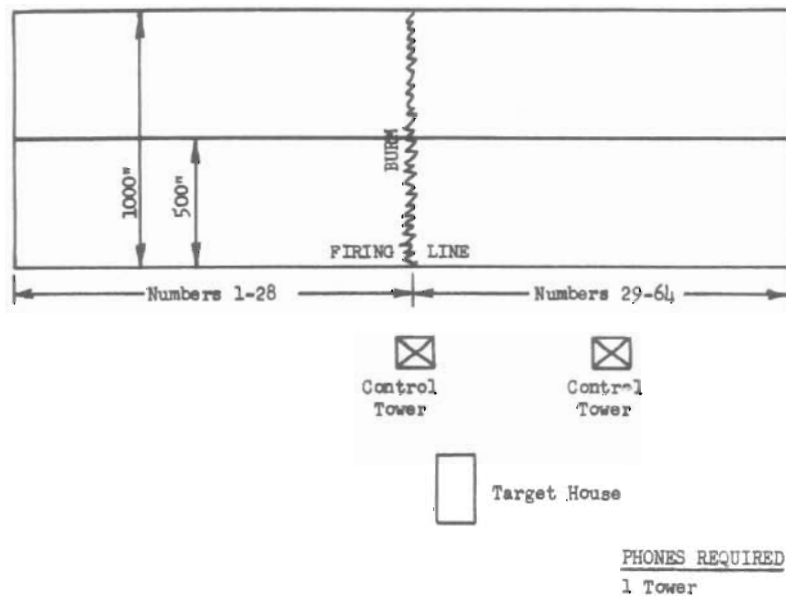
1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation and the appropriate annex on safety for the weapon being fired.
2. Require all firers to fire from numbered firing points to correspondingly numbered targets.
3. Permit no firing into adjacent lanes and no diagonal firing.
4. Issue ammunition on the firing line only.
5. Insure that weapons are loaded and unloaded on the firing line only.
6. Insure that weapons are loaded only on command from the tower.
7. Insure that firing commences on command from the tower only.
8. Insure that all weapons have been cleared and that each one has been inspected by an officer or noncommissioned officer before permission is granted to move from the firing line.
9. Insure that no weapon is moved from the firing line without prior approval from the tower.
10. Permit the firing of all .30 caliber weapons on both the 500 inch and the 1000 inch firing lines, and the firing of the .50 caliber machine gun only on the 1000 inch firing line.

1 Appendix  
WG 500" and 1000" Range

[L-1]

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APPENDIX 1 TO  
ANNEX L TO  
RANGE REGULATIONS



WG 500' and 1000' RANGE

1-1-1

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ANNEX M TO  
RANGE REGULATIONS

RANGE WH-1  
Lieutenant General Hugh A. Drum  
AR Transition - Table VII

THE OFFICER IN CHARGE OF FIRING ON RANGE WH-1 WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation and Annex BBB.
2. Coordinate with the officer in charge of firing on Ranges WJ and WJ-1 when it is necessary to change or move the pit detail forward of the firing line. Ranges WJ and WJ-1 will be requested by telephone to cease firing until the WH-1 pit detail are either in their pits or in rear of the firing line.
3. Order cease firing on telephone requests from Range WJ-1 until the pit detail on Range WJ-1 are either in the pit or to the rear of the firing line.
4. Permit no diagonal firing or firing into adjacent lanes.
5. Require all men in pits to wear steel helmets.
6. Permit ammunition to be issued on the firing point only.
7. Require weapons to be loaded and unloaded on the firing line only.
8. Permit loading only on the command "LOCK AND LOAD."
9. Insure that weapons are locked and kept pointing down range when moving from lane to lane.
10. Insure that all weapons have been cleared and that each one has been checked by an officer or noncommissioned officer before permission is granted to move from the firing line.
11. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the tower officer.

NOTES:

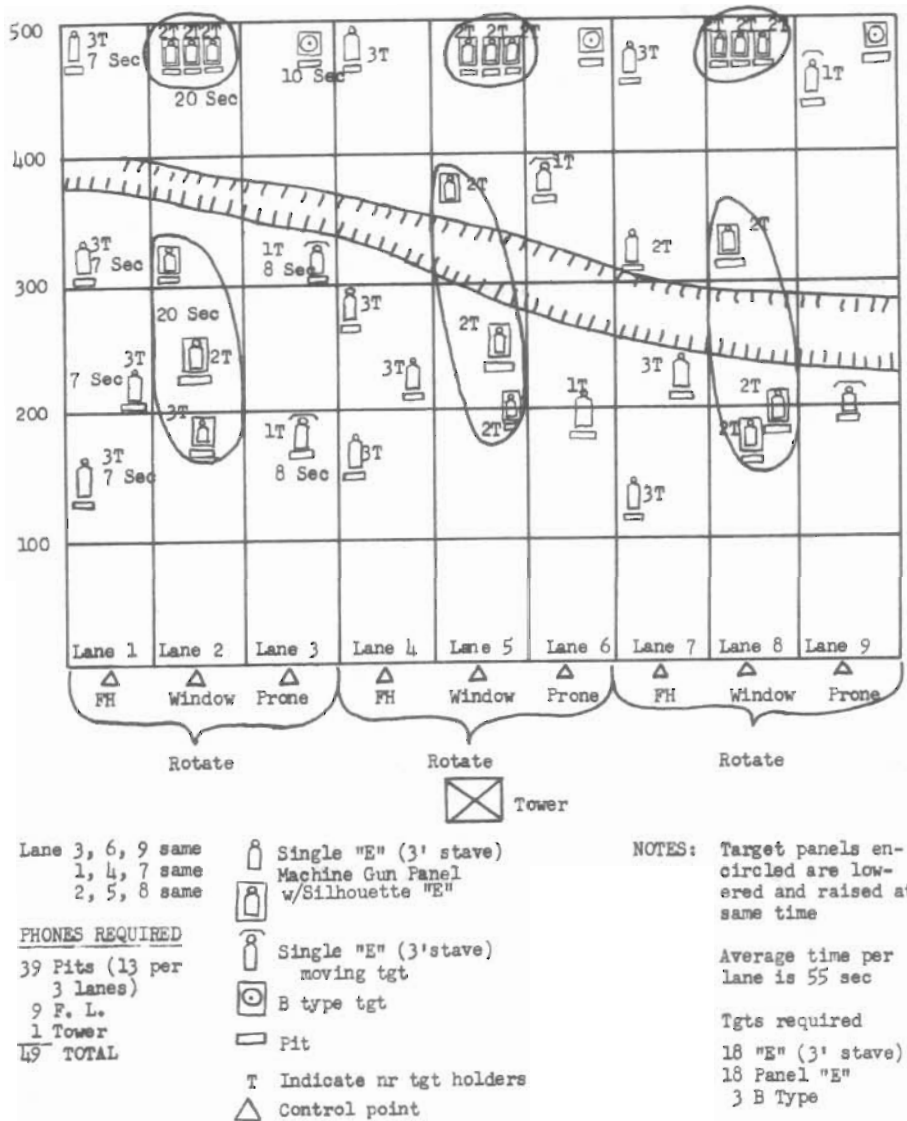
1. When Range WH-1 is in use, Range WI will be closed.
2. Range WH-1 will be closed when Range WI is in use.
3. If a unit desires to use Range WH-1, Ranges WH-1 and WI must have been allocated.

1 Appendix  
AR Transition Table VII WH-1

M-1

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APPENDIX 1 TO ANNEX M TO RANGE REGULATIONS  
AR TRANSITION TABLE VII WH-1



1-M-1

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AR TRANSITION TABLE VII RANGE WH-1

Method of Operation

Firer assigned to each lane-command-one magazine 20 rounds, load - ready right-ready left-ready firing line-commence firing. At command fire, the control point operator assumes control of target operations. Lanes are operated simultaneously.

CONTROL POINT ONE: Operator orders one of 4 targets to be raised for 7 seconds then lowered. Procedure is repeated until all 4 targets in lane have been exposed. (One magazine lane 1).

CONTROL POINT TWO: Operator directs that diagonal target group or lateral target group be exposed. After expending 1 magazine of 20 rounds, or when target disappears, the AR man reloads immediately in anticipation of the second target group. Each target group is exposed for 20 seconds or until the magazine is expended, whichever happens first. The lapse between the disappearance of one target group and appearance of the other target group is kept to a minimum required for AR man to reload. (2 magazines for lane 2).

CONTROL POINT THREE: Operator calls for the appearance of 1 moving target. The target is exposed for 8 seconds; then the other moving target is exposed for 8 seconds. They should be operated so as to traverse in opposite directions. After second moving target disappears, the "B" target is exposed for 10 seconds. (one magazine for lane 3).

TABLE VII STANDARD COURSE, INSTRUCTION AND RECORD FIRING, TRANSITION

Lane	Range(Yds)	Time(Sec)	Total Rnds	Target	Remarks
1	150-400	7 per tgt	20	4ESil	1 mag. 20 rnds in bursts 2/3
2	200-300 400	20 per grp	40	2 tgt	2 mag. 20 rnds ea grp, ea. in bursts 2/3 consist- ing of 3 MG Panels
3	150-250 500	8 per mvng tgt; 10 "B" tgt	20	2E Sil. 20 rnds bursts 2/3 Mvng tgt	1 mag.

<u>Scoring</u>				<u>Points</u>
Lane 1: Each silhouette hit-----				5
Each hit up to 5 in each silhouette-----				1
Total possible lane 1-----				40
Lane 2: Each panel hit in a target group-----				5
Each hit up to 6 in each panel-----				1
Total possible score, lane 2-----				66
Lane 3: Each moving target hit-----				5
Each hit up to maximum of 6 per target-----				1
Hit in "B" target within three ring-----				5
Each hit up to maximum of 6 on "B" target(in 3 Ring)-----				1
Total possible lane 3-----				33
TOTAL POSSIBLE TABLE VII-----				139

NOTE: Ricochets are counted as hits--points not given for unexpended rounds.

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ANNEX N TO  
RANGE REGULATIONS

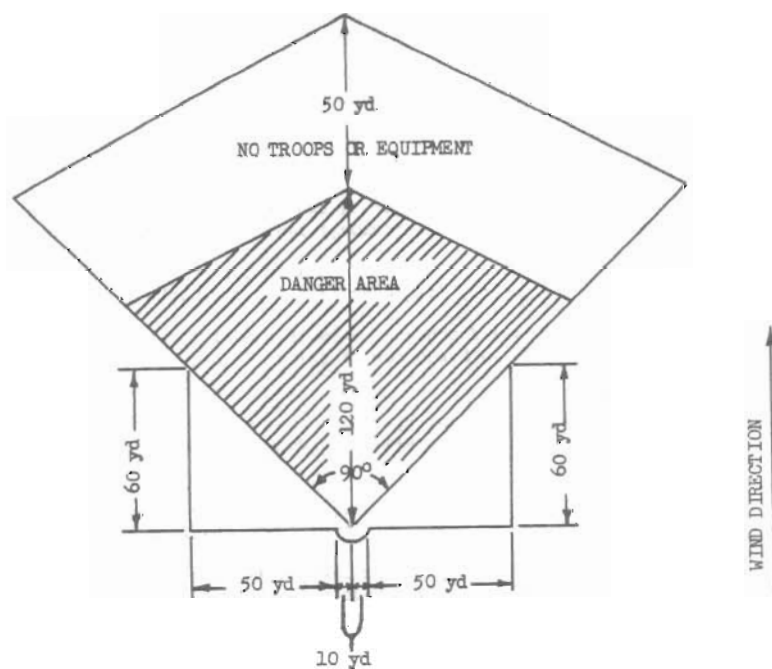
RANGE WH-2  
Lieutenant General Hugh A. Drum  
Portable Flamethrower Qualification

THE OFFICER IN CHARGE OF FIRING ON WH-2 RANGE WILL:

1. Comply with instructions presented in paragraphs 1 and 2 of this regulation.
2. Provide an ambulance equipped with proper first-aid equipment for burns which will be available in the immediate vicinity of the firing. The stretcher will be removed from the ambulance and placed beside it. The driver will remain close by. All firing is to cease in case the ambulance leaves the vicinity for any reason whatsoever.
3. Provide for a fire truck to standby on the range and insure that adequate equipment is on hand for firefighting. During initial training two 10 pound CO<sub>2</sub> fire extinguishers will be manned 10 yards to the rear or flank of the flamethrower during firing.
4. Insure that smoking, open flames, or other source of ignition are prohibited within 50 feet of any flamethrowers or from the scene of filling and charging operations.
5. Be thoroughly familiar with the operation of the weapon, filling and charging procedures, and first aid for casualties caused by burns.
6. Insure that all firing, filling, and charging operations are conducted under the direct supervision of thoroughly trained personnel.
7. Inspect all equipment for serviceability and safety of operation prior to fuel filling and pressure charging and prior to firing.
8. Insure that oxygen or other flammable gasses are never used to charge pressure tanks or containers for flamethrowers.
9. Insure that troops or observers stand outside the danger areas as shown in the figure shown in this annex.
10. Insure that an instructor accompanies each firer during initial training and indoctrination firing, and during range firing.
11. Prohibit unthickened fuel to be fired into a head wind of more than 5 miles per hour. He will not permit flamethrowers to be fired against abrupt terrain or obstacles (i.e. trees, buildings), nearer than 50 feet from spectators, and 20 feet from the firer.
12. Prohibit personnel, other than an instructor, coach, or assistant operator, from being within 10 yards of either side or rear of flamethrower, or within the danger area shown in the figure in this annex.
13. Insure that the maximum depression during firing does not exceed 20°.
14. Insure that when fuel is expended, remaining pressure in the fuel tanks of the flamethrower is blown down (released) on the flamethrower range away from any fire or fuel burning on the ground. Ignition will not be used when the flamethrower is blown down.

N-1

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Surface danger areas when firing portable flame thrower.

N-2



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ANNEX O TO  
RANGE REGULATIONS

RANGE WI  
Mortar Field Target Firing Range  
81mm Mortars and 4.2" Mortars

THE OFFICER IN CHARGE OF FIRING ON RANGE WI WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation.
2. Comply with the Air Distress Cease Fire Instructions as indicated in Annex YY when the trajectory of the projectile being fired exceeds 150 feet in height.
3. Instruct all individuals of the safety limits of the range prior to firing.
4. Permit no smoking in the vicinity of ammunition.
5. Permit no one to move forward of the line of mortars without approval from the officer in charge of firing.
6. Inspect barrels and propelling charges for presence of moisture. If moisture is detected, mortars will not be fired until moisture is removed.
7. Insure that the firing position for 4.2" mortar firing is surveyed by using unit prior to firing.
8. Permit no firing outside of the Marked Sector of Fire nor at ranges of less than 1000 yards or more than 3500 yards; no rounds will be fired that fall within 200 yards of the Fire Break Trail.
9. Insure that no obstructions are in the line of flight of the shell.
10. Require all ammunition to be kept covered until it is fired.
11. Require misfires to be removed only under the close supervision of a qualified officer or noncommissioned officer in accordance with instructions contained in the appropriate field manual for the weapon concerned.
12. Require all mortars to be inspected by a qualified officer or NCO prior to firing to insure proper set up, mask clearance, and lay of the piece.
13. Require all personnel on the range to wear steel helmets during firing.

NOTES:

1. When Range WI is in use, Ranges WH-1, WJ and WJ-1 will be closed.
2. Range WI will be closed when Ranges WH-1, WJ and/or WJ-1 are in use.
3. When a unit desires to fire on Range WI, Ranges WI, WH-1, WJ and WJ-1 must have been allocated.

1 Appendix  
WI 81mm & 4.2" Mortar Range

O-1

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APPENDIX 1 TO  
 ANNEX O TO  
 RANGE REGULATIONS

WI 81mm & 4.2" MORTAR RANGE



NOTE: 81mm Mortars will be placed 35yds  
 apart when firing w/M52 series fuzes  
 and dug in.

PHONES REQUIRED  
 1 Tower  
 1 Air Distress  
 2 TOTAL

1-0-1

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ANNEX P TO  
RANGE REGULATIONS

RANGE WJ  
Colonel Adna G. Clarke  
M1, Carbine and AR Known Distance Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WJ WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation, in the appropriate annex on safety depending on the weapon being fired and in Annex EEE.
2. Order cease firing on telephone request from Range WE (AR Transition) and/or WH-1 until all members of the pit details on Range WE and/or WH-1 are in their pits or in rear of the firing line.
3. Instruct firers to fire from numbered points to correspondingly numbered targets.
4. Permit no diagonal firing.
5. Permit no firing while the red flag is displayed above the pits.
6. Give the command to commence firing only when a clearance has been received from the pit officer.
7. Permit weapons to be loaded and unloaded on the firing line only.
8. Permit weapons to be loaded only on command from the tower.
9. Require that firing commence on command from the tower only.
10. Insure that all weapons have been cleared and each one inspected by an officer or noncommissioned officer before permission is granted to move from the firing line.
11. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the tower officer.

NOTES:

1. When Range WJ is in use, Ranges WI and WJ-1 will be closed and the conduct of tactical problems on Range WE is prohibited.
2. Range WJ will be closed when Range WI or WJ-1 is in use or when tactical problems are being conducted on Range WE.
3. When a unit desires to fire on Range WJ, Ranges WJ, WJ-1 and WI must have been allocated.
4. An exception to the above occurs when firing is conducted in the 600 yard line of Range WJ. In this event the firing on Ranges WJ and WJ-1 have no effect on each other.


1 Appendix  
WJ - KD Range

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APPENDIX 1 TO  
 ANNEX P TO  
 RANGE REGULATIONS

WJ - KD RANGE

 Target House

	
100 YD FIRING LINE	
200 YD FIRING LINE	
300 YD FIRING LINE	
400 YD FIRING LINE	
NOTE: 1. Electric outlet located on each firing line. 2. No electricity in pit.	<u>PHONES REQUIRED</u> 1 per 5 points in pit & line ..... 20 1 each for control firing line & pit ... 2
500 YD FIRING LINE	
1 tower ..... 1 TOTAL PHONES <u>23</u>	
600 YD FIRING LINE	

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ANNEX Q TO  
RANGE REGULATIONS

RANGE WJ-1  
Colonel Adna G. Clarke  
M1 Rifle, Carbine, and AR Known Distance Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WJ-1 WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation, in the appropriate annex on safety depending on the weapon being fired and in Annex EEE.
2. Coordinate with the officer in charge of firing on Range WH-1 and/or WK when it is necessary to change or move the pit detail forward of the firing line. Ranges WH-1 and/or WK will be requested by telephone to cease firing until the WJ-1 pit detail is either in its pits or in rear of the firing line.
3. Order cease firing on telephone request from Ranges WE (AR Transition) and/or WH-1 until all members of the pit detail are in their pits or to the rear of the firing line.
4. Instruct firers to fire from numbered points to correspondingly numbered targets.
5. Permit no diagonal firing.
6. Permit no firing while the red flag is displayed above the pits.
7. Give the command to commence firing only when a clearance has been received from the pit officer.
8. Permit weapons to be loaded and unloaded on the firing line only.
9. Permit weapons to be loaded only on command from the tower.
10. Require that firing commence on command from the tower only.
11. Insure that all weapons are cleared and each one inspected by an officer or noncommissioned officer before permission is granted to move from the firing line.
12. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the tower officer.

NOTES:

1. When WJ-1 is in use, Ranges WI and WJ will be closed and the conduct of tactical problems on Range WE is prohibited.
2. Range WJ-1 will be closed when Range WI or WJ is in use or when tactical problems are being conducted on Range WE.
3. When a unit desires to fire on Range WJ-1, Ranges WI, WJ, and WJ-1 must have been allocated.
4. An exception to the above occurs when firing is conducted on the 600 yard line of Range WJ. In this event the firing in Ranges WJ and WJ-1 have no effect on each other.

Q-1

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ANNEX R TO  
RANGE REGULATIONS

RANGE WK  
Colonel Adna G. Clarke  
M1 Rifle, Carbine, and AR Known Distance Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WK WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation, in the appropriate annex on safety depending on the weapon being fired and in Annex EEE.
2. Order cease firing on telephone request from WJ-1 until the pit detail on Range WJ-1 are either in their pits or in rear of the firing line.
3. Instruct firers to fire from numbered points to correspondingly numbered targets.
4. Permit no diagonal firing.
5. Permit no firing while the red flag is displayed above the pits.
6. Give the command to commence firing only when a clearance has been received from the pit officer.
7. Permit weapons to be loaded and unloaded on the firing line only.
8. Permit weapons to be loaded only on command from the tower.
9. Require that firing commence on command from the tower only.
10. Insure that all weapons are cleared and each one inspected by an officer or noncommissioned officer before permission is granted to move from the firing line.
11. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the tower officer.

1 Appendix  
WK KD Range

R-1

REPRODUCED AT THE NATIONAL ARCHIVES

APPENDIX I TO  
ANNEX R TO  
RANGE REGULATIONS

Target  
House

PIT	PIT	PIT
50 Points		
100 yd Firing Line		
200 yd Firing Line		
300 yd Firing Line		
400 yd Firing Line		
500 yd Firing Line		

NOTE: Electric outlet  
on each firing  
line.  
No electricity  
in pit.

WK KD Range

Phones Required.

1 per 5 points in  
pit & line - 20  
1. ea for control.  
firing line & pit  
-2  
1. Tower - 1  
TOTAL - 23

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ANNEX S TO  
RANGE REGULATIONS

RANGE WL  
Colonel Adna G. Clarke  
M1 Rifle, Carbine and AR Known Distance Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WL WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation, in the appropriate annex on safety depending on the weapon being fired and in Annex EEE.
2. Instruct firers to fire from numbered points to correspondingly numbered targets.
3. Permit no diagonal firing.
4. Permit no firing while the red flag is displayed above the pits.
5. Give the command to commence firing only when a clearance has been received from the pit officer.
6. Permit weapons to be loaded and unloaded on the firing line only.
7. Permit weapons to be loaded only on command from the tower.
8. Require that firing commence on command from the tower only.
9. Insure that all weapons are cleared and each one inspected by an officer or noncommissioned officer before permission is granted to move from the firing line.
10. Insure that no weapons are removed from the firing line until they have been cleared and permission has been granted by the tower officer.

1 Appendix  
WL KD Range

S-1



REPRODUCED AT THE NATIONAL ARCHIVES

APPENDIX 1 TO  
ANNEX S TO  
RANGE REGULATIONS

Target  
House

PIT	PIT
50 Points	
100 yd Firing Line	
200 yd Firing Line	
NOTE: Electric outlet located on each firing line. No electricity in pit.	Phones Required 1 per 5 points in pit & line - 20 1 ea for control firing line and pit - 2 1 tower - 1 TOTAL - 23
300 yd Firing Line	

WL KD RANGE

1-S-1

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ANNEX T TO  
RANGE REGULATIONS

RANGE WM  
Colonel Adna G. Clarke  
M1 Rifle, Carbine, and AR Known Distance Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WM WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation, in the appropriate annex on safety depending on the weapon being fired and in Annex EEE.
2. Order cease firing on telephone request from Range WN (MG Transition) until all members of the pit detail on Range WN are either in their pits or in rear of the firing line.
3. Instruct firers to fire from numbered points to correspondingly numbered targets.
4. Permit no diagonal firing.
5. Permit no firing while the red flag is displayed above the pits.
6. Give the command to commence firing only when a clearance has been received from the pit officer.
7. Permit weapons to be loaded and unloaded on the firing line only.
8. Permit weapons to be loaded only on command from the tower.
9. Require that firing commence on command from the tower only.
10. Insure that all weapons are cleared and each one inspected by an officer or noncommissioned officer before permission is granted to move from the firing line.
11. Insure that weapons are not removed from the firing line until they have been cleared and permission has been granted by the tower officer.

NOTES:

1. When Range WM is in use, the use of Range WN for the conduct of tactical problems is prohibited.
2. Range WM will be closed when tactical problems are being conducted on Range WN.

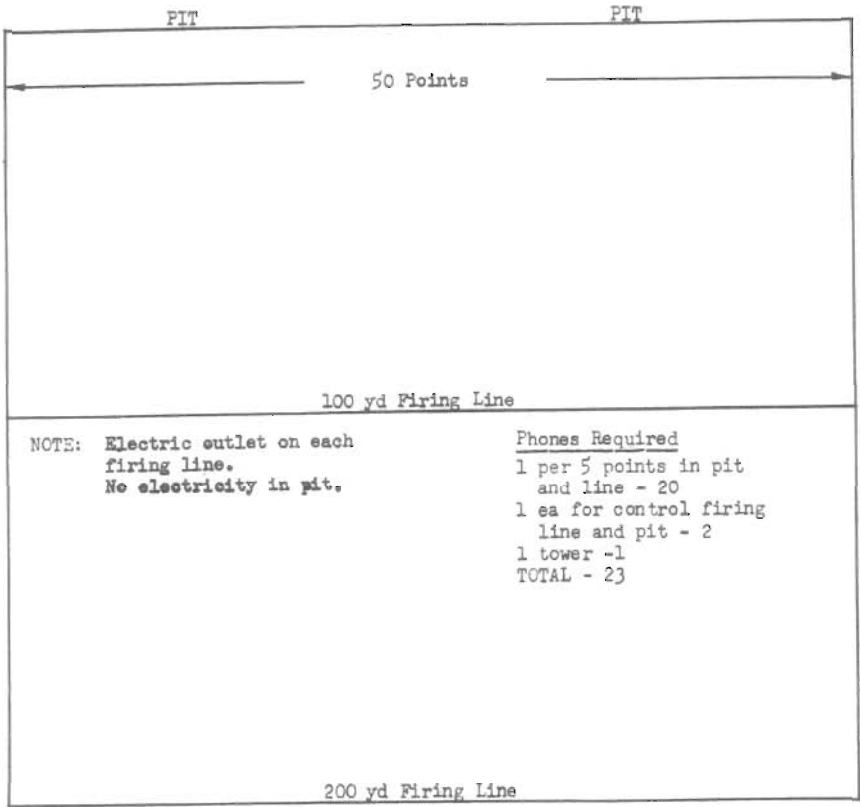
1 Appendix  
WM KD Range

T-1

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APPENDIX 1 TO  
ANNEX 1 TO  
RANGE REGULATIONS

Target  
House



WM KD RANGE

1-T-1

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ANNEX U TO  
RANGE REGULATIONS

RANGE WM-1  
Mohiaka Gulch  
81mm and 4.2" Mortar Field Target Range

THE OFFICER IN CHARGE OF FIRING ON RANGE WM-1 WILL:

1. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation.
2. Comply with the Air Distress Cease Fire Instructions as indicated in Annex YY when the trajectory of the projectile being fired exceeds 150 feet in height.
3. Inform all individuals of the safety limits of the range prior to firing.
4. Permit no smoking in the vicinity of ammunition.
5. Permit no one to move forward of the line of mortars without approval from the officer in charge of firing.
6. Inspect barrels and propelling charges for presence of moisture. If moisture is detected, mortars will not be fired until moisture is removed.
7. Permit no firing outside of Marked Section of Fire nor at less than 1500 yards or more than 3800 yards; no rounds will be fired that fall within 200 yards of the Fire Break Trail.
8. Insure that no obstructions are in the line of flight of the shell.
9. Require all ammunition to be kept covered until it is fired.
10. Require misfires to be removed only under the close supervision of a qualified officer or noncommissioned officer in accordance with instructions contained in the appropriate weapon field manual.
11. Require all mortars to be inspected by a qualified NCO prior to firing to insure proper set up, mask clearance, and lay of the piece.
12. Require all personnel on the range to wear steel helmets during firing.

NOTES:

1. When Range WM-1 is in use, Range WN will be closed.
2. Range WM-1 will be closed when Range WN is in use.
3. When a unit desires to fire on Range WM-1, Ranges WM-1 and WN must have been allocated.

U-1

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ANNEX V TO  
RANGE REGULATIONS

RANGE WN  
Major General Bryant H. Wells  
Machine Gun Transition - Table II

THE OFFICER IN CHARGE OF FIRING ON RANGE WN WILL:

1. Machine Gun Transition.

a. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation and in Annex DDD.

b. Coordinate with the officer in charge of firing on Ranges WM and/or WO when it is necessary to change or move the pit detail forward of the firing line. Ranges WM and/or WO will be requested by telephone to cease firing until the WN (MG Transition) pit detail are either in their pits or in rear of the firing line.

c. Order cease firing on telephone requests from Range WO until all members of the pit details on Range WO are in their pits or in the rear of the firing line.

d. Require all men in pits to wear steel helmets.

e. Permit no diagonal firing or firing into adjacent lanes.

f. Permit ammunition to be issued on the firing line only.

g. Permit weapons to be loaded and unloaded on the firing line only.

h. Permit weapons to be loaded only on command "HALF LOAD" from the tower.

i. Order all weapons to be cleared and checked by an officer or noncommissioned officer before permission is granted to move from the firing line. Each gun will be inspected by an officer or noncommissioned officer to see that it is unloaded. As part of this inspection, a cleaning rod will be passed through the barrel of each gun from the muzzle and immediately removed. The cover will be raised and a wooden block will be inserted into the receiver. The wooden block will remain in the receiver until the gun is again placed in action or disassembled for cleaning.

2. Musketry Problems.

a. Comply with instructions presented in paragraphs 1, 2, and 3 of this regulation.

b. Insure that firing will be in the area between the right and left limit signs only.

c. Use only lanes 6 thru 11 inclusive for the conduct of musketry problems.

NOTES:

1. When Range WN is used for the conduct of Machine Gun Transition firing, Range WM-1 will be closed.

2. When Range WN is used for the conduct of tactical problems, Ranges WM-1, WM, and WO will be closed.

V-1

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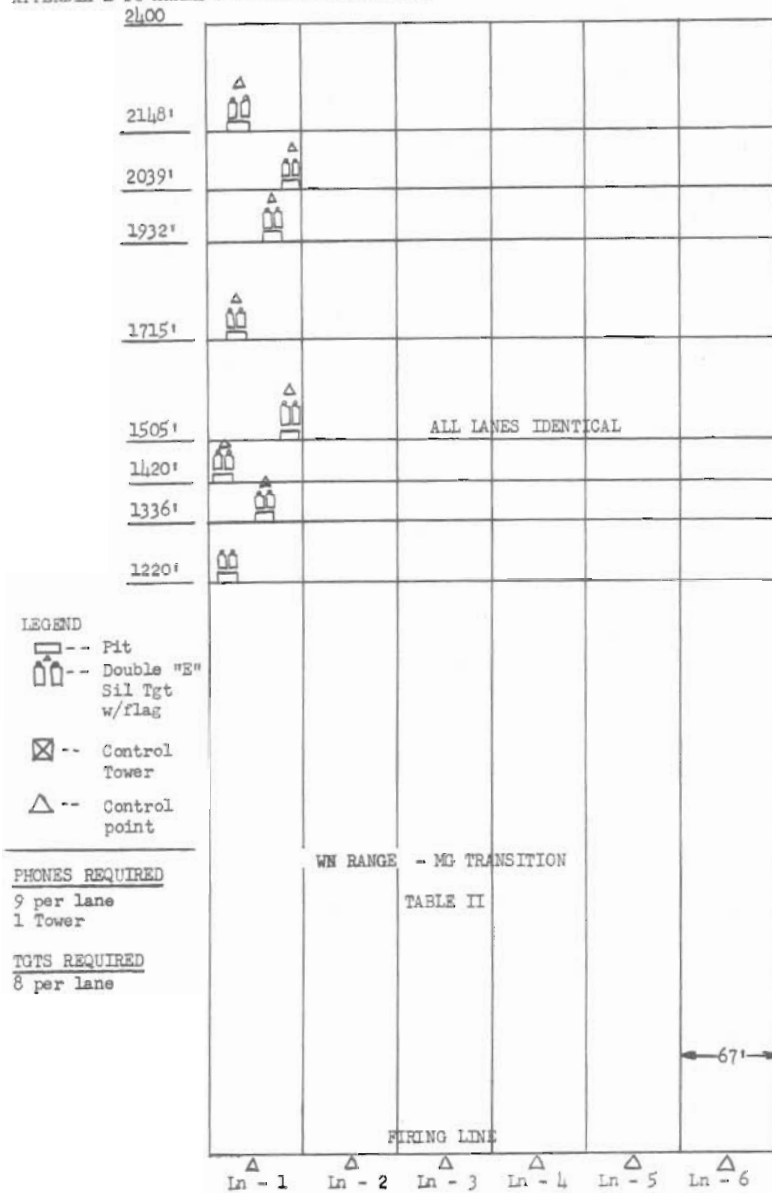
3. The use of Range WN for Machine Gun Transition firing is prohibited when Range WM-1 is in use.
4. The use of Range WN for the conduct of tactical problems is prohibited when Ranges WM-1, WM and WO are in use.
5. If a unit desires to use Range WN for MG Transition firing, Ranges WN and WM-1 must have been allocated.
6. If a unit desires to conduct tactical problems on Range WN, Ranges WN, WM, WO, and WM-1 must have been allocated.

1 Appendix  
WN Range - MG Transition

V-2

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APPENDIX 1 TO ANNEX V TO RANGE REGULATIONS



L-V-1

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WN Range-Machinegun Firing, Table 11

1. Machinegun crews line up behind the firing point in the following order: Squad leader; Nr 1 w/mount; Nr 2 w/machinegun; Nr 3 w/ammunition; upon command to "fall in," "secure equipment."

2. The instructor directs the squad leader to "examine equipment"; upon completion of examination of equipment, he describes the range, explaining that there are 8 double "E" silhouette targets in a lane 30 yards wide and 800 yards deep, from 400 to 800 yards out. Targets are exposed individually on signal and are withdrawn when hit or after two bursts have been fired upon exposure. Time limit: 4 minutes.

3. a. Upon appearance of the first target, the squad leader indicates the target to the crew by pointing and verbal description, i.e., "gun to be mounted here, front, silhouette, action." No range is given. Crew then puts the gun in action, gunner estimates range, adjusts sights, fires one burst at target, watches strike of burst, sees if the target drops, ceases fire, if not, readjusts sights and fires another burst. If the target is not hit, a red flag will be waved from the target pit.

b. As each target is hit or withdrawn after the second burst, the next target will be exposed and the squad leader will indicate each target. Gunners will adjust sights for each successive target engaged.

c. Prearranged sequences for target exposure will not be used although the nearest and farthest targets will be exposed among the first four no matter what sequence has been decided. When firing the M1919A6 machinegun, the first target raised should be along the middle of the gun-target line so that sufficient right and left traversing screw is available for traversing the target area.

d. The ammunition bearer with one box of ammunition consisting of one (1) belt of 120 rounds, will be carried by Nr 3 of the crew. (for periods of difficult observation a ratio one tracer and 3 ball can be used)

e. The instructor and/or the squad leader should make notes of errors committed by the crew and explain the effect of these errors on the firing.

Marksmanship

Course A instruction practice consists of firing table I and 11 (table I-1000" firing) at least once. Record practice consists of firing table I and 11 at least once with M1919A6 gun. Table I is fired from tripod and table 11 is fired from bipod.

Range (yds)	Time	Total Shots	Target	Type of Fire
400-800	4 min	120	8 double "E" sil	fixed 1 exercise 120 rounds

Scoring: Ten points for each target hit      Total      80 points  
(to be fired within time limit)

Stoppages: For stoppages (not fault of gunner) remaining time plus  
2 seconds per stoppage.

Ejected rounds (not fired) 1 second more per round



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ANNEX SS TO  
RANGE REGULATIONS

MAKUA

1. The officer in charge will comply with instructions presented in paragraphs 1, 2, and 4 of this regulation and the instructions contained herein.
2. The Makua area is used primarily for tank gun and recoilless rifle firing and as an artillery impact area.
3. Range flags will be displayed on the flagpoles located at coordinates 79758058 and 81398698.
4. Range guards will be posted at points where flagpoles have been established. The guard will stop all traffic entering the area and inform them that firing is in progress, not to stop in the area, not to get off the back road, and to watch out for tanks on the road.
5. The "Area to be Kept Clear of Duds," as indicated in Appendix 2, will be scouted for any trespassers prior to any firing by the unit using the area.
6. All roads leading off the "Area to be Kept Clear of Duds," (1,000 yards distant from the beach road toward Makua Valley) will be barricaded when not in use. Using unit is responsible that barricades are put in place upon completion of training. Appropriate instructions on metal signs at entrances will be observed.
7. Units detecting duds in the "Area to be Kept Clear of Duds" will mark and report immediately the location and type thereof to the Division Ammunition Officer (DAO).
8. If a fire starts in the impact area, this headquarters, ACoFS, G3, will be notified. No troops will enter the impact area to put out fires. If a fire starts in the area cleared of duds or adjacent thereto troops will be moved a minimum of 200 yards from the fire and will not approach the area until the fire is extinguished and until such time as the possibility that a dud will be exploded by the heat of the fire has elapsed. Only the officer in charge of firing can make this decision based on his personal observation of the fire, its intensity, and its location with respect to cleared areas to be used by troops.
9. The Range Officer is responsible for checking the condition of "warning signs" at both beach road entrances to Makua Valley and "dud area" signs marking the limits of dud area.
10. The firing line for tanks is terminated by coordinates 809812 and 809816 as indicated by Appendix 1. Tanks will fire from this line only.
11. Firing will be confined to the area between the right and left limiting markers.
12. Tanks will not fire on any target at a gun-target range of less than 2000 yards. (At 2000 yards and over, the angle of fall of the projectile is increased so as to decrease the possibility of a ricochet).
13. High explosive and smoke shells (excluding WP) only will be fired.

SS-1

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14. Tanks will not fire with a tube elevation (from horizontal) greater than 147 mils on the 90mm gun, or 170 mils on the 76mm gun. A qualified officer or noncommissioned officer will check the tube elevation with the M-1 gunner's quadrant before each round is fired to ascertain that the tube elevation does not exceed these figures.

15. A qualified officer or noncommissioned officer will verify the lay of the gun prior to the firing of each round to ascertain that the direction of the tube is within the right and left limiting markers.

16. Prior to moving any vehicles or personnel into the impact area on the cleared trails, the OIC will have the trail visually checked for duds. If duds are found on the trail, the OIC will permit no troops or vehicles to move on it and will mark and report the dud(s) to the Division Ammunition Officer immediately.

17. No dismounted personnel may go forward of the rear of any tank except when the green flag is flying.

18. When any guns on the tank are not clear, they will be pointed down range.

19. All guns will be cleared, checked, and reported before tanks leave the firing line.

20. The officer in charge of firing will comply with the Air Distress Cease Firing Instructions as indicated in Annex YY.

21. The OIC will obtain clearance from the ACofS, G3, this headquarters, by telephone before firing.

22. Pioneer Airstrip located between coordinates 78358345 and 78208365 as indicated in Appendix 2 will be used during dry weather only.

23. When Makua Area is being used, Kuaokala Area will be closed to all Army units.

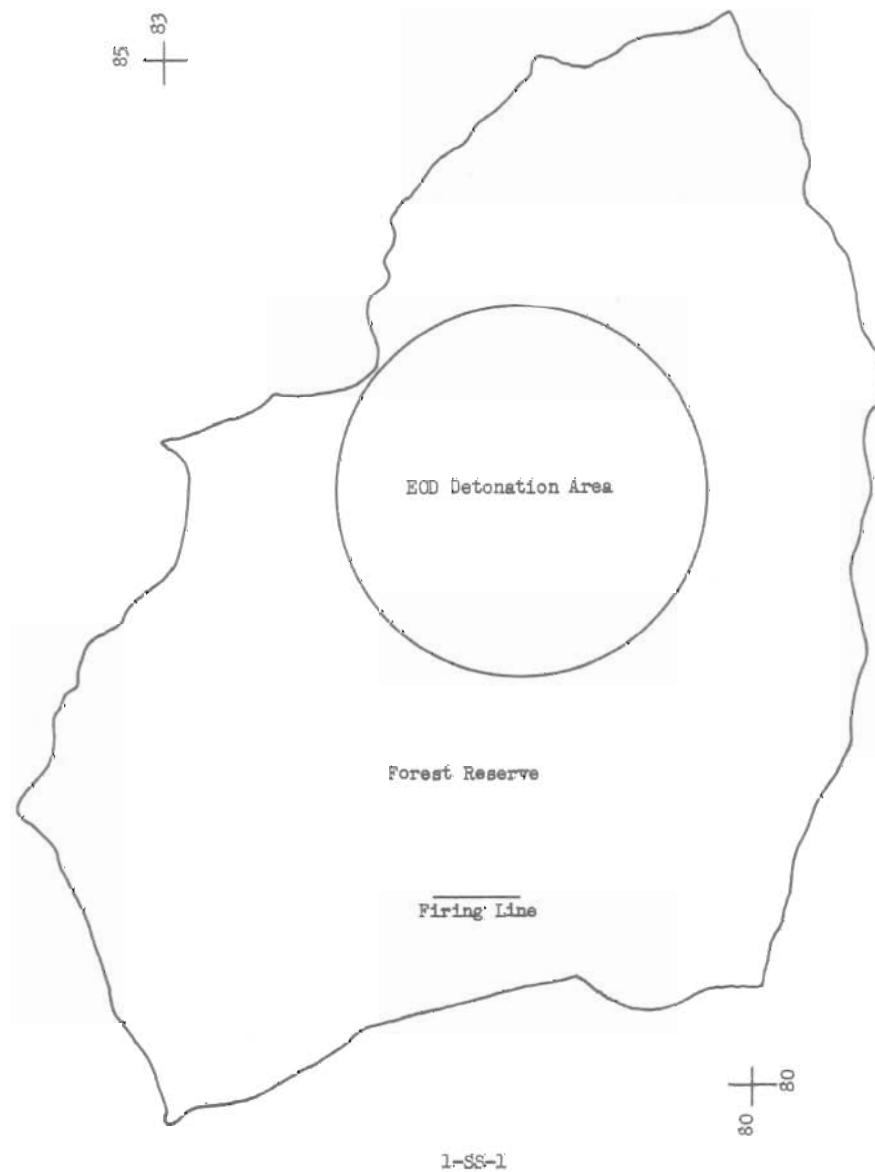
#### 2 Appendices

1. Overlay to Makua Impact Area
2. Overlay to "Area to be Kept Clear of Duds"

REPRODUCED AT THE NATIONAL ARCHIVES

APPENDIX 1 TO  
ANNEX SS TO  
RANGE REGULATIONS

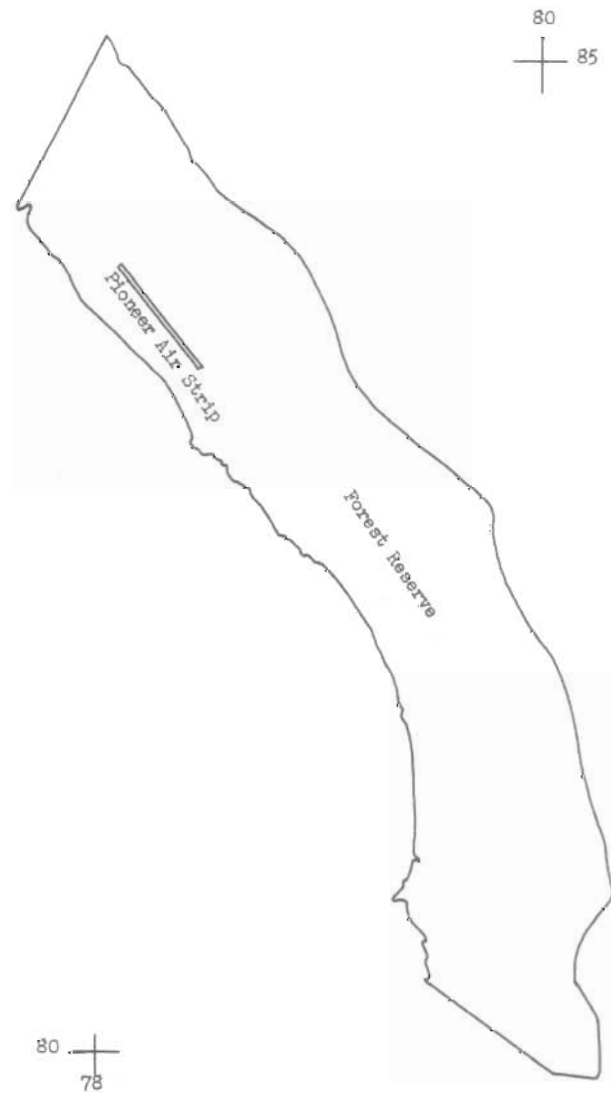
OVERLAY TO MAKUA IMPACT AREA



REPRODUCED AT THE NATIONAL ARCHIVES

APPENDIX 2 TO  
ANNEX SS TO  
RANGE REGULATIONS

OVERLAY TO "AREA TO BE KEPT CLEAN OF DUDS"



2-SS-1

## **APPENDIX C-15**

**NARA II College Park, Maryland (CP),  
Regulation prepared by USAHAW for Schofield  
Barracks, Hawaii entitled *Range Regulations*  
dated 10 September 1971, RG 338, Records of  
U.S. Operational, Tactical, and Support  
Organizations (World War II and Thereafter),  
Entry 401-135 U.S. Army Hawaii 1977, Box 1,  
CP-120806-011.**

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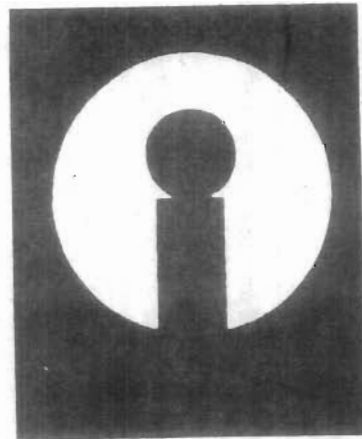


# RANGE REGULATIONS



USARHAW

CP-120806-011



SCHOFIELD BARRACKS, HAWAII

10 Sept 1971

REPRODUCED AT THE NATIONAL ARCHIVES

## RANGES

### 1. General.

a. This appendix lists all available ranges and their primary purposes. Ranges will not normally be utilized for weapons or purposes not listed. Exceptions to this policy may be made by the USARHAW Range Officer if the range normally used is not available and if the usage is within the pertinent safety regulations and physical capabilities of the range to be used. Use of special or new type weapons and/or air to ground firing must be approved by the Directorate of Operations, Plans and Training, USARHAW. At no time will POV be permitted on any range or range complex within the Schofield Barracks vicinity.

b. The following symbols are used to identify the various ranges and their locations:

<u>Symbol</u>	<u>Location</u>
(1) KR-1 through KR-8	Kolekole Road Ranges
(2) TR-1 through TR-5	Trimble Road Ranges
(3) CR-1 through CR-7	Central Ranges
(4) MF-2 through MF-7	McCarthy Flats Ranges
(5) SR-1 through SR-5	South Ranges
(6) PR-1 through PR-3	Pistol Ranges (Waikoloa Gulch, Area A)
(7) Other ranges as described further where listed.	

c. The OIC of firing will fully comply with the pertinent provisions of this regulation, AR 385-63, and applicable field and technical manuals. Safety and special regulations are listed with the ranges. The USARHAW Range Officer may, if conditions warrant, impose further safety requirements or restrictions. Directorate of Operations, Plans and Training, USARHAW, will be kept informed of any such additional requirements and/or restrictions. Using units are responsible for clearing firing pathways from the firing line to targets on all ranges.

### 2. Kolekole Road Ranges.

a. KR-1 (19 pts) Pyrotechnics and 3.5 Rocket Launcher (inert ammunition only) Range. Use of this range closes KR-2.

b. KR-2 (10 pts) Live Hand Grenade Range, 3.5 Rocket Launcher, M72 (LAW) and Pyrotechnics.

(1) Use of this range closes KR-1.

(2) Personnel must have undergone training with practice hand grenades prior to throwing live hand grenades.

(3) Area back of KR-1 firing line can be utilized for practice grenade training (inert ammunition only); individuals will wear steel helmets at all times.

(4) All personnel will remain under cover within 100 meters of the point of burst until 10 seconds after grenades have impacted.

Appendix V to Reg No. 210-6, HQ USARHAW, 1971.

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(5) A guard will be posted at the intersection of Kolekole and Cable Car Road.

c. KR-3 (3 lanes), (12 pts) M79 Grenade Launcher Familiarization and Qualification Range.

(1) Range is used for firing practice and live ammunition in accordance with appendix II, FM 23-31.

(2) OIC will insure that the safety provisions as outlined in appendix III, FM 23-31, are strictly complied with.

(3) The impact area is "OFF LIMITS" to all personnel utilizing this range.

d. KR-4 (5 pts) 106mm Recoilless Rifle and 90mm Recoilless Rifle Range.

(1) Use of this range closes KR-5.

(2) All flat trajectory and small arms weapons can be fired on this range subject to direct coordination with the USARHAW Range Officer.

(3) Direct fire artillery and tank service firing will be conducted in the cleared area in the immediate front of firing berm.

(4) Other special weapons may be utilized subject to the approval of the Directorate of Operations, Plans and Training, USARHAW, if within the applicable safety regulation and physical limitations of the range.

(5) OIC will insure that firing is not directed at targets in KR-3 (M79 grenade launcher range).

e. KR-5 Small Arms Demonstration Range.

(1) Use of this range closes KR-4.

(2) Spectators will be kept out of the danger areas of the weapons being fired.

f. KR-6 Squad and Platoon Live Fire Area.

(1) Use of this range closes KR-7, KR-8, KR-8m, TR-3m, CR-1, CR-1a, CR-2, CR-2a and CR-3.

(2) The range area to be utilized is shown in annex B to this appendix.

(3) OIC will insure that personnel do not wander out of the prescribed maneuver area or fire outside the right and left limits of the range shown by placed barber poles.

(4) All duds found will be clearly marked and promptly reported to USARHAW Range Control.

(5) Safety OIC will be to the immediate rear of firers to insure proper alignment is maintained while advancing.

g. KR-7 Small Arms Night Firing Course.

(1) Use of this range closes KR-6 and KR-8m.

V-2



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(2) Range is presently inoperative.

h. KR-8 (6 pts) Sub-Caliber Recoilless Rifle and Tank Sub-Caliber Range.

(1) Use of this range closes KR-6 and KR-8m.

(2) Table II will be the only authorized fired course for 106mm recoilless rifles on this range.

(3) Tables I, II, and III will be the only authorized fired course for tanks on this range.

(4) OIC will insure that no vehicle larger than a 1/4 ton, 4x4, is used to operate the moving target cart.

3. Trimble Road Ranges.

a. TR-1 (40 pts) 10, 15 and 25 meter Machine Gun, Zero and Manipulation Range for 5.56mm and 7.62mm.

b. TR-2 (3 lanes) Machine Gun Assault Firing Range.

(1) Use of this range closes TR-3, TR-3m, CR-1 and CR-1a.

(2) An active coach or safety NCO will be immediately in the rear of each firer to control firer's movements.

(3) Range is as prescribed in figure 139, chapter II, FM 23-65.

(4) Range is presently inoperative.

c. TR-3 (4 lanes) Portable Flamethrower Qualification and Familiarization Range.

(1) Use of this range closes TR-2 and TR-3m.

(2) OIC will insure that all safety requirements and procedures as listed in AR 385-63 and FM 20-33 are fully complied with.

(3) An ambulance equipped with proper first aid equipment must be available near the firing line. All firing and handling of weapons will cease if ambulance leaves the area for any reason.

(4) Using unit has the responsibility to insure that a fire truck with adequate fire fighting equipment is standing by near the range. In addition, at least two 10-pound CO<sub>2</sub> fire extinguishers will be manned 10 meters to the rear or flank of the flamethrower during firing.

d. TR-4m (4 pts) 81mm Mortar Tear Drop Range. Use of this range closes TR-3m.

e. TR-5 (25 pts) Trainfire Target Detection Range. See paragraph 8 below.

4. Central Ranges.

a. CR-1 (10 pts) 1,000 Yard Known Distance Range. Range is presently inoperative.

b. CR-1a (6 pts) Machine Gun Field Firing Range (day and night). Use of this range closes CR-1, CR-2, CR-2a, TR-3m, TR-2 and KR-6.

V-3

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c. CR-2 (capable of 50 firing points, operational 15) 200, 300, 400, 500 and 600 Yard Known Distance Range.

(1) Use of this range closes CR-1a, CR-2a, TR-3m and KR-6.

(2) Pit personnel will be cautioned in safe handling of target marking discs and restricted to the area between the line of targets and target butt-wall when firing is conducted. Steel helmets will be worn by all personnel in pit.

d. CR-2a (6 pts) Tank, 106mm Recoilless Rifle, 90mm Recoilless Rifle and M72 (LAW).

(1) Use of this range closes CR-1, CR-1a, CR-2, CR-3, TR-3m and TR-6.

(2) Only high explosive shells with SQ Fuzes will be fired.

(3) Range area to be utilized is shown in annex A to this appendix.

e. CR-3 (50 pts) Familiarization and Small Arms Test Fire Range.

(1) Use of this range closes CR-2a and KR-6.

(2) Use of this range can be coordinated at Range Central prior to firing on the same day of firing.

(3) Personnel will not be allowed forward of the 300 yard line at any time.

f. CR-4 (35 pts) Trainfire Field Fire Range. See paragraph 8 below.

g. CR-5 (capable of 65 firing points, operational 35) Trainfire 25 Meter Zero Range. Use of this range closes CR-5m and CR-6m. Firing will also cease when requested to permit changing of targets on MF-2.

h. CR-7 Trainfire Target Detection Range (25 pts) and Bayonet Assault Course (5 pts). See paragraph 8 below.

5. McCarthy Flats Ranges.

a. MF-2 (7 lanes) Machine Gun Transition Range.

(1) Use of this range closes CR-5m, CR-6m and MF-3.

(2) Range guards will be posted at grid coordinates 943791 and 745788.

(3) See paragraph 8b(5)(c) below for personnel support to operate this range when required or requested.

b. MF-2a (3 pts) Combat Engineer Vehicle Range.

(1) Use of this range closes all of Schofield Barracks ranges and firing points (reference Map No. 5,199, Mar 69, G-2 USARPAC) adjacent to impact area appendix I, this regulation.

(2) Use of this range will be restricted solely to the combat engineer vehicle (CEV).

(3) Range area to be utilized is shown in annex C to this appendix.

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c. Kawaihoa Area. (See annexes I thru N of this appendix).

(1) The entire area is divided into three smaller areas, K-1, K-2 and K-3. All areas are primarily used for the conduct of unit tactical problems and bivouacs.

(2) Small arms (5.56 and 7.62mm) live firing is permitted. In accordance with paragraph 12c, this regulation, an SDAD must be submitted to and approved by the Director of Operations, Plans and Training, USARHAW, to conduct live firing. An aircraft watch will be maintained constantly while firing is being conducted, and all firing will cease immediately when the projectiles pass through low hanging cloud formations.

(3) The use of demolitions, simulators, or ammunition of any incendiary nature is prohibited. Personnel will be especially alerted concerning the extreme fire hazard that exists throughout this area.

(4) Upon completion of training, using units will thoroughly police and inspect the area to insure that no fires or conditions exist that may result in a fire. This will include an aerial reconnaissance of the area in the evening of the day of their departure.

(5) The primary access route to all the areas above is the Pupukea Homestead Road and Trail (Drum Road), annexes O and S of this appendix. Under no circumstances will troops leave this road where the Government easement (20 feet from center of road) does not coincide with or is west of the training area boundary. Gates are located on this road at grid coordinates 01289348 and 00948980. These gates will be kept closed at all times. Damage to gates, adjoining fences, or areas will be reported to ROR, USARHAW, immediately.

(6) The use of any other access route without specific permission is prohibited. Units desiring to utilize other access routes must submit their requests to reach Director of Operations, Plans and Training, USARHAW, through channels, not later than 30 days prior to the intended use. These requests will be kept to a minimum and the primary access used whenever possible.

d. Makua Training Area. (See annexes T and U, DD, this appendix).

(1) This area is divided into two sections: A training area primarily used for bivouacs, tactical training problems, CPX and communication sites, and an impact area or danger area used for live firing with all weapons. An area is available at grid coordinates 80728132 for the destruction of unserviceable ammunition by EOD teams.

(2) Small arms (5.56 and 7.62mm) firing problems may be conducted in the training area. However, in accordance with paragraph 12c of this regulation, an SDAD must be furnished and all rounds must impact into the Makua Danger Area. Under no circumstances will personnel move in the danger area. All other firing, i.e., 81mm mortar, 106RR, tank weapons, demolition demonstrations, and special weapons, must be conducted from the established firing line between grid coordinates 809814 and 809813 on Hill 210. In all cases, an SDAD must be furnished. All personnel involved in firing from Hill 210 will use the access road leaving the training area at grid coordinates 80418135. Personnel will leave the access road after entering the danger area until they arrive in the immediate vicinity of the firing line indicated above. Personnel will not in any event move forward of the firing line. The above restrictions on movement of personnel are

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necessary because only a small portion of the danger area has been cleared of duds, and movement into the adjacent area is extremely dangerous. Mortars, 81mm, also may be fired from position as shown in annex DD of this appendix.

(3) Tank weapons and other flat trajectory weapons of a similar nature are further restricted as follows:

(a) Only cannisters and high explosive ammunition with SQ fuzes will be used when firing main gun.

(b) Weapons will not fire with a tube elevation greater than 108 mils from the horizontal. Units desiring to utilize other weapons will furnish proposed elevation of tubes with SDAD. A qualified commissioned or noncommissioned officer will check the tube elevation with a gunners' quadrant before each round is fired to verify the above elevations.

(c) A qualified officer or noncommissioned officer will check the lay of the gun prior to the firing of each round to verify that the gun is laid within the right and left limiting markers and within the limits imposed by the SDAD.

(d) Personnel will not be allowed at the rear of any tank or weapon which has not been cleared.

(e) Guns will be cleared, checked, and reported before being traversed or elevated out of the limits imposed by subparagraphs (b) and (c) above and the SDAD.

(f) Tank crew proficiency range will be fired in accordance with annexes EE thru HH of this appendix. BOD teams are authorized to utilize the area in vicinity of grid coordinate 80728132 for destruction of unserviceable ammunition. If other units are scheduled to utilize the training area or the firing line on Hill 210 at the same time, coordination will be effected to permit joint utilization if practicable. OIC of BOD teams will fully comply with all provisions of this regulation, AR 385-63, and applicable field and technical manuals in the same manner as if live firing were to be conducted.

(4) The use of blanks, simulators, demolitions, and pyrotechnics is authorized throughout the area but must be controlled so as not to create a hazard to the public utilizing Farrington Highway and the beaches. When using any of the above to include 4.2 inch mortar, or artillery, road guards and range flags will be placed at each end of the area in use on Farrington Highway and the road leading to the tracking station, and the public warned not to stop in the area, not to get off the main road and to watch out for military traffic, especially if tanks are utilizing the road.

(5) Fires will be controlled as indicated in paragraph 11, this regulation, with the following exceptions: If a fire starts in that area bounded by grid coordinates 796804 and 790325, the beach and the danger area (this area has been cleared of duds), troops will be moved a minimum of 200 yards from the fire and will not approach the area until the fire is extinguished and/or until such time that the possibility of a dud being exploded by the heat of the fire has elapsed. Only the OIC of firing can make this decision based on personal observation of the fire, its intensity, and its location with respect to the area in question.

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(6) Basic wire communications for both air distress and administration is available at grid coordinates 79758058. Communication must be maintained at all times by either land line or radio between that point and the immediate vicinity where the firing is being conducted.

e. Small unit training areas.

(1) The following areas are small in size and suitable for purposes as small unit problems, bivouacs, CPX, communication exercises, and sites:

- (a) Barbers Point Area.
- (b) Kaena Point Area.
- (c) Waikele (Waikakalaua) Gulch.
- (d) Lower Kipapa Gulch Area.
- (e) Haleiwa Airstrip Bivouac Area.
- (f) Kahuku Airstrip Bivouac Area.

(2) No live firing of any kind is permitted. The use of blanks (Cal .30, 5.56mm and 7.62mm) is permitted at all locations except Kahuku Airstrip Bivouac Area. The use of pyrotechnics and simulators is permissible except at Kahuku Airstrip Bivouac Area and Haleiwa Airstrip Bivouac Area. No tracked vehicles of any type will be utilized within the Kahuku Airstrip Bivouac Area and on the access routes thereto.

(3) Straddle trench latrines will be dug and their use enforced. All accumulated trash and garbage will be disposed of at the Schofield Barracks sanitary fill.

(4) The digging of foxholes and hasty fortifications is permitted except at Kahuku Airstrip Bivouac Area. All holes will be filled prior to departure.

(5) Entry to the Kahuku Airstrip Bivouac Area will be made by use of the roadway leading off Kamehameha Highway in the vicinity of grid coordinates 06129931 and the locked gate located at grid coordinates 06939991. Keys for the gate are available at USARHAW Range Control Office.

(6) Keys for the gate leading into Waikele Gulch and Lower Kipapa Gulch Area are available at USARHAW Range Control Office.

f. Kahuku Airstrip (east end of airstrip only). The airstrip will be utilized for aircraft only. Access to the airstrip will only be made by way of the Kahuku Airstrip Bivouac Area as described in paragraph e(5) above. (See annex AA of this appendix.)

g. South Range 1 (Driver Training Course).

(1) This area is used to conduct driver training in rugged terrain for all vehicles (see annex BB of this appendix).

(2) Use of the area is partially restricted by the artillery firing points and SR-3 trainfire record range. As indicated on the area overlay, certain portions of the area are closed when SR-3 is being used. Use of the area will be coordinated with the USARHAW Range Officer.

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(3) The road from vicinity of grid coordinates 93957598 to 94057585 will not be used when it is wet. Consideration must be given to safety on all the roads during inclement weather.

h. South Range 5 (Small Unit Training Area).

(1) This area is used for small unit (squad and platoon) training, CPXs, bivouacs and communication exercises, and sites (see annex BB of this appendix).

(2) No live firing is permitted. Blanks, pyrotechnics, and simulators may be used.

(3) As indicated in the area overlay, certain portions of the area will be closed when SR-3 is in use. Use of the area will be coordinated by the USARHAW Range Officer.

i. Other facilities are available as follows (see annex BB of this appendix):

(1) Area X assembly area is used for assembly and staging exercises.

(2) Area X bivouac area is a semipermanent bivouac area equipped with concrete tent slabs, water, latrines, and utilities.

(3) Area X driver course is used for driver training of wheeled vehicles for left hand side of road driver training.

(4) Area X Physical Proficiency Combat and Physical Fitness Testing Course is used to meet five stage requirements of 150 yard man carry, run-dodge and jump, half-mile run, horizontal bars, and crawl. Units must provide necessary equipment except horizontal bars and run, dodge, and jump course which are installed.

(5) Mockup area located on McCarthy Flats is used for simulated loading of vehicles into aircraft.

(6) Dry nets area located in the vicinity of grid coordinates 94517664 is utilized to practice loading unloading with nets from landing craft and ships.

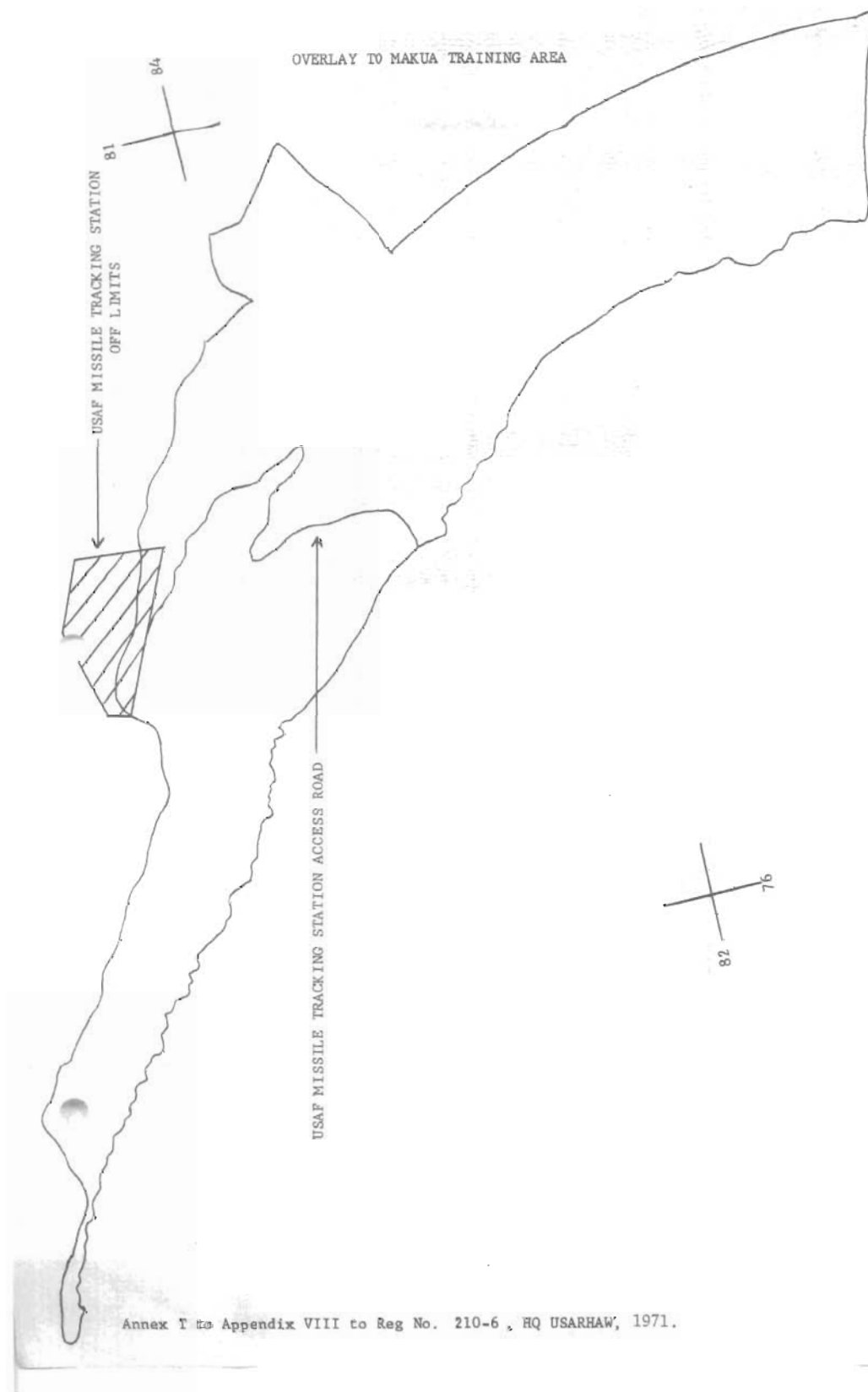
(7) Bayonet course located in the vicinity of grid coordinates 95047784 is utilized to conduct bayonet practice.

(8) CS chamber located on Kolekole Road in the vicinity of grid coordinates 93257680 may be utilized to conduct gas familiarization exercises. Units will furnish their own equipment and necessary chemicals. Technical assistance is available upon request. Request must indicate number of personnel involved. A commissioned officer who has completed the three-week USARHAW CBR Course or has received formal instruction in CS chamber operation from Chemical Corps personnel must be present as safety officer. Requests for utilization of the CS chamber will be submitted to the Directorate of Operations, Plans and Training, USARHAW.

(9) Airborne training facility located in Area X in vicinity of grid coordinates 95407850 is utilized to conduct basic airborne training. Some facilities available are: jump tower, aircraft mockup and swing landing fall platform. Request to utilize will include number of personnel involved.

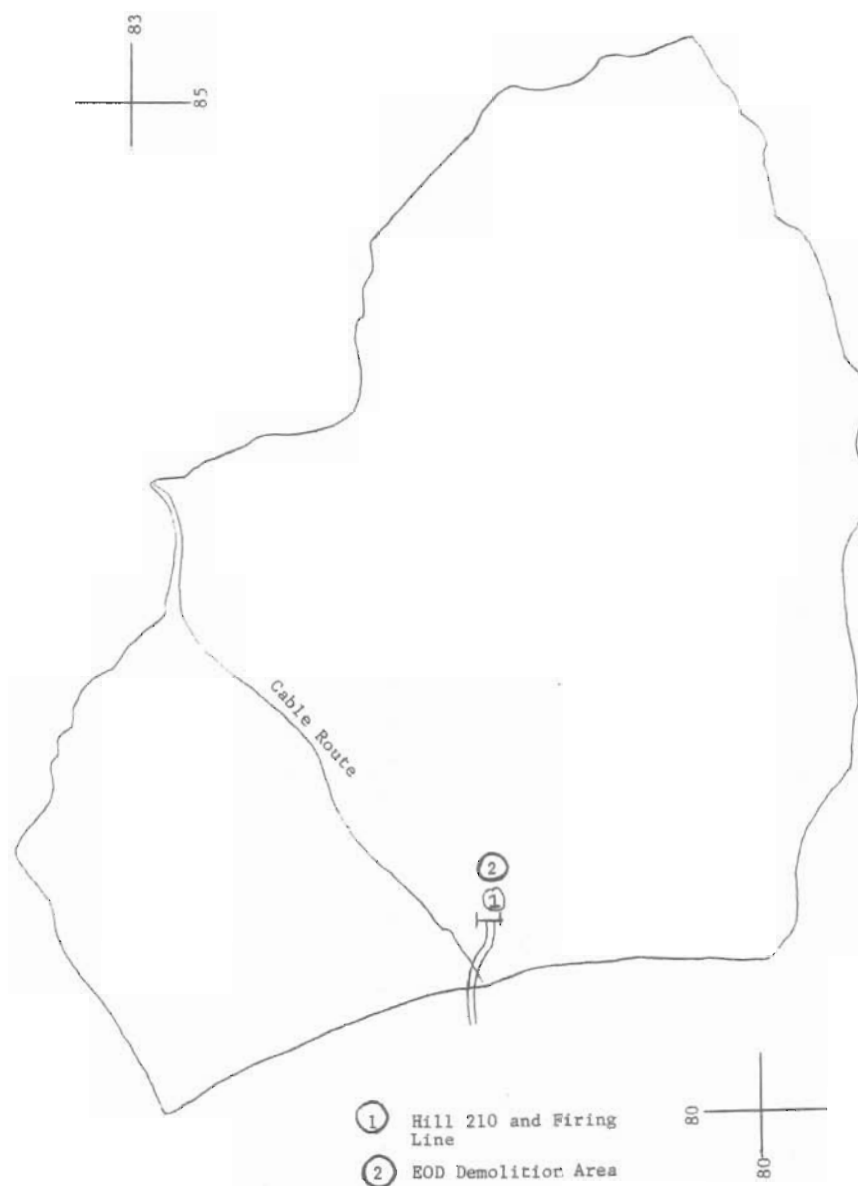
VIII-6

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REPRODUCED AT THE NATIONAL ARCHIVES

OVERLAY TO MAKUA DANGER AREA AND FIRING LOCATIONS

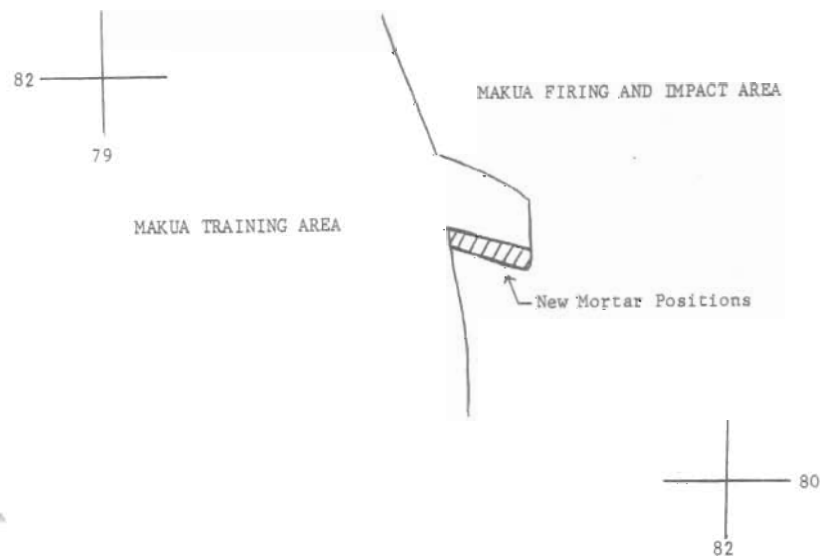


Annex U to Appendix VIII to Reg No. 210-6, HQ USARHAW, 1971.



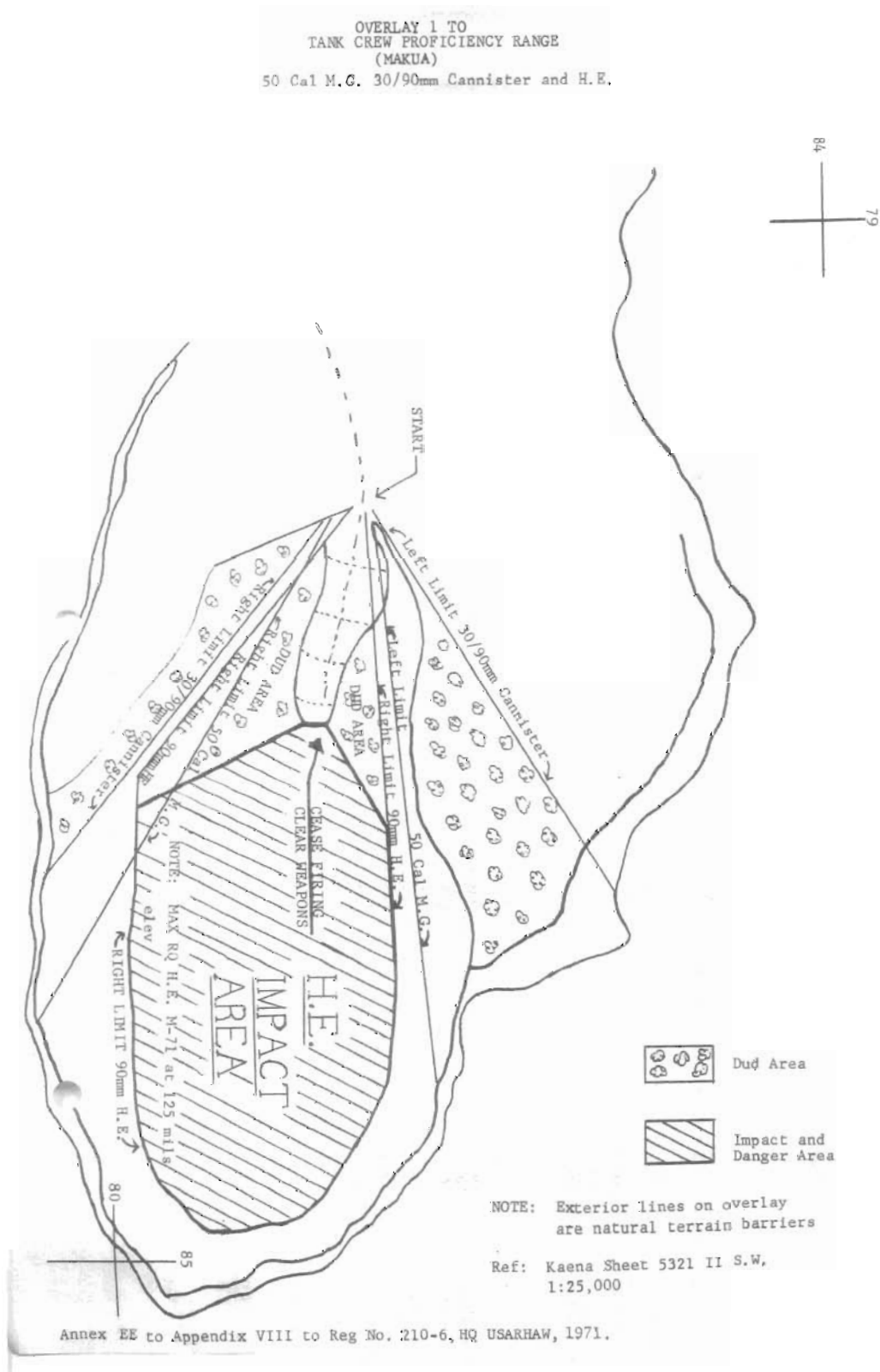
REPRODUCED AT THE NATIONAL ARCHIVES

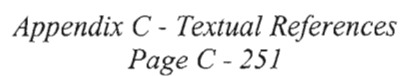
81MM MORTAR FIRING POSITIONS  
(MAKUA)  
Ref: Map, Island of OAHU, 1: 25,000 Sheet 5321 II SW, Series W 833



Annex DD to Appendix VIII to Reg No. 210-6, HQ USARHAW, 1971.

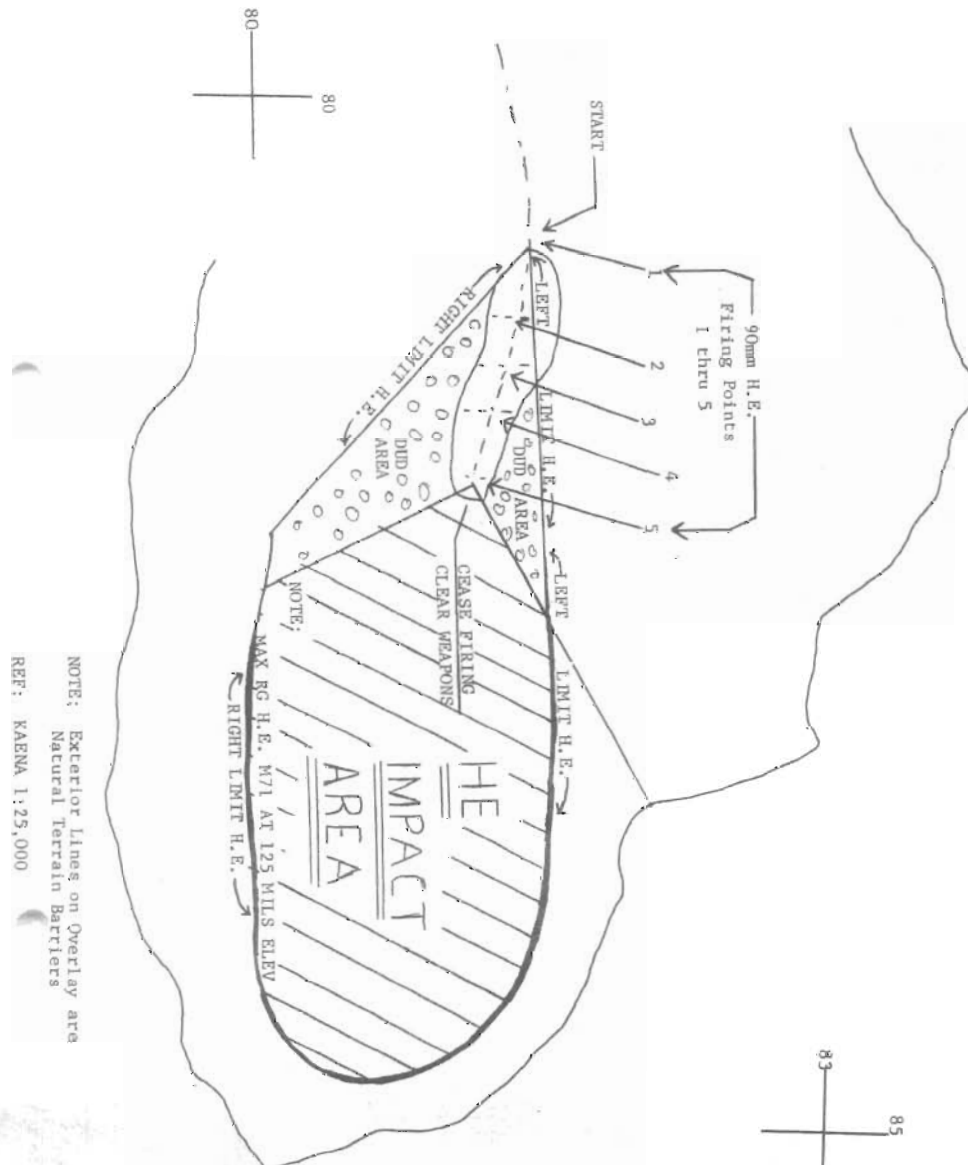
REPRODUCED AT THE NATIONAL ARCHIVES





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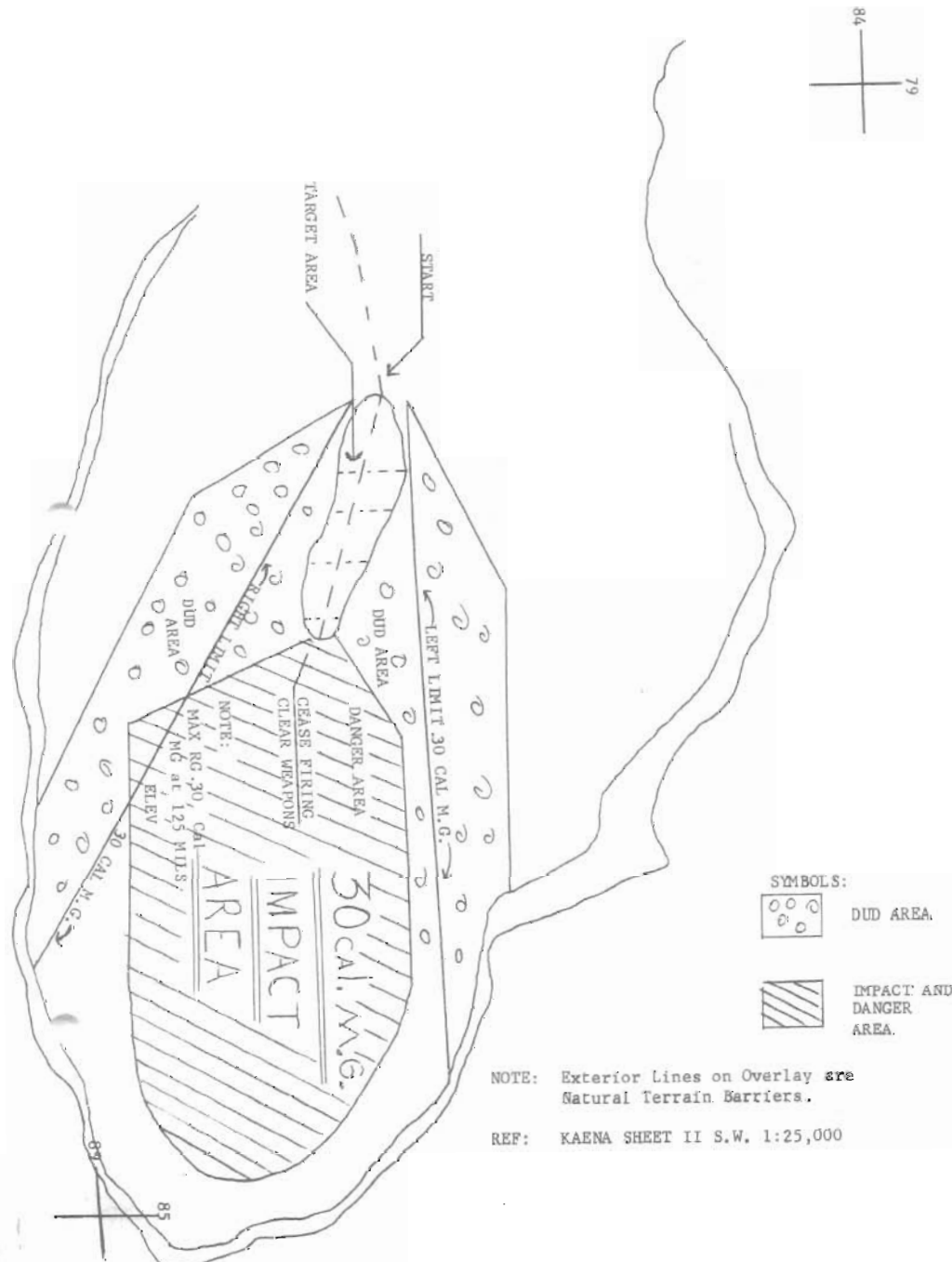
OVERLAY 3 TO  
 TANK CREW PROFICIENCY RANGE (MAKUA)  
 MAKUA VALLEY MOVING  
 TANK RANGE - 90MM



Annex GG to Appendix VIII to Regulation No. 210-6, HQ USARHAW, 1971.

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OVERLAY 4 TO  
TANK CREW PROFICIENCY RANGE (MAKUA)  
MOVING TANK RANGE, CAL .30 MACHINE GUN RANGE



Annex HH to Appendix VIII to Reg No. 210-6, HQ USARHAW, 1974.

## APPENDIX C-16

**NARA II College Park, Maryland (CP),  
Regulation No. 210-11 *Installations Pohakuloa  
Training Area Range Regulations*,  
dated 13 December 1971, RG 338, Records of  
U.S. Operational, Tactical, and Support  
Organizations (World War II and Thereafter),  
Entry 401-135 U.S. Army 1977, Box 1,  
CP-031507-001.**

REPRODUCED AT THE NATIONAL ARCHIVES

\*Reg No. 210-11

DEPARTMENT OF THE ARMY  
HEADQUARTERS UNITED STATES ARMY, HAWAII  
APO San Francisco 96557

REGULATION  
NUMBER 210-11

13 December 1971

INSTALLATIONS  
Pohakuloa Training Area Range Regulations

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DANGER AREAS. . . . .	5
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ACCIDENT/INCIDENT REPORT. . . . .	7
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1. PURPOSE. This regulation:

- a. Provides information on training facilities and maneuver areas available at the Pohakuloa Training Area (PTA) on the island of Hawaii and outlines procedures for scheduling these facilities.
- b. Delineates responsibilities of the Comdr, PTA, the tenant unit commander, and the officer in charge of ranges during firing exercises.
- c. Emphasizes the need for continuous safety precautions and amplifies Department of the Army and local safety regulations associated with the operation of firing ranges, mortar and artillery firing points, and training areas at PTA.

2. GENERAL.

- a. PTA consists of a cantonment area capable of accommodating approximately 3,000 troops, a maneuver area of 55,957 acres, an impact area totaling 51,000 acres and a safety buffer zone of 7,640 acres. All weapons of the infantry division can be fired, including the employment of tactical fighter aircraft and U.S. Army armed helicopters for close

\*This regulation supersedes Reg No. 210-11, HQ USARHAW, 20 Apr 70.

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#### RANGE 2 (FLAMETHROWER)

1. PURPOSE. This appendix prescribes instructions for the operation of Range 2 (Flamethrower).

2. PROCEDURES. The OIC will:

a. Comply with the instructions contained in this regulation and with specific safety precautions contained in FM 20-33.

b. Insure that an ambulance equipped with the proper first aid equipment for burns is available in the immediate vicinity of the firing range and that a stretcher is immediately available outside of the ambulance. The driver will remain close by and all firing will cease in the event the ambulance leaves the range for any reason.

c. Provide two manned 10-pound CO<sub>2</sub> fire extinguishers 10 meters to the rear or flank of the flamethrower during firing.

d. Insure that smoking, open flame or other sources of ignition are prohibited within 15 meters of any flamethrowers and that filling and charging are conducted at least 15 meters behind the firing line.

e. Be thoroughly familiar with the operation of the weapon, filling and charging procedures, and first aid for casualties caused by burns.

f. Insure that all filling, charging, and firing are conducted under the direct supervision of thoroughly trained personnel.

g. Inspect all equipment for serviceability and safety of operation prior to firing.

h. Insure that oxygen and other flammable gases are not used to charge pressure tanks or containers for flamethrowers.

i. Insure that troops or observers stand outside the danger area.

j. Insure that an instructor accompanies each firer during initial training and indoctrination firing and during range firing.

k. Prohibit unthickened fuel to be fired into a head wind of more than five miles per hour. The OIC will not permit flamethrower to be fired against trees or buildings or closer than 15 meters from spectators and five meters from firer.

l. Prohibit personnel, other than an instructor, coach, or assistant operator from within 10 meters of either side or rear of flamethrower or within the danger area.

m. Insure that when fuel is expended, the remaining pressure in the fuel tanks of the flamethrower is blown down (released) on the flamethrower range away from any fire or fuel burning on the ground. Ignition will not be used when the flamethrower is blown down.

Appendix C to Reg No. 210-11, HQ USARHAW, 1971.



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RANGES 3 and 4 (M-79 GRENADE LAUNCHER)

1. PURPOSE. This appendix prescribes instructions for the operations of Ranges 3 and 4 (M-79 Grenade Launcher).
2. PROCEDURES. The OIC will:
  - a. Insure that personnel are properly instructed before firing the M-79 Grenade Launcher.
  - b. Require all personnel to wear steel helmets.
  - c. Insure that only practice ammunition is fired on Range 3 (practice range).
  - d. Insure that safety personnel are familiar with the safety precautions set forth in TC 23-3.
  - e. Insure that personnel remain to the rear of the firing line during firing.
  - f. Insure that personnel fire within the safety limits (red and white barber pole).
  - g. Insure that personnel firing high explosive ammunition on Range 4 have undergone prior instruction using practice ammunition.
  - h. Insure that prior to firing on Range 4:
    - (1) Targets are properly placed within the safety limits of the range.
    - (2) Targets are not placed less than 80 meters from the firing line.
    - (3) Ammunition is placed 25 meters to the flank and rear of the firing line.
    - (4) Non-firing personnel remain well to the rear of the firing line and away from the ammunition.
  - i. Insure that personnel do not smoke on the firing line and within 20 meters from any ammunition storage area.
  - j. Insure that ranges are continually policed.
  - k. Insure that duds are reported to the PTA Range Central.
  - l. Contact PTA Range Central prior to and upon completion of firing.

Appendix D to Reg No. 210-11, HQ USARHAW, 1971.

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PUU AHI AND RANGE 5

1. PURPOSE. This appendix prescribes instructions for the operation of Puu Ahi and Range 5 for firing of the Rocket, 66mm (M-72) and the 90mm recoilless and 106mm recoilless rifles.

2. PROCEDURES. The OIC of firing will:

a. Comply with instructions contained in this regulation and with specific safety precautions contained in appropriate FM, TM, and TC (range firing will be conducted in accordance with FM 23-30 and FM 23-32).

b. Insure that personnel do not fire live rockets without first having undergone instructions utilizing practice rockets.

c. Post guards on both flanks of the range. Guards will not permit anyone to pass without permission from the OIC of firing.

d. Require all personnel to wear steel helmets.

e. Insure that ammunition is placed at least 50 meters from troop concentrations and sufficiently in rear of the firing line to protect the ammunition from fragmentation missile effect and sympathetic detonation.

f. Insure that non-firing personnel remain a minimum of 200 meters from the firing line.

g. Permit no one to recover or tamper with duds or to enter the firing line.

h. Report all duds by type to PTA Range Central.

Appendix E to Reg No. 210-11, HQ USARHAW, 1971.

REPRODUCED AT THE NATIONAL ARCHIVES

#### ARTILLERY, 4.2-INCH MORTAR AND FREE ROCKET FIRING

1. PURPOSE. This appendix prescribes the firing of artillery, 4.2-inch mortars and rockets in areas under control of Commander, PTA.
2. FIRING AREAS. The location and identification of all authorized firing points are contained in annex I, this appendix. Requests to utilize any other areas or establish additional firing points will be submitted with all necessary data to the Comdr, PTA, through Dir of Op, Plans and Tng, for approval.
3. CONTROL OFFICER. The senior infantry or artillery commander, as applicable, will designate a control officer for all artillery and 4.2 inch mortar firing points at PTA. The control officer is responsible for the establishment and maintenance of survey control (UTM).
4. RESPONSIBILITIES.
  - a. The OIC of firing is responsible for:
    - (1) Preparation of SDAD by firing units. These diagrams will show the right, left, and intermediate limits by UTM grid azimuth, all maximum and minimum ranges in meters from firing point marker, and any other data and restrictions to firing as directed by AR 385-63 or other existing directives.
    - (2) Safety within the unit. The OIC will be familiar with safety regulations contained in AR 385-68.
    - (3) Insuring that the existing firing point markers are not disturbed.
  - b. Prior to firing, the OIC will:
    - (1) Insure that the position occupied is as designated on the SDAD and that the battery/mortar platoon center is within 100 meters of the firing point marker.
    - (2) Appoint a qualified safety officer for each firing position. This safety officer will insure that the laying of the pieces will cause rounds to fall within the safety limits prescribed. The safety officer's duties are prescribed in FM 6-40, FM 23-92 and AR 385-63. Prior to registration, he will prepare a safety diagram of the impact area showing the deflections corresponding to the right, left and intermediate limits, the quadrant elevation and the fuze setting for the minimum and maximum ranges which have been corrected by the value of the eight probable errors, as prescribed by AR 385-63. All intervening crests will be considered in determining the minimum quadrant elevation. The officer in charge of firing will insure that the safety officer is not "rushed or in any way harassed" where battery/platoon safety is concerned or when rounds are being prepared for firing. The safety officer will not be assigned additional duties during firing.

Appendix F to Reg No. 210-11, HQ USARHAW, 1971.

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(3) Establish wire and radio communications with PTA Range Central.

(4) Request firing clearance from PTA Range Central.

(5) Insure that impact area is clear and road guards are posted.

c. During firing, the OIC will:

(1) Maintain continuous communications with PTA Range Central over telephone and radio net. Firing will cease when communications with PTA Range Central are disrupted and will not resume until communications are re-established.

(2) Initiate a half-hourly wire communication and an hourly radio communication check with PTA Range Central.

(3) Insure that all unused powder increments are burned in an area that will not cause a range fire. Unused powder increments will not be taken to the sanitary fill or trash dump for disposal.

5. FREE RANGE FIRING.

a. The safety precautions, procedures, and policies contained in this regulation apply to the firing of all free rockets, except as specifically modified due to technical changes, ordnance or manufacturer's instructions and specifications.

b. Field and technical manuals include safety precautions prescribed for the particular equipment and ammunition being used. The unit commander using this equipment will insure that these precautions are taken.

c. Standing operating procedures (SOP) intended to prevent accidents will be established by the rocket battery before launchings are undertaken. This SOP will enumerate the duties of the safety officer(s). A copy of this SOP will be available at the firing position during firing.

d. The battery commander or range officer may render launching a rocket unsafe when conditions not covered by regulation arise. Nothing shall be construed as authorization for launching under such conditions.

1 Annex  
PTA Firing Point  
Coordinate List

REPRODUCED AT THE NATIONAL ARCHIVES

#### MOVING TARGET RANGE (ALPHA FIRING LINE)

1. PURPOSE. This appendix prescribes instructions for the operations of the Moving Target Range which is designed to accommodate tank and armored reconnaissance assault vehicle weapons.

2. INSTRUCTIONS.

a. The moving target range can provide a minimum of four moving targets, traveling at 10 miles per hour, on a rhombic type track.

b. The firing of solid type projectiles at the moving target is permitted; the firing of projectiles containing an explosive element at the moving target is prohibited.

c. The engagement of the moving target will be in accordance with appropriate field and technical manuals.

d. The engagement of the moving target outside of the safety markers or when the moving target has stopped within the safety markers is prohibited.

e. The operation and maintenance of the moving target vehicles are responsibilities of the Comdr, PTA.

(1) The using unit will notify the Comdr, PTA of the actual date/time of usage 48 hours prior to the first usage date.

(2) The firing unit will be responsible for the maintenance, installation, and removal of targets. Fixed targets will not be placed on the berm or between the range and firing line.

f. The stationing of maintenance/scoring personnel in the immediate vicinity of the moving target track during a firing exercise is prohibited. Target replacement or vehicle maintenance will be accomplished only when a "Cease Fire" is in effect.

g. The impact of any high explosive projectile within 200 yards of the outside radius of the moving target track is prohibited. The construction of surface danger diagrams for indirect or direct fire weapons will include the aforementioned restriction.

h. Road guards will be located on all roads that lead into the area covered by the SDAD.

Appendix G to Reg No. 210-11, HQ USARHAW, 1971.

REPRODUCED FROM THE ARCHIVES

MENEHUNE TANK RANGE (BRAVO FIRING LINE)

1. PURPOSE. This appendix prescribes instructions for the operations of the Menehune Tank Range.
2. PROCEDURE. The OIC will:
  - a. Comply with the instructions contained in this regulation and with specific safety precautions contained in appropriate FM, TM, and TC (range firing will be conducted in accordance with FM 17-12 and TC 9-2350-230-13).
  - b. Confine firing to firing line only.
  - c. Confine firing to the fan-shaped area formed by the limits of the range fan.
  - d. Insure that only high explosive shells with fuze SQ are used.
  - e. Insure that a qualified officer or noncommissioned officer verifies the lay of the gun prior to firing each round to see that the direction of the tube is within the right and left limits.
  - f. Insure that the safety officer in charge does not allow personnel forward of the turret except when the green flag is displayed.
  - g. Insure that guns not cleared are pointed down range.
  - h. Insure that guns are cleared, checked, and reported before tanks leave the firing line.
  - i. Insure that tank machine guns when cleared have the bolt back, receiver cover up, and a "T" block in the receiver.
  - j. Insure that road guards are posted on all roads that lead into the area covered by the SDAD.

Appendix H to Reg No. 210-11, HQ USARHAW, 1971.

## **APPENDIX C-17**

**NARA II College Park, Maryland (CP),  
Department of the Army Headquarters United  
States Army Support Command, Hawaii  
Regulation Number 210-11 *Installations  
Pohakuloa Training Area Range Regulation*,  
dated 18 March 1974, RG 338, Records of  
U.S. Operational, Tactical, and Support  
Organizations (World War II and Thereafter),  
Entry 401-75 U.S. Army Hawaii 1968, Box 3,  
CP-031507-005.**

REPRODUCED AT THE NATIONAL ARCHIVES

\*Reg No. 210-11

DEPARTMENT OF THE ARMY  
HEADQUARTERS UNITED STATES ARMY SUPPORT COMMAND, HAWAII  
APO San Francisco 96557

REGULATION  
NUMBER 210-11

18 March 1974

INSTALLATIONS  
Pohakuloa Training Area Range Regulations

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1. PURPOSE. This regulation:

- a. Provides information on training facilities and maneuver areas available at the Pohakuloa Training Area (PTA) on the island of Hawaii and outlines procedures for scheduling these facilities.
- b. Delineates responsibilities of the CDR, PTA, the tenant unit commander, and the officer in charge of ranges during firing exercises.
- c. Emphasizes the need for continuous safety precautions and amplifies Department of the Army and local safety regulations associated with the operation of firing ranges, mortar and artillery firing points, and training areas at PTA.

2. GENERAL.

- a. The PTA consists of a contonment area capable of accomodating approximately 3,000 troops, a maneuver area of 55,957 acres, an impact

\*This regulation supersedes Reg No. 210-11, HQ USARHAW, 13 Dec 70.



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#### RANGE 2 (FLAMETHROWER)

1. PURPOSE. This appendix prescribes instructions for the operation of Range 2 (Flamethrower).
2. PROCEDURES. The OIC will:
  - a. Comply with the instructions contained in this regulation and with specific safety precautions contained in FM 20-33.
  - b. Insure that an ambulance equipped with the proper first aid equipment for burns is available in the immediate vicinity of the firing range and that a stretcher is immediately available outside of the ambulance. The driver will remain close by, and all firing will cease in the event the ambulance leaves the range for any reason.
  - c. Provide two manned 10-pound CO<sub>2</sub> fire extinguishers 10 meters to the rear or flank of the flamethrower during firing.
  - d. Insure that smoking, open flame, or other sources of ignition are prohibited within 15 meters of any flamethrowers and that filling and charging are conducted at least 15 meters behind the firing line.
  - e. Be thoroughly familiar with the operation of the weapon, filling and charging procedures, and first aid for casualties caused by burns.
  - f. Insure that all filling, charging, and firing are conducted under the direct supervision of thoroughly trained personnel.
  - g. Inspect all equipment for serviceability and safety of operation prior to firing.
  - h. Insure that oxygen and other flammable gases are not used to charge pressure tanks or containers for flamethrowers.
  - i. Insure that troops or observers stand outside the danger area.
  - j. Insure that an instructor accompanies each firer during initial training and indoctrination firing and during range firing.
  - k. Prohibit unthickened fuel to be fired into a head wind of more than five miles per hour. The OIC will not permit a flamethrower to be fired against trees or buildings or closer than 15 meters from spectators and five meters from a firer.
  - l. Prohibit personnel, other than an instructor, coach, or assistant operator, from within 10 meters of either side or rear of a flamethrower or within the danger area.

Appendix C to Reg No. 210-11, HQ USASCH, 1974.

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m. Insure that when fuel is expended, the remaining pressure in the fuel tanks of a flamethrower is blown down (released) on the flamethrower be used when the flamethrower is blown down.

C-2

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RANGES 3 and 4 (M-79 GRENADE LAUNCHER)

1. PURPOSE. This appendix prescribed instructions for the operations of Ranges 3 and 4 (M-79 Grenade Launcher).
2. PROCEDURES. The OIC will:
  - a. Insure that personnel are properly instructed before firing the M-79 Grenade Launcher.
  - b. Require all personnel to wear steel helmets.
  - c. Insure that only practice ammunition is fired on Range 3 (practice range).
  - d. Insure that safety personnel are familiar with the safety precautions set forth in TC 23-3.
  - e. Insure that personnel remain to the rear of the firing line during firing.
  - f. Insure that personnel fire within the safety limits (red and white barber pole).
  - g. Insure that personnel firing high explosive ammunition on Range 4 have undergone prior instruction using practice ammunition.
  - h. Insure that prior to firing on Range 4 that:
    - (1) Targets are properly placed within the safety limits of the range.
    - (2) Targets are not placed less than 80 meters from the firing line.
    - (3) Ammunition is placed 25 meters to the flank and rear of the firing line.
    - (4) Non-firing personnel remain well to the rear of the firing line and away from the ammunition.
  - i. Insure that personnel do not smoke on the firing line and within 20 meters from any ammunition storage area.
  - j. Insure that ranges are continually policed.
  - k. Insure that duds are reported to the PTA Range Central.
  - l. Contact PTA Range Central prior to and upon completion of firing.

Appendix D to Reg No. 210-11, HQ USASCH, 1974.

REPRODUCED AT THE NATIONAL ARCHIVES

PUU AHI AND RANGE 5

1. PURPOSE. This appendix prescribes instructions for the operation of Puu Ahi and Range 5 for firing of the Rocket, 66mm (M-72) and the 90mm recoilless and 106mm recoilless rifles.
2. PROCEDURES. The OIC of firing will:
  - a. Comply with instructions contained in this regulation and which specific safety precautions contained in appropriate FM, TM, and TC (range firing will be conducted in accordance with FM 23-30 and FM 23-32).
  - b. Insure that personnel do not fire live rockets without first having undergone instructions utilizing practice rockets.
  - c. Post guards on both flanks of the range. Guards will not permit anyone to pass without permission from the OIC of firing.
  - d. Require all personnel to wear steel helmets.
  - e. Insure that ammunition is placed at least 50 meters from troop concentrations and sufficiently in the rear of the firing line in order to protect the ammunition from fragmentation missile effect and sympathetic detonation.
  - f. Insure that non-firing personnel remain at a minimum of 200 meters from the firing line.
  - g. Permit no one to recover or tamper with duds or to enter the firing line.
  - h. Report all duds by type to PTA Range Central.

Appendix E to Reg No. 210-11, HQ USASCH, 1974.

REPRODUCED AT THE NATIONAL ARCHIVES

#### ARTILLERY, 4.2-INCH MORTAR AND FREE ROCKET FIRING

1. PURPOSE. This appendix prescribes the firing of artillery, 4.2-inch mortars and rockets in areas under control of the CDR, PTA.
2. FIRING AREAS. The location and identification of all authorized firing points are contained in annex I, this appendix. Requests to utilize any other areas or establish additional firing points will be submitted with all necessary data to the CDR, PTA, through the Director of Plans, Training, and Security, for approval.
3. CONTROL OFFICER. The senior infantry or artillery commander, as applicable, will designate a control officer for all artillery and 4.2-inch mortar firing points at the PTA. The control officer is responsible for the establishment and maintenance of survey control (UTM).
4. RESPONSIBILITIES.
  - a. The OIC of firing is responsible for:
    - (1) Preparation of the SDAD by firing units. These diagrams will show the right, left, and intermediate limits by UTM grid azimuth, all maximum and minimum ranges in meters from firing point marker, and any other data and restrictions to firing, as directed by AR 385-63 or other existing directives.
    - (2) Safety within the unit. The OIC will be familiar with safety regulations contained in AR 385-63.
    - (3) Insuring that the existing firing point markers are not disturbed.
  - b. Prior to firing, the OIC will:
    - (1) Insure that the position occupied is as designated on the SDAD and that the battery and mortar platoon center is within 100 meters of the firing point marker.
    - (2) Appoint a qualified safety officer for each firing position. This safety officer will insure that the laying of the pieces will cause rounds to fall within the safety limits prescribed. The safety officer's duties are prescribed in FM 6-40, FM 23-92, and AR 385-63. Prior to registration, the safety officer will prepare a safety diagram of the impact area showing the deflections corresponding to the right, left, and intermediate limits, the quadrant elevation, and the fuse setting for the minimum and maximum ranges which have been corrected by the value of the eight probable errors, as prescribed by AR 385-63. All intervening crests will be considered in determining the minimum quadrant elevation. The officer in charge of firing will insure that the safety officer is not "rushed

Appendix F to Reg No. 210-11, HQ USASCH, 1974.

REPRODUCED AT THE NATIONAL ARCHIVES

or in any way harassed" where battery and platoon safety is concerned or when rounds are being prepared for firing. The safety officer will not be assigned additional duties during firing.

(3) Establish wire and radio communications with PTA Range Central.

(4) Request firing clearance from PTA Range Central.

(5) Insure that the impact area is clear and road guards are posted.

c. During firing, the OIC will:

(1) Maintain continuous communications with PTA Range Central over telephone and radio net. Firing will cease when communications with PTA Range Central are disrupted and will not resume until communications are reestablished.

(2) Initiate half-hourly wire communication and hourly radio communication checks with PTA Range Central.

(3) Insure that all unused powder increments are burned in an area that will not cause a range fire. Unused powder increments will not be taken to the sanitary fill or trash dump for disposal.

5. FREE RANGE FIRING.

a. The safety precautions, procedures, and policies contained in this regulation apply to the firing of all free rockets, except as specifically modified due to technical changes, ordnance, or manufacturer's instructions and specifications.

b. Field and technical manuals include safety precautions prescribed for the particular equipment and ammunition being used. The unit commander using this equipment will insure that these precautions are taken.

c. Standing operating procedures (SOP's) intended to prevent accidents will be established by the rocket battery before launchings are undertaken. This SOP will enumerate the duties of the safety officer(s). A copy of this SOP will be available at the firing position during firing. In addition, a copy of AR 385-62 will also be available.

d. The battery commander or range officer may render launching a rocket unsafe when conditions not covered by regulation arise. Nothing shall be construed as authorization for launching under such conditions.

1 Annex  
PTA Firing Point  
Coordinate List

F-2

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#### MOVING TARGET RANGE (ALPHA FIRING LINE)

PURPOSE. This appendix prescribes instructions for the operations of the Moving Target Range, which is designed to accommodate tank and broad reconnaissance assault vehicle weapons.

##### INSTRUCTIONS.

- a. The Moving Target Range can provide a minimum of four moving targets, traveling at 10 miles per hour, on a rhombic type track.
- b. The firing of solid type projectiles at the moving target is permitted; the firing of projectiles containing an explosive element at the moving target is prohibited.
- c. The engagement of the moving target will be in accordance with appropriate field and technical manuals.
- d. The engagement of the moving target outside of the safety markers or when the moving target has stopped within the safety markers is prohibited.
- e. The operations and maintenance of the moving target vehicles are the responsibilities of the CDR, PTA.
  - (1) The using unit will notify the CDR, PTA, of the actual date and time of usage 48 hours prior to the first usage date.
  - (2) The firing unit will be responsible for the maintenance, installation, and removal of targets. Fixed targets will not be placed on the berm or between the range and firing line.
- f. The stationing of maintenance or scoring personnel in the immediate vicinity of the moving target track during a firing exercise is prohibited. Target replacement or vehicle maintenance will be accomplished only when a "Cease Fire" is in effect.
- g. The impact of any high explosive projectile within 200 yards of the outside radius of the moving target track is prohibited. The construction of surface danger diagrams for indirect or direct fire weapons will include the aforementioned restriction.
- h. Road guards will be located on all roads that lead into the area covered by the SDAD.

Appendix G to Reg No. 210-11, HQ USASCH, 1974.

REPRODUCED AT THE NATIONAL ARCHIVES

MENEHUNE TANK RANGE (BRAVO FIRING LINE)

1. PURPOSE. This appendix prescribes instructions for the operations of the Menehune Tank Range.
2. PROCEDURE. The OIC will:
  - a. Comply with the instructions contained in this regulation and with specific safety precautions contained in appropriate FM, TM, and TC (range firing will be conducted in accordance with FM 17-12 and TM 9-2350-230-13).
  - b. Confine firing to the firing line only.
  - c. Confine firing to the fan-shaped area formed by the limits of the range fan.
  - d. Insure that only high explosive shells with an SQ fuse are used.
  - e. Insure that a qualified officer or noncommissioned officer verifies the lay of the gun prior to firing each round to see that the direction of the tube is within the right and left limits.
  - f. Insure that the safety officer in charge does not allow personnel forward of the turret, except when the green flag is displayed.
  - g. Insure that guns not cleared are pointed downrange.
  - h. Insure that guns are cleared, checked, and reported before tanks leave the firing line.
  - i. Insure that tank machine guns, when cleared, have the bolt back, receiver cover up, and a "T" block in the receiver.
  - j. Insure that road guards are posted on all roads that lead into the area covered by the SDAD.

Appendix H to Reg No. 210-11, HQ USASCH, 1974.



## APPENDIX C-18

**NARA II College Park, Maryland (CP),  
Department of the Army, Headquarters United  
States Army Hawaii, Regulation Number 210-11  
entitled *Installations Pohakuloa Training Area  
Range Regulation*, dated 20 April 1970, RG 338,  
Records of U.S. Operational, Tactical, and  
Support Organizations (World War II and  
Thereafter), Entry 401-284, Department of the  
Army HQ USARPAC 1962-1972, Box 1,  
CP-032207-001.**

REPRODUCED AT THE NATIONAL ARCHIVES

\*Reg No. 210-11

DEPARTMENT OF THE ARMY  
HEADQUARTERS UNITED STATES ARMY, HAWAII  
APO San Francisco 96557

REGULATION  
NUMBER 210-11

20 April 1970

INSTALLATIONS  
Pohakuloa Training Area Range Regulations

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1. Purpose. This regulation is to:

- a. Provide information on training facilities and maneuver areas available at the Pohakuloa Training Area (PTA) on the island of Hawaii and outlines procedures for scheduling these facilities.
- b. Delineate responsibilities of the Commander, PTA, tenant unit commander and officer in charge of ranges during firing exercises.
- c. Emphasize the need for continuous safety precautions and amplify Department of the Army and local safety regulations associated with the operation of firing ranges, mortar and artillery firing points and training areas at PTA.

2. General.

- a. PTA consists of a cantonment area capable of accommodating approximately 3,000 troops, a maneuver area of 31,600 acres and an impact area totaling 84,000 acres. All weapons of the infantry division can be fired, including the employment of tactical fighter aircraft and US Army armed helicopters for close air support. PTA is available for training purposes, upon request, to Active Army units, US Army Advisor Group (USAR), Hawaii, US Army Advisor Group (ARNGUS), Hawaii, and US Marine Corps units.

\*This Reg supersedes Reg. No. 210-11, HQ USARHAW, 19 Mar 65.

CP-0322207-001

REPRODUCED AT THE NATIONAL ARCHIVES

#### RANGE 2 FLAMETHROWER

1. Purpose. This appendix prescribes instructions for the operation of Range 2 (Flamethrower).
2. The OIC will:
  - a. Comply with the instructions contained in this regulation and with specific safety precautions contained in FM 20-33.
  - b. Insure that an ambulance equipped with the proper first aid equipment for burns is available in the immediate vicinity of the firing range and that a stretcher is immediately available outside of the ambulance. The driver will remain close by and all firing will cease in the event the ambulance leaves the range for any reason.
  - c. Provide two manned 10-pound CO2 fire extinguishers, 10 meters to the rear or flank of the flamethrower during firing.
  - d. Insure that smoking, open flame or other sources of ignition are prohibited within 15 meters of any flamethrowers and that filling and charging are conducted at least 15 meters behind the firing line.
  - e. Be thoroughly familiar with the operation of the weapon, filling and charging procedures, and first aid for casualties caused by burns.
  - f. Insure that all filling, charging and firing are conducted under the direct supervision of thoroughly trained personnel.
  - g. Inspect all equipment for serviceability and safety of operation prior to firing.
  - h. Insure that oxygen and other flammable gases are not used to charge pressure tanks or containers for flamethrowers.
  - i. Insure that troops or observers stand outside the danger area.
  - j. Insure that an instructor accompanies each firer during initial training and indoctrination firing, and during range firing.
  - k. Prohibit unthickened fuel to be fired into a head wind of more than five miles per hour. The OIC will not permit flamethrower to be fired against trees, buildings or closer than 15 meters from spectators and five meters from firer.
  - l. Prohibit personnel, other than an instructor, coach or assistant operator from within 10 meters of either side or rear of flamethrower or within the danger area.
  - m. Insure that when fuel is expended, the remaining pressure in the fuel tanks of the flamethrower is blown down (released) on the flamethrower range away from any fire or fuel burning on the ground. Ignition will not be used when the flamethrower is blown down.

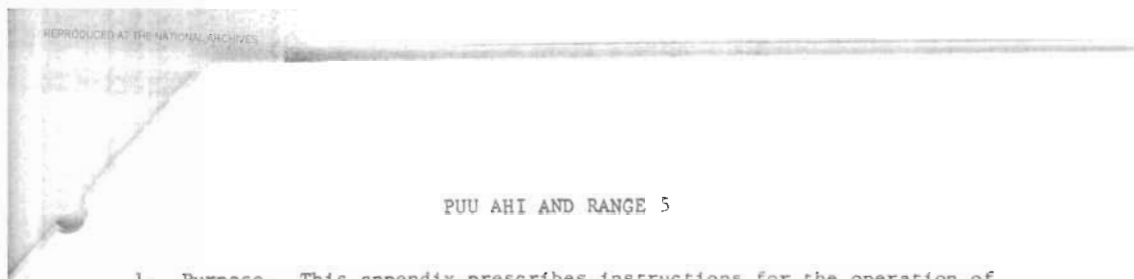
Appendix III to Reg. No. 210-11, HQ USARHAW, 1970

REPRODUCED AT THE NATIONAL ARCHIVES

RANGES 3 AND 4 M-79 GRENADE LAUNCHER

1. Purpose. This appendix prescribes instructions for the operations of Ranges 3 and 4 (M-79 Grenade Launcher).
2. The OIC will:
  - a. Insure that personnel are properly instructed before firing the M-79 Grenade Launcher.
  - b. Require all personnel to wear steel helmets.
  - c. Insure that only practice ammunition is fired on Range 3 (practice range).
  - d. Insure that safety personnel are familiar with the safety precautions set forth in TC 23-3.
  - e. Insure personnel remain to the rear of the firing line during firing.
  - f. Insure that personnel fire within the safety limits (red and white barber pole).
  - g. Insure that personnel firing high explosive ammunition on Range 4 have undergone prior instruction using practice ammunition.
  - h. Insure that prior to firing on Range 4:
    - (1) Targets are properly placed within the safety limits of the range.
    - (2) Targets are not placed less than 80 meters from the firing line.
    - (3) Ammunition is placed 25 meters to the flank and rear of the firing line.
    - (4) Non-firing personnel remain well to the rear of the firing line and away from the ammunition.
  - i. Insure that personnel do not smoke on the firing line and within 20 meters from any ammunition storage area.
  - j. Insure that ranges are continually policed.
  - k. Insure all duds are reported to the PTA Range Central.
  - l. Contact PTA Range Central prior to and upon completion of firing.

Appendix IV to Reg No. 210-11, HQ USARHAW, 1970



1. Purpose. This appendix prescribes instructions for the operation of Puu Ahi and Range 5 for firing of the Rocket, 66mm (M-72) and the 90mm recoilless and 106mm recoilless rifles.

2. The OIC of firing will:

- a. Comply with instructions contained in this regulation and with specific safety precautions contained in appropriate FM's, TMs, and TCs (range firing will be conducted in accordance with FM 23-30 and FM 23-32).
- b. Insure that personnel do not fire live rockets without first having undergone instructions utilizing practice rockets.
- c. Post guards on both flanks of the range. The guard will not permit anyone to pass without permission from the OIC of firing.
- d. Require all personnel to wear steel helmets.
- e. Insure that ammunition is placed at least 50 meters from troop concentrations and sufficiently in rear of the firing line to protect the ammunition from fragmentation missile effect and sympathetic detonation.
- f. Insure that non-firing personnel remain a minimum of 200 meters from the firing line.
- g. Permit no one to recover or tamper with duds or to enter the firing line.
- h. Report all duds by type to PTA Range Central.

Appendix V to Reg No. 210-11, HQ USARHAW, 1970

REPRODUCED AT THE NATIONAL ARCHIVES

#### ARTILLERY, 4.2-INCH MORTAR AND FREE ROCKET FIRING

1. This appendix prescribes the firing of artillery, 4.2-inch mortars and rockets in areas under control of Commander, PTA.
2. The location and identification of all authorized firing points are contained in annex A, this appendix. Requests to utilize any other areas or establish additional firing points will be submitted with all necessary data to the Commander, PTA, through ACoFS, G3, USARHAW, for approval.
3. The senior infantry or artillery commander, as applicable, will designate a control officer for all artillery and 4.2 inch mortar firing points at PTA. The control officer is responsible for the establishment and maintenance of survey control (UTM).
4. The OIC of firing is responsible for the following specific functions:
  - a. Preparation of SDAD's by firing units. These diagrams will show the right, left and intermediate limits by UTM grid azimuth. All maximum and minimum ranges in meters from firing point marker and any other data and restrictions to firing as directed by AR 385-63 or other existing directives.
  - b. Safety within the unit.
  - c. Insure that the existing firing point markers are not disturbed.
  - d. Prior to firing:
    - (1) Be familiar with safety regulations contained in AR 385-63.
    - (2) Insure that the position occupied is as designated on the SDAD and that the battery/mortar platoon center is within 100 meters of the firing point marker.
    - (3) Appoint a qualified safety officer for each firing position. This safety officer will insure that the laying of the pieces will cause rounds to fall within the safety limits prescribed. The safety officer's duties are prescribed in FM 6-40, FM 23-92 and AR 385-63. Prior to registration, he will prepare a safety diagram of the impact area showing the deflections corresponding to the right, left and intermediate limits, the quadrant elevation and the fuze setting for the minimum and maximum ranges which have been corrected by the value of the eight probable errors, as prescribed by AR 385-63. All intervening crests will be considered in determining the minimum quadrant elevation. The officer in charge of firing will insure that the safety officer is not "rushed or in any way harassed" where battery/platoon safety is concerned or when rounds are being prepared for firing. Safety officer will not be assigned additional duties during firing.

Appendix VI to Reg No. 210-11, HQ USARHAW, 1970

(4) Establish wire and radio communications with PTA Range Central.

(5) Request firing clearance from PTA Range Central.

(6) Insure that impact area is clear and road guards are posted.

e. During firing:

(1) Maintain continuous communications with PTA Range Central over telephone and radio net. Firing will cease when communications with PTA Range Central are disrupted and will not resume until communications are re-established.

(2) Initiate a half-hourly wire communication and an hourly radio communication checks with PTA Range Central.

(3) Insure that all unused powder increments are burned in an area that will not cause a range fire. Unused powder increments will not be taken to the sanitary fill or trash dump for disposal.

#### 5. Free Range Firing.

a. The safety precautions, procedures and policies contained in this regulation apply to the firing of all free rockets, except as specifically modified due to technical changes, ordnance or manufacturer's instructions and specifications.

b. Field and technical manuals include safety precautions prescribed for the particular equipment and ammunition being used. The unit commander using this equipment will insure that these precautions are taken.

c. Standing Operation Procedures (SOP) intended to prevent accidents will be established by the rocket battery before launchings are undertaken. This SOP will enumerate the duties of the safety officer(s). A copy of this SOP will be available at the firing position during firing.

d. The battery commander or range officer may render launching a rocket unsafe when conditions not covered by regulation arise. Nothing shall be construed as authorization for launching under such conditions.

1 Annex  
PTA Firing Point  
Coordinate List

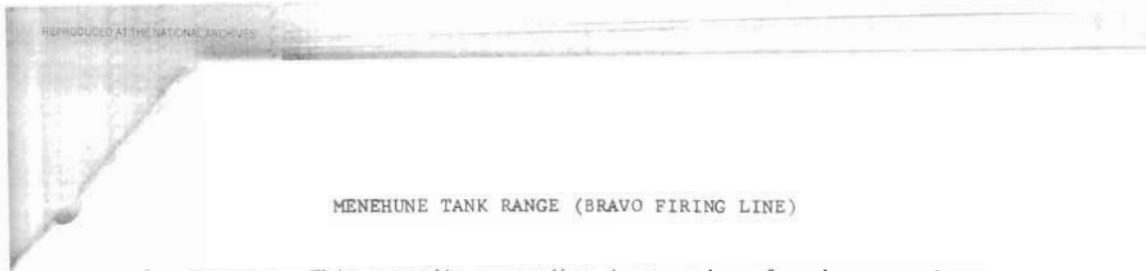
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#### MOVING TARGET RANGE (ALPHA FIRING LINE)

1. Purpose. This appendix prescribes instructions for the operations of the Moving Target Range which is designed to accommodate tank and armored reconnaissance assault vehicle weapons. See appendix X for location.
2. Instructions Applicable to the Range.
  - a. The moving target range can provide a minimum of four moving targets, traveling at 10 miles per hour, on a rhombic type track.
  - b. The firing of solid type projectiles at the moving target is permitted; the firing of projectiles containing an explosive element at the moving target is prohibited.
  - c. The engagement of the moving target will be in accordance with appropriate field and technical manuals.
  - d. The engagement of the moving target outside of the safety markers or when the moving target has stopped within the safety markers is prohibited.
  - e. The operation and maintenance of the moving target vehicles are responsibilities of the Commander, PTA.
    - (1) The using unit will notify the Commander, PTA, of the actual date/time of usage 48 hours prior to the first usage date.
    - (2) The firing unit will be responsible for the maintenance, installation and removal of targets. Fixed targets will not be placed on the berm or between the range and firing line.
  - f. The firing line and moving target track range limits are defined in appendix X.
  - g. The stationing of maintenance/scoring personnel in the immediate vicinity of the moving target track during a firing exercise is prohibited. Target replacement or vehicle maintenance will be accomplished only when a "Cease Fire" is in effect.
  - h. The impact of any high explosive projectile within 200 yards of the outside radius of the moving target track is prohibited. The construction of surface danger diagrams for indirect or direct fire weapons will include the aforementioned restriction.
  - i. Road guards will be located on all roads that lead into the area covered by the SDAD.

Appendix VII to Reg No. 210-11, HQ USARHAW, 1970





1. Purpose. This appendix prescribes instructions for the operations of the Menehune Tank Range. See appendix X for location of range.
2. The OIC will:
  - a. Comply with the instructions contained in this regulation and with specific safety precautions contained in appropriate FMs, TMs, and TCs (range firing will be conducted in accordance with FM 17-12 and TM 9-2350-230-12).
  - b. Confine firing to firing line only.
  - c. Confine firing to the fan-shaped area formed by the limits of the range fan.
  - d. Insure that only high explosive shells with fuze SQ are used.
  - e. Insure that a qualified officer or noncommissioned officer verifies the lay of the gun prior to firing each round to see that the direction of the tube is within the right and left limits.
  - f. Insure that the safety officer in charge does not allow personnel forward of the turret except when the green flag is displayed.
  - g. Insure that guns not cleared are pointed down range.
  - h. Insure that guns are cleared, checked and reported before tanks leave the firing line.
  - i. Insure that tank machine guns when cleared have the bolt back, receiver cover up and a "T" block in the receiver.
  - j. Insure that road guards are posted on all roads that lead into the area covered by the SDAD.

Appendix VIII to Reg No. 210-11, HQ USARHAW, 1970

## **APPENDIX C-19**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Department of the Army Field Manual  
FM 23-6 *Antitank Guided Missile (ENTAC)*,  
dated 13 May 1964, MVS-031907-001.**

MHI

Copy 3

COPY Rec. by DA Cir. 310-32 (23 May 72)

**FM 23-6**

DEPARTMENT OF THE ARMY FIELD MANUAL

# ANTITANK GUIDED MISSILE (ENTAC)

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HEADQUARTERS, DEPARTMENT OF THE ARMY  
MAY 1964

TAGO 8637A

MVS-031907-001

## CHAPTER 1 INTRODUCTION

### Section I. GENERAL

#### 1. Purpose and Scope

This manual provides guidance for commanders, instructors, and other interested personnel presenting instruction and training on the French manufactured ENTAC (Engin-Téleguidé Anti-Char) antitank guided missile. It covers the description, assembly, functioning, employment, and considerations necessary for training on this missile and associated equipment. It is applicable to both nonnuclear and nuclear warfare. Tactical employment is included in FM 7-20.

#### 2. Improvement of the Manual

Users are encouraged to submit recommended changes or comments to improve this manual. Comments should be submitted on Department of the Army Form 1598 and should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Forward comments to Commandant, U.S. Army Infantry School, Fort Benning, Ga.

### Section II. DESCRIPTION

#### 3. Missile Description

a. *General.* The ENTAC (fig. 1) is a light, no roll stabilized, remote controlled, wire guided missile intended for use against ground targets. It is primarily an antitank weapon, but can be used effectively against gun emplacements, roadblocks, and fortifications.

- (1) The missile has four fins or wings, each equipped with a remote controlled spoiler that acts as a controlling surface. It is brought into alignment and guided to the target by the gunner, who initiates guidance commands with a manually operated control stick. Guidance commands are transmitted to the missile through two conducting wires that unwind from within the missile during flight. The missile flies in a "nose-up" attitude on an angle of six degrees above the horizontal.
- (2) The missile is launched and propelled by two solid propellant rocket motors which burn in series. The first, or

booster motor, launches and accelerates the missile to its flying speed; the second, or sustainer motor, maintains this speed throughout the missile's flight.

- (3) The ENTAC is armed and fired electrically. The warhead is equipped with an electrical fuze which, upon impact, completes a circuit back to the detonator causing the warhead to explode. The ENTAC missile carries a 130-mm, high explosive, antitank (HEAT) warhead. Practice and dummy missiles are provided for training. The practice head is inert but has the same ballistic characteristics as the 130-mm HEAT.
- (4) The ENTAC antitank guided missile is type classified standard A.

#### b. Detailed Description.

##### (1) Missile.

Total weight.....	27 lb., 12.25 kg.
Cruising speed.....	80 meters per sec., 180 mph.

AGO 8637A

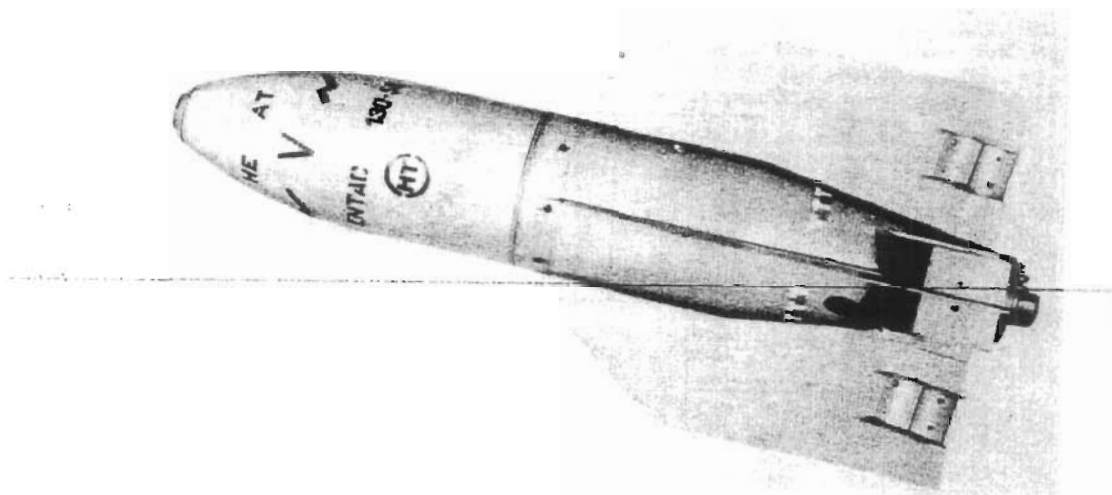


Figure 1. The ENTAC missile.

Propelled flight time.....25 sec. (approx.)  
Maximum practical range. 2,000 meters  
Minimum practical range. 400 meters  
Dimensions (fig. 2).

(2) *Launching container.*

Weight..... 10.8 pounds, 4.9 kilograms.  
Height..... 10.8 inches, 27.5 centimeters.  
Width..... 10.8 inches, 27.5 centimeters.  
Length..... 19 inches, 48.3 centimeters.

(3) Total weight of missile in its launcher container is 37.5 pounds or 17.0 kilograms.

(4) *Shipping container.*

Weight..... 44.5 pounds, 20.2 kilograms.  
Height..... 13.4 inches, 34 centimeters.  
Width..... 13.1 inches, 33.5 centimeters.  
Length..... 27.7 inches, 70.4 centimeters.

(a) Markings (fig. 17). Each shipping container, storing a missile with a

live motor, is marked by yellow trihedrons on two diagonally opposed corners. A rocket symbol on the side of the shipping container will indicate the forward end of the missile body. Type and size of warhead, weight, volume, ammunition lot number, storage temperature range, and other information will be stenciled on the container.

(b) *Contents and markings.*

Contents	Type of Charge	Color of Trihedron
130-mm HEAT	Shaped charge	Yellow.
Inert, with live motor, (TP).	Inert	Brown.
Inert, without motor.	Dummy	None.

(5) *Warheads.*

Type	Diameter of Charge	Weight		Length		Color	Warhead marking	Fuze marking
		Pounds	Kilo-grams	Inches	Centi-meters			
HEAT	130-mm	8.7	3.9	13.8	35.1	OD	>	<
Inert	N/A	8.7	3.9	13.8	35.1	Blue	>	<

AGO 8637A

## APPENDIX C-20

**NARA II College Park, Maryland (CP), Report  
from HQ, United States Army, Hawaii, APO 957  
entitled *Staff Office Report, Office of the  
Ordnance Officer, January - March 1962*,  
dated spring 1962, RG 550, Records of the United  
States Army, Pacific, Entry 17, U.S. Army  
Hawaii 1959-1963, Box 10, CP-121406-003.**

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By *[signature]* NARA Date *12/14/00*

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HEADQUARTERS  
UNITED STATES ARMY, HAWAII  
APO 957

~~CONFIDENTIAL~~

*62-7917*  
~~CONFIDENTIAL~~  
*1-25*

STAFF OFFICE REPORT  
OFFICE OF THE ORDNANCE OFFICER

January - March 1962

PART I - Narrative

PART II - Supporting Documents

*CP-121406-003*

Classification approved

FLETCHER KIRWIN  
Executive Assistant  
Ordnance Office

~~CONFIDENTIAL~~  
*15 Dec 66*  
*8310-6*

~~CONFIDENTIAL~~

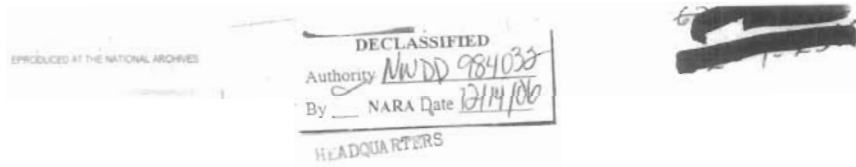
DOWN TO 10 YEAR INTERVALS;  
DECLASSIFY ON 10 YEARS  
DOD 418.50-10

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*4/24/84* *J-6-857*  
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*Heckler 461-67*



PART I

NARRATIVE



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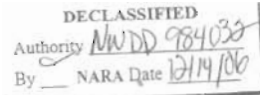


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MATERIEL

(Unclassified) M113 APC Exchange Program

The final shipment of 6 M113's with harness for radio AN/VRC-29 was received from CONUS in March 1962 and were issued to the 25th Infantry Division. Of the 33 M75 APC's on hand in depot, 26 excess unserviceable M75's are being cannibalized prior to shipment to the Property Disposal Officer. Per USARJ message, 7 serviceable M75's are being shipped to USARJ.

(Unclassified) M151  $\frac{1}{2}$  Ton Utility Truck

Advance shipping documents for 277 Trucks, M151, have been received; ETA is 4th Qtr FY 62. Balance of 661 is scheduled for shipment in the 1st Qtr FY 63.

(Unclassified) M60 7.62mm Machine Gun

Advance shipping documents for 90 Machine Gun, M60, have been received. Balance of 809 will be shipped from production as they become available; ETA is end of 4th Qtr FY 62 (809 + 90 = 899).

(Unclassified) Little John Launcher

Four Launchers, Rocket, 318mm, XM34 and 8 Cart Assembly Rocket Transporters were issued to the 25th Infantry Division during the 3rd Qtr. Four Trucks, M36 (substitute for Rocket Handling Unit XM3E2) are still due in from CONUS.

(Unclassified) 90mm Recoilless Rifle, M67

Request for 5 M67 Rifles for training purpose was disapproved by Major Items Supply Management Agency, pending DA distribution plan. Availability date of weapon to USARHAW is not known.

1. Message (U), FM603261 OCA-SS, CGUSARJ to CGUSARHAW, 2 Mar 62 (pt II, Docu. 1).
2. Message (U), 3-788, COUSAORDHISMA to CGUSARHAW, 24 Mar 62 (pt II, Docu. 2).

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(Confidential) Launcher Grenade M79

Five Grenade Launchers, M79, are on hand at the Ordnance School for training purpose. USARPAC distribution will commence during FY 63. However, USARHAW allocation or ETA is not known.

(Secret) Davy Crockett System

One Light Weapons System (120mm) XM28 and 2 Heavy Weapons Systems (155mm) XM29 were received and issued to the Ordnance School for training purpose. Balance of Davy Crockett Systems and ancillary equipment, ETA 4th Qtr FY 62, are as follows:

Light Weapons System XM28	14
Heavy Weapons System XM29	6
Truck, $\frac{1}{2}$ Ton, M38A1D (for XM28)	14
APC M113 (for XM29)	7

(Confidential) Cal 30 MG Twin XM1 (Helicopter Armament)

Five XM1 Cal 30 twin MG's were requisitioned to CONUS supply per USARPAC allocation. Weapons will be available for shipment in the 4th Qtr FY 62.

(Confidential) 115mm Multiple Rocket Launcher M91

USARPAC availability is 2nd Qtr FY 63. Intra-theater distribution is not known. Tentative basis of issue is 2 launchers per 105mm howitzer battery.

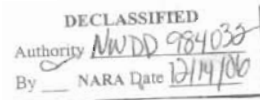
(Confidential) Medium Recovery Vehicle M88

Availability of M88 VTR to USARHAW is 2nd Qtr FY 63. Reduced strength allowance for the 25th Infantry Division is 14. M48A1 Tanks are held in command stocks as a substitute for this requirement.

(Confidential) ENTAC (Surface to Surface Guided Missile)

Latest DA advice is ENTAC tactical equipment, which replaces the SS-10 and SS-11, will become available in the 1st Qtr FY 63. Basis of issue is one platoon of 5 launchers per battle group.

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(Unclassified) Ammunition Credits for Training

Effective 1 January 1962, establishment of ammunition credits for training requirements in this command has been converted from a calendar year to a fiscal year basis in accordance with DA policy contained in TA 23-100, 1961.

(Unclassified) Inspection of M1 Rifles

In conjunction with Change 5 to TB ORD 587, a small arms inspection of M1 Rifles is presently being conducted. The effect of this change will replace approximately 10% of the M1 Rifles in the command.

FUNDING PROGRAM

(Unclassified) Logistic Support of JTF8/Holmes and Nerver

Ordnance has expended a total 1,812 man-hours of normal duty time and 5,310 of overtime in support of Holmes and Nerver as of 6 April 1962.

Cumulative costs on loans and sales follows:

Loans

Acquisition value of 176 ea major items on loan	\$ 859,843.00
Accessorial charges for major items (if sold) (14.8%)	127,256.76
Labor charges for major items (@ \$6 P/H)	40,902.00
(Regular - 1,746 hours)	
(Overtime - 5,071 hours)	
(Total - 6,817 hours)	
Supplies expended	1,633.25
Accessorial charges for supplies expended	241.72
Total	\$1,029,876.73

Sales

Repair parts sold	\$ 5,735.39
Accessorial charges (14.8%)	848.85
Labor (@ \$6 P/H)	1,830.00
(Regular - 66 hours)	
(Overtime - 239 hours)	
(Total - 305 hours)	
Total	\$ 8,414.24
Grand Total	\$1,038,290.97

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Measured in man-hours expended to date, the backlog in the in-storage maintenance and processing of vehicles alone has been increased by approximately 82 vehicles due to this diversion of manpower from normal operations. In spite of the fact that the costs for the hours spent on this project are reimbursable, the actual time lost from normal operation cannot be recovered. Due to the urgent nature of the support to JTF8, most of the time spent for the issue of materiel was in overtime hours. This affected the efficiency in performance of normal operations and cannot be recouped by dollar reimbursement.

It is expected that many more man-hours will be expended and diverted from normal operations when the materiel is returned. Return to stock from usage in the field will necessitate repairs and processing which were not required when the vehicles were issued from a ready-for-issue condition.

Finally, this work, coupled with other unfinanced/unprogrammed requirements and hire lags, continues to have a direct bearing on the personnel ceilings necessary to keep backlogs to a minimum and accomplish normal operational missions.

#### TRAINING

##### (Unclassified) Calibration of Towed Artillery

A CONUS calibration team conducted calibration of 64 pieces of the 25th Infantry Division artillery. The team arrived 2 March 1962 and departed 14 March 1962.

##### (Unclassified) Ordnance School

The Ordnance School presented 12 special classes on the following new equipment:

- M79 Grenade Launcher (Orientation and Maintenance) - 1 class
- M60 Machine Gun and M79 Grenade Launcher (Orientation and Field Maintenance) - 2 classes
- M151 Truck Utility  $\frac{1}{2}$  Ton (Orientation and 4th Echelon) - 2 classes,  
(Orientation and Instructor Driver Training) - 5 classes, (Organizational Maintenance) - 2 classes

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PERSONNEL

(Unclassified) Civilian Hire Lags

Permanent personnel vacancies as of 31 March have increased to 22 spaces. Net vacancies for Ordnance as supplemented by temporary hires and utilization of profile enlisted men follows:

Hire lags - permanent vacancies	- 22
Temporary hires to supplement permanent vacancies	- 12
	10
EM augmentation	- 8
Net vacancies	- 2

Although the EM are supposed to be augmenting the presently authorized space of 552 civilian employees and not chargeable to the Ordnance personnel ceiling, they are, at present, merely helping to fill the hire lag gap. It is emphasized that the temporary hires and utilization of profile enlisted men are temporary stop-gaps in alleviating the existing permanent vacancies of 22 civilian spaces. This lag of 22 is above the average of 19.7 for FY 61 and approaching the 25 which was cause for concern in October 1961. In view of this lag, unprogrammed requirements including support to JTF8 plus the workload created in the introduction of new items and scheduled exchange of equipment, a reduction in the present authorized personnel ceiling may have a serious effect in the accomplishment of normal mission operations. This statement is made since the guidance to the command is to reduce by 100 spaces in FY 63.

(Unclassified) TDY to Taiwan

3

A Command Maintenance Inspection Team was sent to Taiwan to inspect Batteries A, B, C and D of the 61st Artillery (CA). The team consisted of 1 officer, 2 warrant officers and 9 enlisted men. The team departed on 27 February 1962 and returned on 18 March 1962.

3. Letter Orders 02-88 (U), USARHAW to Distr, 20 Feb 62, subject: TDY to Taiwan. (pt II, Docu. 3).

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(Unclassified) Appointment of Commandant

Major George E. Pickering was appointed Officer-in-Charge of USARHAW Ordnance School effective 9 April 1962 and will carry the title Commandant.

MAINTENANCE

(Unclassified) Maintenance Backlog

The maintenance backlog has risen slightly since the successful concentrated efforts to reduce it was reported at the end of the 2nd Qtr. However, there has been no appreciable change in the number of items in the shops which are for repair and return to users, and the backlog in this area is well below the DA standard. Much of the present backlog represents maintenance of depot stock materiel. For example, of 665 small arms items and assemblies awaiting repair, 381, or more than half, are for depot stock. This same holds true for major items of combat and support vehicles, where 14 of 23, and 45 of 67 respectively are for maintenance of depot stocks. Mention is made of this to preclude misinterpretation of maintenance backlog statistics as they might be applied in connection with deadline reports and/or readiness of using units.

EXPLOSIVES ORDNANCE DISPOSAL

(Unclassified) Explosive Ordnance Reconnaissance Training

The 6th Ordnance Detachment (ED) conducted a class on Explosive Ordnance Reconnaissance Training for 17 members of the Honolulu Police Department<sup>4</sup> on 29-31 January 1962.

(Unclassified) Incident Calls

The 6th Ordnance Detachment (ED) responded to 43 incident calls involving 18 calls for civil assistance, 18 calls for military and 7 calls for HASP. Four of the civil assistance calls were in response for assistance at outer islands, 3 to Maui and 1 to Hilo.

4. Letter (U), Honolulu Police Dept to 6th Ord Det (ED), 28 Dec 61 (pt II, Docu. 4).

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(Unclassified) Range Clearance in the Lalamilo Farm Lot

The 6th Ordnance Detachment (ED) conducted range clearance in the Lalamilo Farm Lot near Kamuela, Hawaii, during 19 February 1962 through 2 March 1962.<sup>5</sup> Recovered were 800+ items of which 133 were destroyed by demolition and the remaining items were classified as scrap. With permission received from the Base Camp Commander, this scrap was dumped into a crater in the artillery impact area at Pohakuloa.

AUTHENTICATION:

BARTON O BAKER  
Colonel, Ord Corps  
Ordnance Officer

- 
5. Letter (U), 6th Ord Det (ED) Thru: Ammo Div To: Ord Officer, 6 Mar 62, subject: Destruction and Removal of Loaded and Inert Explosive Ordnance Items at the Lalamilo Farm Lots, Kamuela, Hawaii (pt II, Docu. 5).



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PART II

LIST OF SUPPORTING DOCUMENTS

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Authority	NWDD 984033
By	NARA Date 12/14/06

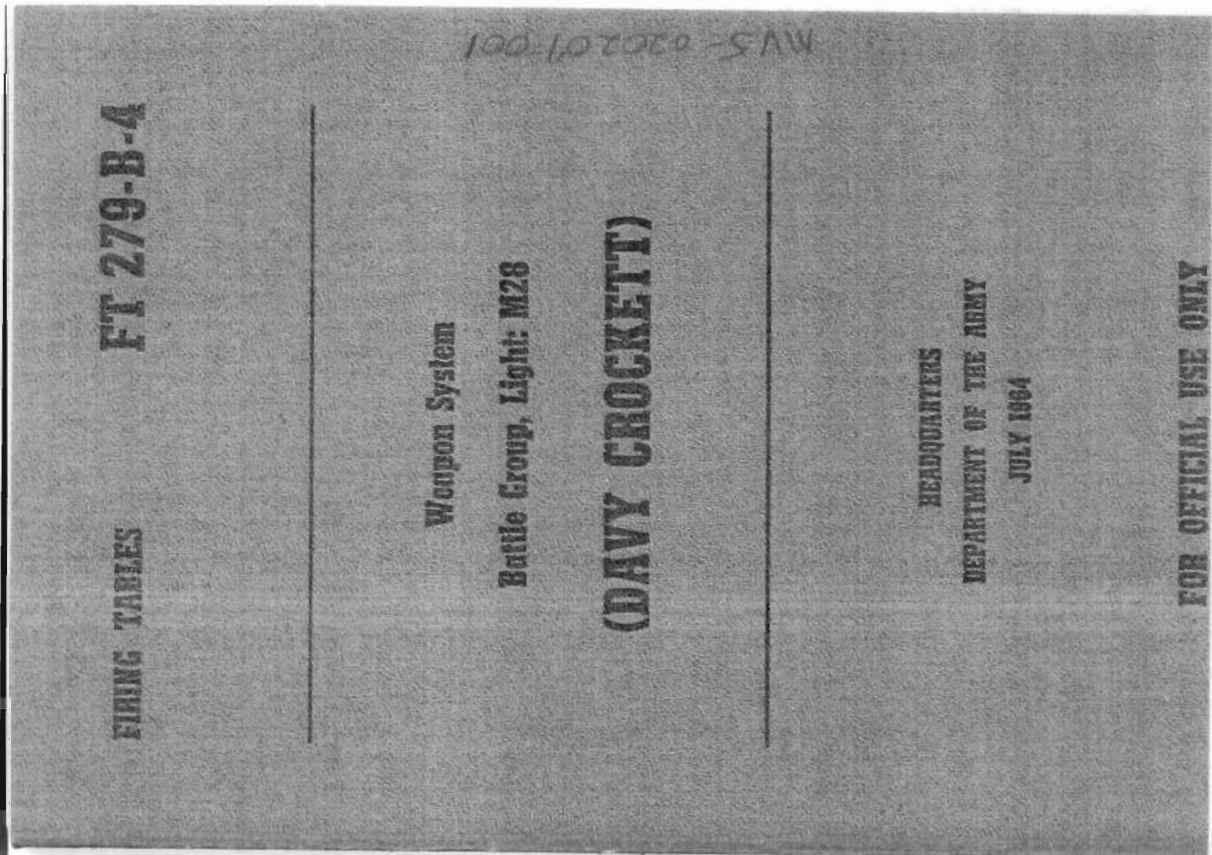
PART II

LIST OF SUPPORTING DOCUMENTS

1. Message (U), FM603261 OCA-SS, CGUEARJ to CGUSARHAW, 2 Mar 62.
2. Message (U), 3-788, COUSAORDMISMA to CGUSARHAW, 24 Mar 62.
3. Letter Orders 02-88 (U), USARHAW to Distr, 20 Feb 62, subject: TDY to Taiwan.
4. Letter (U), Honolulu Police Dept to 6th Ord Det (ED), 28 Dec 61.
5. Letter (U), 6th Ord Det (ED) Thru: Ammo Div To: Ord Officer, 62 Mar 62, subject: Destruction and Removal of Loaded and Inert Explosive Ordnance Items at the Lalamilo Farm Lots, Kamuela, Hawaii.

## **APPENDIX C-21**

**USACE St. Louis District, St. Louis, Missouri (MVS), Firing Tables FT 279-B-4 entitled *Weapon System Battle Group, Light: M28 (Davy Crockett)*, Headquarters Department of the Army, dated 1 July 1964, MVS-020207-001.**



Headquarters  
Department of the Army  
Washington, D. C., 6 July 1964

Firing Tables for Rifle, 20mm, Spotting: M69 Firing Cartridge, 20mm: spotting, M101 and Gun, Recoiless, 120mm: M63 Firing Projectile, Atomic, Supercaliber 279mm: M388 Projectile, Atomic, Supercaliber 279mm, Practice: HE, M390 with Charge, Propelling, Atomic Projectiles: M92
---

General Information Characteristics Mean Weights of Fuzed Projectiles Fuzes Explanation of Tables Fire Problems Examples of Problems	INTRODUCTION	Paragraph	Page
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		2	v
		3	vi
		4	vii
		5	viii
		6	ix
		7	xiv

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INTRODUCTION

1. GENERAL INFORMATION. These tables are based on range firings conducted at Aberdeen Proving Ground, Maryland during the period April 1961 to August 1961. Results of the ballistic reductions of these firings are contained in BRL Technical Note 1426, dated September 1961. Analysis of these range firing data yielded the following ballistic coefficients:

Projectile, Atomic, Supercaliber 279mm: M388

	Ballistic Coefficient
0.0	.4705
$\leq \phi \leq 337.78$	$-.45664063 \times 10^{-5} (\phi - 337.78)^2$
337.78	+.4705
$\leq \phi \leq 497.78$	
497.78	$-.75184915 \times 10^{-4} (\phi - 507.49770744)^2$
$\leq \phi \leq 507.49770744$	+.5945
507.49770744	.5945
$\leq \phi \leq 657.78$	
657.78	$-.12409445 \times 10^{-5} (\phi - 657.78)^2$
$\leq \phi \leq 800.0$	+.5945

with respect to a constant  $K_D = .022$

Cartridge, 20mm: spotting, M101

	Ballistic Coefficient
$0 \leq \phi \leq 800$	$.9359 + .1105 \times 10^{-3} \phi + .1533 \times 10^{-7} \phi^2$

with respect to a constant  $K_D = .105$

In the above expressions,  $\phi$  is the elevation in mils.

All firing table data given for Projectile, Atomic, Supercaliber 279mm: M388 are also applicable to Projectile, Atomic, Supercaliber 279mm, Practice: HE, M390.

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PART 1

List of Symbols and Abbreviations

PART 2

Table A  
Table B  
Table C  
Table D

APPENDICES

Appendix

- A Trajectory Chart 279-B-4, A, Prop. Temp.  $-40^\circ\text{F.}$  to  $-1^\circ\text{F.}$
- B Trajectory Chart 279-B-4, B, Prop. Temp.  $0^\circ\text{F.}$  to  $+34^\circ\text{F.}$
- C Trajectory Chart 279-B-4, C, Prop. Temp.  $+35^\circ\text{F.}$  to  $+69^\circ\text{F.}$
- D Trajectory Chart 279-B-4, D, Prop. Temp.  $+70^\circ\text{F.}$  to  $+130^\circ\text{F.}$
- E World Time Zone Map

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F 1 2 / 9 - D - 4

Projectile, Atomic, Supercaliber 279mm: M388 and Projectile, Atomic, Supercaliber 279mm, Practice: HE, M390 are fired from Gun, Recoilless, 120mm: M63 with Charge, Propelling, Atomic Projectile: M92, Cartridge, 20mm: spotting, M101 is fired from Rifle, 20mm, Spotting: M69.

Listed below, as functions of propellant temperature, are the following:

- a. Muzzle velocities of the M101 spotting round.
- b. Muzzle velocities of the M388 and M390 major caliber rounds.
- c. Maximum ranges of the M388.

Prop. Temp.	Muzzle Velocity			Maximum Range
	M101	M388	M390	
"F.	f/s	m/s	f/s	m/s
-40	520	158.5	461	140.5
0	524	159.7	478	145.7
+35	527	160.6	492	150.0
+70	530	161.5	506	154.2
+130	535	163.1	530	161.5

2. CHARACTERISTICS.

a. Gun, Recoilless, 120mm: M63				
Diameter of the bore	millimeters	120		
Total length	inches	60.4		
Weight of the gun	pounds	77		
b. Rifle, 20mm, Spotting: M69				
Diameter of the bore	millimeters	20		
Total length	inches	27.5		
Weight of the rifle	pounds	7		

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c. Mount, Tripod, Recoilless Gun: M120

Traverse limits from center position

Traverse screw right or left

Cross tube right or left

Least possible elevation

Greatest possible elevation

Maximum adjustment to elevation by elevating knob

Change in elevation for one turn of elevating knob

Change in traverse for one turn of traversing knob

d. Mount, Gun: M131 (For 120mm Recoilless Gun M62 on Vehicle)

Traverse limits from center position

Least possible elevation

Greatest possible elevation

Maximum adjustment to elevation by elevating knob

Change in elevation for one turn of elevating knob

Change in traverse for one turn of traversing knob

Firing limits (elevation)

LOW position

HIGH position

Firing limits (traverse)

LOW position

HIGH position

viii	FT 279-B-4	ix
3. MEAN WEIGHTS OF FUZED PROJECTILES.		
Projectile, Atomic, Supercaliber 279mm: M388	pounds	76.42
Cartridge, 20mm: spotting, M101	pounds	0.61
4. FUZES. These tables apply to the following projectile-fuze combinations.		
a. Projectile, Atomic, Supercaliber 279mm: M388 with Fuze, M1112.		
b. Projectile, Atomic, Supercaliber 279mm, Practice: HE, M390 with Fuze, M1117.		
c. Cartridge, 20mm: spotting, M101 with Fuze, PD, M538.		
5. EXPLANATION OF TABLES. These firing tables contain data based on standard trajectories for the M28 system, and on a combination of projectile, fuze and propelling charge. A standard trajectory is one theoretically existing under arbitrarily chosen conditions of weather and material.		
A pseudo-atmosphere for these trajectories has been constructed at a reference level 1000 feet above sea level (mean battle field height) using percentage differences of pressure from standard pressure. These differences, which are functions of the propellant temperature, compensate for significant variations from standard conditions.		
Standard firing data, based on the above standard trajectories and on the pseudo-atmosphere, may be determined from the firing tables.		
The ranges in the table are distances along the surface of a sphere concentric with the earth and passing through the muzzle of the tube. The point at which the descending branch of the trajectory intersects this concentric sphere is designated the level point. However, for practical purposes, the ranges may be considered as distances along a horizontal plane passing through the muzzle of the tube.		
Certain general terms, which are defined below, will be used to explain the contents and use of these tables. Other terms will be defined in explaining the contents of various parts of the tables.		
FT 279-B-4	Base of Trajectory:	The base of a trajectory is the straight line from the muzzle of the tube to the level point of the trajectory.
	Line of elevation:	The line of elevation is the axis of the muzzle extended.
	Elevation:	Elevation is the vertical acute angle between the line of elevation and the base of the trajectory.
	Vertical Interval:	The vertical interval of a target is the perpendicular distance from the target to the base of the trajectory. The vertical interval of a target above the base of the trajectory is positive; the vertical interval of a target below the base of the trajectory is negative.
	Range:	The range to a target is the distance, measured along the base of the trajectory, from the muzzle to the projection of the target onto the base of the trajectory.
	Line of Site:	The line of site is the straight line passing through the sight unit and the target.
	Angle of Site:	The angle of site is the vertical acute angle between the line of site and the base of the trajectory. Angle of site is positive for targets above the base of the trajectory and negative for targets below the base of the trajectory.
	Superelevation:	Superelevation is the vertical acute angle between the line of elevation and the line of site.

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Table

D Timer Dial Setting and Minimum Arming Range - For each of two propellant temperature zones (-40°F. to +29°F. and +30°F. to +130°F.) timer dial setting (TDS), minimum superelevation (MSE) and minimum arming range (MAR) are listed as functions of the superelevation for the M388. Timer dial setting is the number to be set on the M35 Timer Dial in order to delay the arming of Fuse, M1112. The M1112 fuse will not become armed until a time along the trajectory, equal to the timer dial setting, has elapsed. The minimum superelevation listed beside any timer dial setting is the smallest superelevation at which that timer dial setting should be used. If the M388 is fired with a given superelevation, as listed in Table D, and if the corresponding timer dial setting is used, then the minimum arming range listed with this superelevation and timer dial setting is the shortest possible distance, measured along the line of site, at which the M1112 fuse could become armed.

c. Part 3 contains five appendices (Appendix A through Appendix E) which follow the main body of the table. Appendices A through D contain trajectory charts for Projectile, Atomic, Supercaliber 279mm: M388. In each of these appendices, trajectories are shown for given values of propellant temperature of the M388 projectile. Vertical interval in meters is plotted against range in meters for every 100 m of elevation, up to 800 m. Time of flight, by five-second intervals, is marked on each trajectory.

Appendix E is a world time zone map. Of the two rows of numbers at the top of the map, the first is degrees of longitude east and west of Greenwich, England: Greenwich being 0° and the International Date Line, 180°. The second row of numbers shows the time difference, in hours, between Greenwich and any time zone. The time difference is again shown at

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FT 279-B-4

These tables are divided into three parts. An explanation of the material contained in these three parts is given below.

- Part 1 contains a list of symbols and abbreviations.
- Part 2 contains tables A, B, C and D. The contents of these tables are described below.

Table

A Elevation and Angle of Site - Angle of site (AS) and elevation (ELEV) for Cartridge, 20mm: spotting, M101 are listed as functions of range and vertical interval. The table is computed using arbitrarily chosen standard conditions such that the elevations listed are intended to serve as initial trial elevations for the spotting round and to provide estimates of the changes in elevation required to produce desired changes in range. Superelevation (SE) for the spotting round can be obtained by subtracting the angle of site from the elevation:  $SE = ELEV - AS$ .

B Superelevation for Near-Surface Burst - Superelevation (SE) for Projectile, Atomic, Supercaliber 279mm: M388, to achieve near-surface burst (NSB) above the target, is listed as a function of propellant temperature and superelevation for the spotting round. The table, computed with arbitrarily chosen standard conditions, corrects superelevation for the M101 to the superelevation for the M388. This correction is necessary because of a ballistic difference between the two projectiles and also a difference in the effect of propellant temperature.

C Superelevation for Medium-Height Burst - Superelevation (SE) for Projectile, Atomic, Supercaliber 279mm: M388, to achieve medium-height burst (MHB) above the target, is listed as a function of propellant temperature and superelevation for the spotting round. The method of computation for this table is the same as that for Table B with the exception that an additional correction is made to place the M388 at the proper height above the target for medium-height burst.

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c. Round-off Rules.

Table	Argument		Extracted Value	
	Enter with	Rounded to the nearest	Value obtained	Rounded to the nearest
A*	Range to Target (SE) Vertical Interval	25 m 10 m	Quadrant Elevation and Angle of Site	1 m
A**	Range to Target Angle of Site	25 m 1 m	Quadrant Elevation	1 m
B	Superelevation (SE) Propellant Temp.	10 m 5°F.	Superelevation for Near-Surface Burst	1 m
C	Superelevation (SE) Propellant Temp.	10 m 5°F.	Superelevation for Medium-Height Burst	1 m
D	Superelevation (SE) m	10 m	Timer Dial Setting Minimum Arming Range Minimum Superelevation	0.5 sec 1 m 1 m

\* Indirect fire problem.  
\*\* Direct fire problem.

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the bottom of the map; with below it a row of letters designating the time zones. 2 is Greenwich time; zones to the east, as far as the International Date Line, are designated by the letters at the beginning of the alphabet (J being omitted), zones to the west are designated by the letters at the end of the alphabet. The lines connecting the top and bottom of the map demark the time zones of the continental land masses and of the island groups of the world. Any exceptions are noted on the map.

6. FIRE PROBLEMS.

a. General.

Firing tables contain the quadrant elevation that will produce detonation of the projectile at the target when firing under standard conditions of weather and materiel. The examples of problems in paragraph 7 illustrate the use of the firing table in computing the fire problem.

b. Arithmetic Precision.

In the computation of the examples that follow, certain rules and principles affecting the arithmetic precision of the solutions are stated or implied. These are guides only. Greater arithmetic precision could be achieved by more stringent rules; however, the improvement in effectiveness of fire would generally be negligible and certainly not justify the added complexity.

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7. EXAMPLES OF PROBLEMS.

a. General.

The examples in the following sections are defined as follows:

- |             |                       |
|-------------|-----------------------|
| Problem I   | General Use of Tables |
| Problem II  | Indirect Fire Problem |
| Problem III | Direct Fire Problem   |

A thorough understanding of the abbreviations and symbols used in these problems is required. See page 2 for a list of abbreviations and symbols.

b. Known Conditions.

- (1) Range to target in meters.
- (2) Vertical interval in meters for an indirect fire problem or angle of site for a direct fire problem.
- (3) Propellant temperature in °F.
- (4) Type of burst desired (NSB or MHB).

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## **APPENDIX C-22**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Analysis of Ammunition Data Cards  
(ADC) of Cartridge, 20mm Spotting M101 from  
document no. LC-031507-004,  
dated 27 March 2007, MVS-032707-001.**

MVS-032907-001

AMMUNITION DATA CARD (ADC) ANALYSIS			
LOTS AND QUANTITIES OF CARTRIDGE, 20MM SPOTTING M101			
MANUFACTURED AT LAKE CITY ORDNANCE PLANT			
LOT NO.	DATE COMPLETED	QTY IN LOT	NOTES
LC 1-1	23-Jun-61	1,077	
LC 1-2	8-Aug-61	640	
LC 1-3	Unknown	478	Qty from Attributes Inspection and DD Form 550, ADC never found
LC 1-4	14-Sep-61	488	
LC 1-5	26-Sep-61	756	
LC 1-6	28-Sep-61	894	
LC 2-1	23-Oct-61	399	Interfix number change due to new crimp
LC 2-2	24-Oct-61	616	
LC 2-3	26-Oct-61	1,073	
LC 2-4	Unknown	0	Evidence of rework to lot LC 2-4B for 524 rounds. However, no final ADC, DD Form 550, or packing attributes inspection found for lot. Possibly lot rejected again after rework.
LC 2-5	7-Nov-61	776	
LC 2-6	1-Nov-61	50	Special test lot loaded with inert capsules shipped to Frankford Arsenal
LC 2-7	8-Nov-61	965	

LOT NO.	DATE COMPLETED	QTY IN LOT	NOTES
LC 2-8	15-Nov-61	900	
LC 2-9A	6-Dec-61	689	Lot LC 2-9 reloaded to meet velocity test requirements and suffixed as lot LC 2-9A
LC 2-10	28-Nov-61	983	
LC 2-11	12-Dec-61	888	
LC 2-12	6-Dec-61	424	
LC 2-13A	15-May-62	1,035	Lot LC 2-13 reloaded to meet velocity and accuracy test requirements. Suffixed as lot LC 2-13A
LC 2-14	21-Dec-61	845	
LC 2-15	22-Dec-61	1,341	
LC 2-16	15-Jan-62	911	
LC 2-17	17-Jan-62	865	
LC 2-18	17-Jan-62	488	
LC 2-19	19-Jan-62	1,148	
LC 2-20	23-Jan-62	908	
LC 2-21	25-Jan-62	1,236	
LC 2-22	26-Jan-62	1,309	
LC 2-23	29-Jan-62	1,077	
LC 2-24	1-Feb-62	1,031	
LC 2-25	13-Feb-62	1,248	
LC 2-26	13-Feb-62	457	
LC 2-27	14-Feb-62	532	

LOT NO.	DATE COMPLETED	QTY IN LOT	NOTES
LC 2-28	15-Feb-62	561	
LC 2-29	16-Feb-62	219	
LC 2-30	20-Feb-62	619	
LC 2-31	21-Feb-62	899	
LC 2-32	23-Feb-62	866	
LC 2-33	27-Feb-62	702	
LC 2-34	27-Feb-62	892	
LC 2-35	7-Mar-62	153	
LC 2-36	13-Mar-62	751	
LC 2-37	21-Mar-62	1,078	
LC 2-38	26-Mar-62	1,077	
LC 2-39	4-Apr-62	483	
			Lot LC 2-40 reloaded to meet velocity test requirements and suffixed as lot LC 2-40A
LC 2-40A	6-Apr-62	226	
LC 2-41	13-Apr-62	1,387	
LC 2-42	23-Apr-62	830	
LC 2-43	4-May-62	1,508	
LC 2-44	21-May-61	979	
LC 2-45	5-Jun-62	336	
LC 2-46	2-Jul-62	650	
LC 2-47	3-Jul-62	579	
LC 2-48	9-Jul-62	981	
LC 2-49	12-Jul-62	1,213	

LOT NO.	DATE COMPLETED	QTY IN LOT	NOTES
LC SA 9-62	15-Jul-62	20	Special sample lot for Aberdeen Proving Ground
LC 3-1	20-Aug-62	818	Interfix number change due to modification in M538E1 fuze
LC 3-2	18-Sep-62	1,297	
LC 3-3	26-Sep-62	2,145	
LC 3-4	27-Sep-62	1,194	
LC 3-5	15-Oct-62	1,682	
LC 3-6A	23-Oct-62	1,545	Lot LC 3-6 reloaded to meet test requirements and suffixed as lot LC 3-6A
LC 3-7	26-Oct-62	1,399	
LC 3-8	11-Nov-62	1,764	
LC 3-9	27-Nov-62	985	
LC 3-10A	8-Jan-63	516	Lot LC 3-10 reloaded to meet test requirements and suffixed as lot LC 3-10A
LC 3-11	17-Dec-61	1,625	
LC 3-12	27-Dec-62	516	
LC 3-13	7-Jan-63	1,048	
LC 3-14	14-Jan-63	1,059	
LC 3-15	8-Feb-63	1,195	
LC 3-16	25-Feb-63	554	
LC 3-17	25-Feb-63	397	



LOT NO.	DATE COMPLETED	QTY IN LOT	NOTES
LC 3-18	14-Mar-63	930	
LC 3-19	19-Mar-63	969	
LC 3-20	20-Mar-63	283	
LC 3-21	16-Mar-63	1,050	
LC 3-22	29-Apr-63	1,103	
LC 3-23	20-May-63	576	
LC 3-24	21-May-63	536	
LC 3-25	28-May-63	734	
LC 3-26	24-Jun-63	1,011	
LC 3-27B	22-Jul-63	847	Lot LC 3-27 reloaded to meet test requirements and suffixed as lot LC 3-27B
LC 3-28	25-Jul-63	958	
LC 3-29	21-Aug-63	1,353	
LC 3-30	19-Sep-63	1,693	
		75,318	

## **APPENDIX C-23**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), Analysis of DD Form 550 Ordnance  
Corps Ammunition Lot Record for Cartridge,  
20mm Spotting M101 document no.  
LC-031507-005, dated 27 March 2007,  
MVS-032707-002.**

MVS-032707-002

Summary of Cartridge, 20mm Spotting M101 Shipments from Lake City Ordnance Plant					
DD Form 550 - Ordnance Corps Ammunition Lot Record					
Cartridge, 20mm Spotting XM101					
FSN 1305-473-6246					
Cartridge, 20mm Spotting XM101E1					
FSN 1305-856-9754					
Item AIC CR-1					
FSN=Federal Stock Number					
AIC=Ammunition Identification Code					
DATE	FSN	QTY	LOT	SHIPPED TO	
7-Aug-61	1305-473-6246	20	LC 1-1	Aberdeen Proving Ground, MD	
23-Apr-62	1305-473-6246	160	LC 2-31	Aberdeen Proving Ground, MD	
18-Jun-62	1305-473-6246	20	LC SA-9-62	Aberdeen Proving Ground, MD	
<b>TOTAL</b>		<b>200</b>			
19-Jul-61	1305-473-6246	20	LC 1-1	Doc No. JO 3-20718-1, destination unknown	
<b>TOTAL</b>		<b>20</b>			
27-Jul-61	1305-473-6246	658	LC 1-1	Fort Benning, GA	
5-Oct-61	1305-473-6246	640	LC 1-2	Fort Benning, GA	
5-Oct-61	1305-473-6246	78	LC 1-3	Fort Benning, GA	
5-Oct-61	1305-473-6246	488	LC 1-4	Fort Benning, GA	
5-Oct-61	1305-473-6246	36	LC 1-5	Fort Benning, GA	
5-Oct-61	1305-473-6246	14	LC 1-6	Fort Benning, GA	
31-Oct-61	1305-473-6246	160	LC 2-1	Fort Benning, GA	
9-Nov-61	1305-473-6246	239	LC 2-1	Fort Benning, GA	
27-Sep-62	1305-473-6246	880	LC 2-13A	Fort Benning, GA	
1-Nov-62	1305-473-6246	96	LC 2-13A	Fort Benning, GA	
29-Jan-62	1305-473-6246	591	LC 2-16	Fort Benning, GA	
31-Oct-61	1305-473-6246	560	LC 2-2	Fort Benning, GA	

DATE	FSN	QTY	LOT	SHIPPED TO
31-Oct-61	1305-473-6246	30	LC 2-2	Fort Benning, GA
9-Nov-61	1305-473-6246	26	LC 2-2	Fort Benning, GA
2-Feb-62	1305-473-6246	908	LC 2-20	Fort Benning, GA
2-Feb-62	1305-473-6246	1,120	LC 2-21	Fort Benning, GA
2-Feb-62	1305-473-6246	36	LC 2-21	Fort Benning, GA
2-Feb-62	1305-473-6246	29	LC 2-22	Fort Benning, GA
2-Feb-62	1305-473-6246	37	LC 2-23	Fort Benning, GA
9-Nov-61	1305-473-6246	1,073	LC 2-3	Fort Benning, GA
1-Nov-62	1305-473-6246	19	LC 2-31	Fort Benning, GA
27-Sep-62	1305-473-6246	12	LC 2-34	Fort Benning, GA
27-Sep-62	1305-473-6246	31	LC 2-36	Fort Benning, GA
27-Sep-62	1305-473-6246	800	LC 2-44	Fort Benning, GA
27-Sep-62	1305-473-6246	19	LC 2-44	Fort Benning, GA
27-Sep-62	1305-473-6246	320	LC 2-45	Fort Benning, GA
17-Nov-61	1305-473-6246	320	LC 2-5	Fort Benning, GA
1-Nov-61	1305-473-6246	80	LC 2-9A	Fort Benning, GA
27-Sep-62	1305-473-6246	400	LC 2-9A	Fort Benning, GA
<b>TOTAL</b>		<b>9,700</b>		
3-Apr-62	1305-473-6246	619	LC 2-30	Fort Campbell, KY
3-Apr-62	1305-473-6246	62	LC 2-33	Fort Campbell, KY
<b>TOTAL</b>		<b>681</b>		
29-May-62	1305-473-6246	38	LC 2-37	Fort Hood, TX
29-May-62	1305-473-6246	640	LC 2-38	Fort Hood, TX
29-May-62	1305-473-6246	1,360	LC 2-41	Fort Hood, TX
3-May-63	1305-856-9754	1,600	LC 3-11	Fort Hood, TX
3-May-63	1305-856-9754	160	LC 3-12	Fort Hood, TX
3-May-63	1305-856-9754	240	LC 3-9	Fort Hood, TX
<b>TOTAL</b>		<b>4,038</b>		

DATE	FSN	QTY	LOT	SHIPPED TO
27-Jul-61	1305-473-6246	329	LC 1-1	Fort Knox, KY
5-Oct-61	1305-473-6246	400	LC 1-3	Fort Knox, KY
5-Oct-61	1305-473-6246	720	LC 1-5	Fort Knox, KY
5-Oct-61	1305-473-6246	880	LC 1-6	Fort Knox, KY
4-Dec-61	1305-473-6246	240	LC 2-10	Fort Knox, KY
5-Dec-61	1305-473-6246	23	LC 2-10	Fort Knox, KY
17-Nov-61	1305-473-6246	63	LC 2-5	Fort Knox, KY
5-Dec-61	1305-473-6246	320	LC 2-5	Fort Knox, KY
5-Dec-61	1305-473-6246	16	LC 2-5	Fort Knox, KY
5-Dec-61	1305-473-6246	965	LC 2-7	Fort Knox, KY
<b>TOTAL</b>		<b>3,956</b>		
29-May-62	1305-473-6246	88	LC 2-18	Fort Lewis, WA
22-May-62	1305-473-6246	68	LC 2-43	Fort Lewis, WA
1-Nov-62	1305-473-6246	1,440	LC 2-43	Fort Lewis, WA
9-Jun-62	1305-473-6246	160	LC 2-44	Fort Lewis, WA
10-Dec-62	1305-856-9754	80	LC 3-9	Fort Riley, KS
10-Dec-62	1305-856-9754	25	LC 3-9	Fort Riley, KS
<b>TOTAL</b>		<b>1,861</b>		
2-Oct-61	1305-473-6246	50	LC 2-6	Frankford Arsenal, PA
<b>TOTAL</b>		<b>50</b>		
29-Jun-61	1305-473-6246	50	LC 1-1	Frankfurt, Germany via McGuire, AFB, NJ
26-Dec-61	1305-473-6246	720	LC 2-10	Frankfurt, Germany via McGuire, AFB, NJ
26-Dec-61	1305-473-6246	888	LC 2-11	Frankfurt, Germany via McGuire, AFB, NJ
26-Dec-61	1305-473-6246	424	LC 2-12	Frankfurt, Germany via McGuire, AFB, NJ
9-Jan-62	1305-473-6246	800	LC 2-14	Frankfurt, Germany via McGuire, AFB, NJ
9-Jan-62	1305-473-6246	1,280	LC 2-15	Frankfurt, Germany via McGuire, AFB, NJ
9-Jan-62	1305-473-6246	61	LC 2-15	Frankfurt, Germany via McGuire, AFB, NJ
24-Jan-62	1305-473-6246	320	LC 2-16	Frankfurt, Germany via McGuire, AFB, NJ

DATE	FSN	QTY	LOT	SHIPPED TO
24-Jan-62	1305-473-6246	800	LC 2-17	Frankfurt, Germany via Meguire, AFB, NJ
24-Jan-62	1305-473-6246	65	LC 2-17	Frankfurt, Germany via Meguire, AFB, NJ
23-Jan-62	1305-473-6246	1,148	LC 2-19	Frankfurt, Germany via Meguire, AFB, NJ
26-Dec-61	1305-473-6246	57	LC 2-5	Frankfurt, Germany via Meguire, AFB, NJ
26-Dec-61	1305-473-6246	900	LC 2-8	Frankfurt, Germany via Meguire, AFB, NJ
6-Feb-62	1305-473-6246	320	LC 2-22	Frankfurt, Germany via Red River Arsenal
<b>TOTAL</b>		<b>7,833</b>		
27-Apr-62	1305-473-6246	800	LC 2-32	Inchon, South Korea via Travis AFB, CA
27-Apr-62	1305-473-6246	640	LC 2-33	Inchon, South Korea via Travis AFB, CA
<b>TOTAL</b>		<b>1,440</b>		
12-Aug-63	1305-856-9754	20	LC 3-10A	Lake City Ordnance Plant, MO
19-Apr-63	1305-856-9754	25	LC 3-6A	Lake City Ordnance Plant, MO
<b>TOTAL</b>		<b>45</b>		
13-Mar-62	1305-473-6246	80	LC 2-21	Letterkenny Ordnance Depot, PA
13-Mar-62	1305-473-6246	960	LC 2-22	Letterkenny Ordnance Depot, PA
13-Mar-62	1305-473-6246	1,040	LC 2-23	Letterkenny Ordnance Depot, PA
13-Mar-62	1305-473-6246	1,031	LC 2-24	Letterkenny Ordnance Depot, PA
13-Mar-62	1305-473-6246	1,248	LC 2-25	Letterkenny Ordnance Depot, PA
13-Mar-62	1305-473-6246	457	LC 2-26	Letterkenny Ordnance Depot, PA
13-Mar-62	1305-473-6246	532	LC 2-27	Letterkenny Ordnance Depot, PA
13-Mar-62	1305-473-6246	219	LC 2-29	Letterkenny Ordnance Depot, PA
13-Dec-62	1305-856-9754	800	LC 3-1	Letterkenny Ordnance Depot, PA
20-May-63	1305-856-9754	18	LC 3-1	Letterkenny Ordnance Depot, PA
20-May-63	1305-856-9754	1,040	LC 3-13	Letterkenny Ordnance Depot, PA
20-May-63	1305-856-9754	1,040	LC 3-14	Letterkenny Ordnance Depot, PA
20-May-63	1305-856-9754	1,120	LC 3-15	Letterkenny Ordnance Depot, PA
13-Dec-62	1305-856-9754	1,280	LC 3-2	Letterkenny Ordnance Depot, PA
13-Dec-62	1305-856-9754	2,080	LC 3-3	Letterkenny Ordnance Depot, PA

DATE	FSN	QTY	LOT	SHIPPED TO
13-Dec-62	1305-856-9754	74	LC 3-4	Letterkenny Ordnance Depot, PA
13-Dec-62	1305-856-9754	1,120	LC 3-4	Letterkenny Ordnance Depot, PA
13-Dec-62	1305-856-9754	1,680	LC 3-5	Letterkenny Ordnance Depot, PA
13-Dec-62	1305-856-9754	1,360	LC 3-7	Letterkenny Ordnance Depot, PA
13-Dec-62	1305-856-9754	4	LC 3-8	Letterkenny Ordnance Depot, PA
<b>TOTAL</b>		<b>17,183</b>		
27-Apr-62	1305-473-6246	561	LC 2-28	Oahu, Hawaii via Travis AFB, CA
27-Apr-62	1305-473-6246	153	LC 2-35	Oahu, Hawaii via Travis AFB, CA
<b>TOTAL</b>		<b>714</b>		
26-Feb-63	1305-856-9754	65	LC 3-3	Pirmasens, Germany via Sunny Point Army Terminal, NC
26-Feb-63	1305-856-9754	1,520	LC 3-6A	Pirmasens, Germany via Sunny Point Army Terminal, NC
26-Feb-63	1305-856-9754	39	LC 3-7	Pirmasens, Germany via Sunny Point Army Terminal, NC
26-Feb-63	1305-856-9754	1,760	LC 3-8	Pirmasens, Germany via Sunny Point Army Terminal, NC
<b>TOTAL</b>		<b>3,384</b>		
13-Dec-62	1305-473-6246	59	LC 2-13A	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	400	LC 2-18	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	720	LC 2-31	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	880	LC 2-34	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	720	LC 2-36	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	1,040	LC 2-37	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	400	LC 2-38	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	480	LC 2-39	Pueblo Ordnance Depot, CO
13-Dec-62	1305-473-6246	3	LC 2-39	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	160	LC 2-40A	Pueblo Ordnance Depot, CO

<u>DATE</u>	<u>FSN</u>	<u>QTY</u>	<u>LOT</u>	<u>SHIPPED TO</u>
13-Dec-62	1305-473-6246	66	LC 2-40A	Pueblo Ordnance Depot, CO
13-Dec-62	1305-473-6246	27	LC 2-41	Pueblo Ordnance Depot, CO
15-Jun-62	1305-473-6246	800	LC 2-42	Pueblo Ordnance Depot, CO
13-Dec-62	1305-473-6246	30	LC 2-42	Pueblo Ordnance Depot, CO
13-Dec-62	1305-473-6246	16	LC 2-45	Pueblo Ordnance Depot, CO
13-Dec-62	1305-473-6246	650	LC 2-46	Pueblo Ordnance Depot, CO
13-Dec-62	1305-473-6246	579	LC 2-47	Pueblo Ordnance Depot, CO
13-Dec-62	1305-473-6246	981	LC 2-48	Pueblo Ordnance Depot, CO
13-Dec-62	1305-473-6246	1,213	LC 2-49	Pueblo Ordnance Depot, CO
13-Feb-62	1305-473-6246	209	LC 2-9A	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	496	LC 3-10A	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	25	LC 3-11	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	320	LC 3-12	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	36	LC 3-12	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	8	LC 3-13	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	19	LC 3-14	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	75	LC 3-15	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	480	LC 3-16	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	74	LC 3-16	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	320	LC 3-17	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	77	LC 3-17	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	880	LC 3-18	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	50	LC 3-18	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	960	LC 3-19	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	9	LC 3-19	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	17	LC 3-2	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	240	LC 3-20	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	43	LC 3-20	Pueblo Ordnance Depot, CO



<u>DATE</u>	<u>FSN</u>	<u>QTY</u>	<u>LOT</u>	<u>SHIPPED TO</u>
20-May-63	1305-856-9754	1,040	LC 3-21	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	10	LC 3-21	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	400	LC 3-22	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	63	LC 3-22	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	640	LC 3-22	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	576	LC 3-23	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	536	LC 3-24	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	734	LC 3-25	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	1,011	LC 3-26	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	847	LC 3-27B	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	958	LC 3-28	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	1,353	LC 3-29	Pueblo Ordnance Depot, CO
27-Nov-63	1305-856-9754	1,693	LC 3-30	Pueblo Ordnance Depot, CO
20-May-63	1305-856-9754	2	LC 3-5	Pueblo Ordnance Depot, CO
29-May-63	1305-856-9754	640	LC 3-9	Pueblo Ordnance Depot, CO
<b>TOTAL</b>		<b>24,065</b>		
27-Apr-62	1305-473-6246	66	LC 2-32	Ryukus Island (Okinawa) Japan via Travis AFB, CA
27-Apr-62	1305-473-6246	37	LC 2-38	Ryukus Island (Okinawa) Japan via Travis AFB, CA
<b>TOTAL</b>		<b>103</b>		
5-Jan-62	1305-473-6246	15	LC 2-14	San Jose, CA
5-Jan-62	1305-473-6246	15	LC 2-14	San Jose, CA
5-Jan-62	1305-473-6246	15	LC 2-14	San Jose, CA
<b>TOTAL</b>		<b>45</b>		
<b>GRAND TOTAL</b>		<b>75,318</b>		

## **APPENDIX C-24**

**USACE St. Louis District, St. Louis, Missouri  
(MVS), DD Form 550, Ordnance Corps  
Ammunition Lot Records for Lot No. LC-2-28  
and LC-2-35, dated 26 February 1962,  
MVS-020807-001.**

16-48584-1 U. S. GOVERNMENT PRINTING OFFICE



# **APPENDIX D**

## **ABBREVIATIONS, ACRONYMS, AND BREVITY CODES**

## **ABBREVIATIONS, ACRONYMS AND BREVITY CODES**

The following list contains abbreviations, acronyms and brevity codes within this ASR, as well as typical others.

AAF*	Army Air Field
AA	Anti-Aircraft
ACGIH	American Conference of Governmental Industrial Hygienist
ADC	Ammunition Data Cards
AEC	Army Environmental Center
AFB	Air Force Base
AGO	Adjutant General's Office
AKO	Army Knowledge Online
ANSI	American National Standards Institute
AP	Armor Piercing
APDS	Armor Piercing Discarding Sabot
APERS	Anti-Personnel
AP-T	Armor Piercing-Tracer
ASR	Archive Search Report
AT	Anti-Tank
Aux	Auxiliary
BD	Base Detonating
BD/DR	Building Demolition/Debris Removal
BE	Base Ejection
BGR	Bombing and Gunnery Range
BLM	Bureau of Land Management
BRAC	Base Realignment and Closure
CADD	Computer-Aided Drafting and Design
CAIS	Chemical Agent Identification Set
cal	Caliber
CBDA	Chemical and Biological Defense Agency
CBDCOM	Chemical and Biological Defense Command
CE	Corps of Engineers
CEHNC	Corps of Engineers, Huntsville Engineering and Support Center
CEMVS	Corps of Engineers, Mississippi Valley-St. Louis District
CEMVK	Corps of Engineers, Mississippi Valley-Vicksburg District
CEP	Circular Error of Probability
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
CN	Chloroacetopheno
COE	Chief of Engineers

COMP	Composition
CP	NARA II College Park, Maryland
ctg	Cartridge
CSM	Chemical Surety Material
CSM	Command Sergeant Major
CWM	Chemical Warfare Materials
CWS*	Chemical Warfare Service
CX	Center of Expertise
DA	Department of the Army
DARCOM	Development and Readiness Command
DEET	Diethyltoluamide
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DMM	Discarded Military Munitions
DoD	Department of Defense
DOE	Department of Energy
DOI	Department of Interior
DPW	Department of Public Works
DTIC	Defense Technical Information Center
EE/CA	Engineering Evaluation/Cost Analysis
EIS	Environmental Impact Statement
EKO	Engineering Knowledge Online
EM	Engineer Manual
ENTAC	Engin Teleguide Anti-Char
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
ERDA	Environmental Restoration Defense Account
ETL	Engineering Technical Letter
FDE	Findings and Determination of Eligibility
FFMC	Federal Farm Mortgage Corporation
FGDC	Federal Geographic Data Committee
FM	Field Manual
FS	Feasibility Study
FUDS	Formerly Used Defense Sites
GIS	Geographic Information System
GPM	Gallons Per Minute
GPS	Global Positioning System
GSA	General Services Administration
HARNG	Hawaii Army National Guard
HAZWOPER	Hazardous Waste Operations
HBX	high blast explosives; mixtures of RDX, TNT and aluminum
HE	High Explosive
HEAT	High Explosive Anti-Tank
HEI	High Explosive Incendiary

HEP	High Explosive Plastic
HMX	cyclotetramethylenetetranitramine (a type of high explosive)
HTRW	Hazardous Toxic and Radioactive Waste
HTW	Hazardous and Toxic Waste
IAS	Initial Assessment Study
IATCB	Interdepartmental Air Traffic Control Board
ILLUM	Illuminating
INPR	Inventory Project Report
IRP	Installation Restoration Program
JMC	Joint Munitions Command
LAW	Light Antitank Weapon
LC	Lake City Army Ammunition Plant, Independence, Missouri
LD	Lyme Disease
LEDC	Low Energy Detonating Cord
M28	Davy Crocket Light Weapon System
M29	Davy Crocket Heavy Weapon System
MC	Munitions Constituents
MEC	Munitions and explosives of concern
MCX	Mandatory Center of Expertise
MEC	Munitions and Explosives of Concern
MG	Machine Gun
MG	Major General
mm	Millimeter
MMR	Military Munitions Response
MPPEH	Material Potentially Presenting an Explosive Hazard
MR	Molasses Residuum
MRA	Munitions Response Area
MRS	Munitions Response Site
MT	Mechanical Time
MTSQ	Mechanical Time Super Quick
MVS	USACE St. Louis District, St. Louis, Missouri
NARA	National Archives and Records Administration
NARA II	National Archives and Records Administration College Park, MD
NAVSEA	Naval Sea Systems Command
NAAS*	Naval Auxiliary Air Station
NAS*	Naval Air Station
NCDC	National Climatic Data Center
NCP	National Contingency Plan
n.d.	No Date
NDAI	No DoD Action Indicated
NEW	Net Explosive Weight
NFS	National Forest Service
NG	National Guard
NGVD	National Geographic Vertical Datum



NIMA	National Imagery and Mapping Agency
NIOSH	National Institute for Safety and Health
NMAS	National Map Accuracy Standards
NOAA	National Oceanic and Atmospheric Administration
NOFA	No Further Action
NPL	National Priorities List
NPRC	National Personnel Records Center
NRC	National Records Center
NWS	National Weather Service
OCE	Office Chief of Engineers
OE	Ordnance and Explosives
OEW	Ordnance and Explosive Waste
OP	Ordnance Pamphlet
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PAE	Preliminary Assessment of Eligibility
PD	Point Detonating
PE	Professional Engineer
PETN	pentaerythritol tetranitrate (a type of high explosive)
PIBD	Point Initiating, Base Detonating
PL	Public Law
PM	Project Manager
PPE	Personal Protective Equipment
PTA	Pohakuloa Training Area
QASAS	Quality Assurance Specialist, Ammunition Surveillance
RA	Removal Action
RAC	Risk Assessment Code
RCWM	Recovered Chemical Warfare Material
RD	Remedial Design
RDX	cyclotrimethylenetrinitramine; also known as cyclonite or hexogen (a type of high explosive)
RG	Record Group
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROAD	Reorganization Objective Army Division
SARA	Superfund Amendments and Reauthorization Act
SCH	U.S. Army Garrison Schofield, Honolulu, HI
SCS	Soil Conservation Service
SDAD	Surface Danger Area Diagram
SEP	Spherical Error of Probability
SLD	St. Louis District, Corps of Engineers
SOP	Standing Operating Procedures
SPB*	Surplus Property Board
SSHO	Site Safety and Health Officer

SSHP	Site Safety and Health Plan
SWMU	Solid Waste Management Units
TAG	Technical Advisory Group
TCRA	Time Critical Removal Action
TECOM	Test Evaluation Command
TEU	United States Army Technical Escort Unit
TM	Technical Manual
TNT	Trinitrotoluene
TOE	Table of Organization and Equipment
TP	Target Practice
USA	United States of America
USACE	U.S. Army Corps of Engineers
USADACS	U.S. Army Defense Ammunition Center and School
USAED	U.S. Army Engineer District
USAESCH	U.S. Army Engineering and Support Center, Huntsville, Alabama
USAFHRA	U.S. Air Force Historical Research Agency
USAHAW	U.S. Army Army Hawaii
USATCES	U.S. Army Technical Center for Explosive Safety
USATHMA	U.S. Army Toxic and Hazardous Materials Agency
USC	United States Code
USCG	United States Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UXO	Unexploded Ordnance
WAA*	War Assets Administration
WAGE	Wide Area GPS Enhancement
WD	War Department
WGS	World Geodetic System
WNRC	Washington National Records Center
WW I	World War I
WW II	World War II

\* designates an historic acronym

# **APPENDIX E**

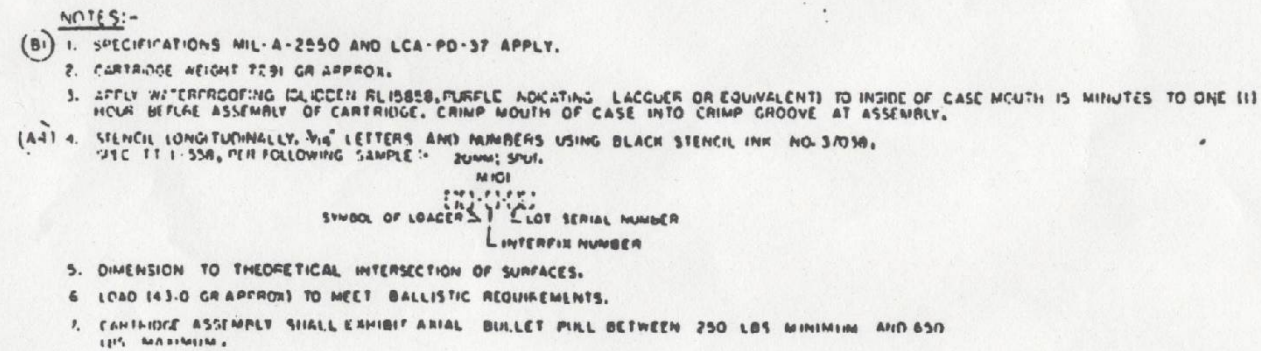
## **AMMUNITION DRAWINGS**

## **AMMUNITION DRAWINGS**

<u>Page No.</u>	<u>Drawing</u>
3	Cartridge, 20mm Spotting M101
5	Projectile, 20mm Spotting M101 Assembly
7	Fuze, PD Electric M53B Assembly
9	Charged Projectile Assembly

**APPENDIX E-1**

**CARTRIDGE  
20MM SPOTTING  
M101**



20mm Spotting  
m101

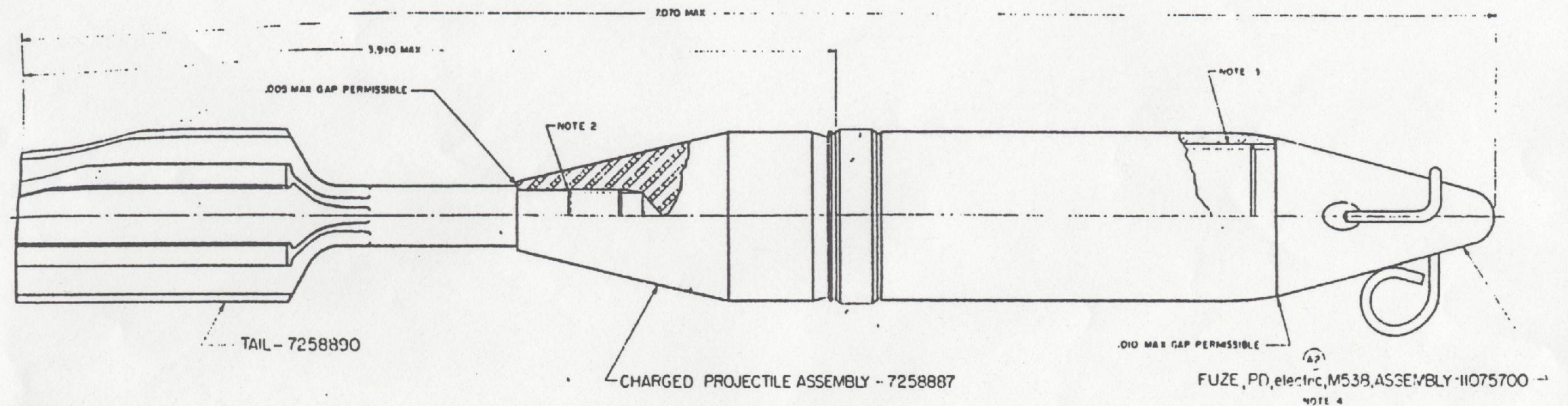
MVS-020707-003

FOR LIST OF PARTS SEE ENGINEERING PARTS LIST 7259061		CHARGEANCE PART NO. 7259061	
SEE ENGINEERING RECORDS		ORIGINAL DATE NO. 26, 1982 DATE 6/82	LAKELAND CITY CHARGEANCE PLANT MILITARY POLICE, W. 1400
		<i>See below for details</i> <i>Gonell L. Hanger</i> <i>Jahar P. Kouskian</i>	CARTRIDGE, 20MM, spotting, MIOI
		19201 D 7259061	

**APPENDIX E-2**

**PROJECTILE  
20MM SPOTTING  
M101 ASSEMBLY**





NOTES:-

1. SPECIFICATIONS MIL-A-7550 AND LCA-PD-37 APPLY.
2. SECURE TAIL TO BODY BY APPLYING EPOXY CEMENT TO THE BODY THREADS.
3. SECURE FUZE TO BODY BY APPLYING SEALING COMPOUND ORDNANCE PART NO. 754000, 1/4" DIA., TO THE BODY THREADS.
4. FUZE MAY BE ASSEMBLED TO PROJECTILE AFTER ASSEMBLY OF PROJECTILE AND CARTRIDGE CASE. PROJECTILE ASSEMBLY LESS FUZE SHALL WEIGH 3540GR ± 30.
5. PROJECTILE ASSEMBLY WEIGHT 4275 GR ± 35.

20mm Spotting  
M101

FOR LIST OF PARTS SEE  
ENGINEERING PARTS LIST 7259062

SEE ENGINEERING RECORDS		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES UNLESS OTHERWISE SPECIFIED		ORIGINAL DATE OF DRAWING NOV 28, 1962	ORDNANCE PART NO. 7259062
LAKE CITY ORDNANCE PLANT INDIANAPOLIS, INDIANA		PROJECTILE, 20MM, spotting, M101, ASSEMBLY		19201 D 7259062	
UNIT WEIGHT 4275 GR ± 35					

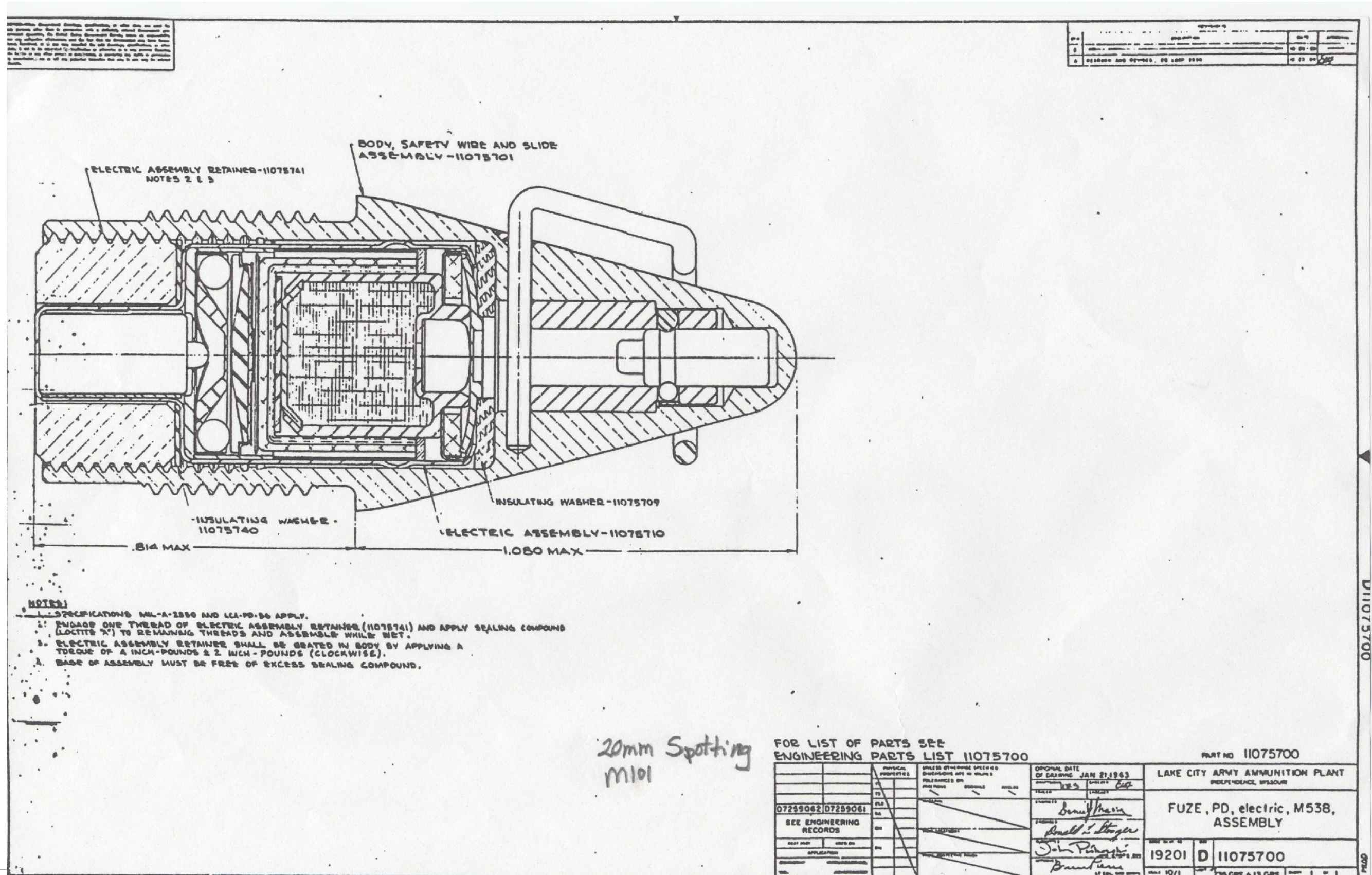


**APPENDIX E-3**

**FUZE**

**PD ELECTRIC**

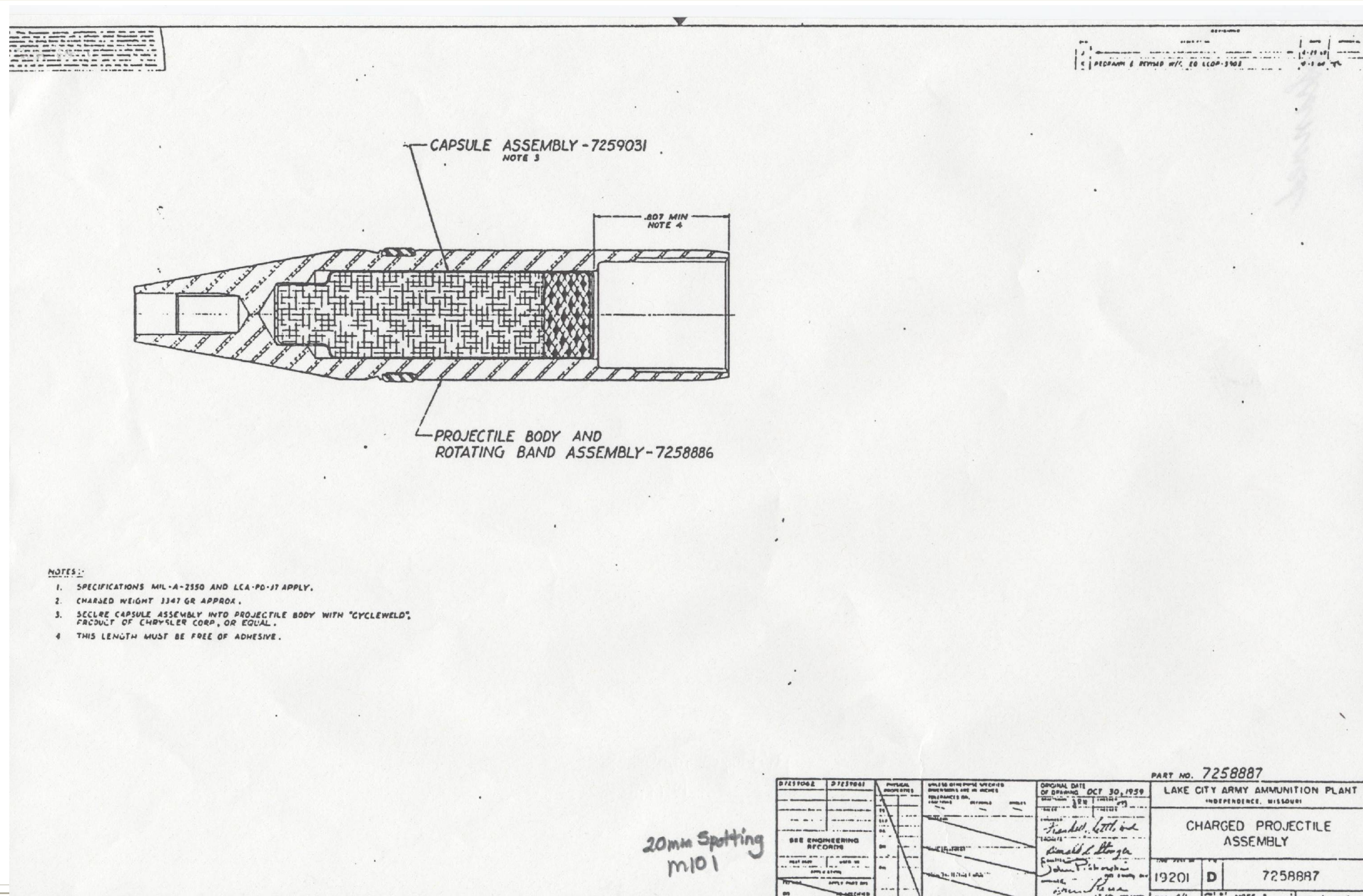
**M538 ASSEMBLY**



## **APPENDIX E-4**

# **CHARGED PROJECTILE ASSEMBLY**





# **APPENDIX F**

## **STILL PHOTOGRAPH REFERENCES**

## **STILL PHOTOGRAPH REFERENCES**

<u>Page No.</u>	<u>Still Photograph</u>
F-2	(1) Fired Launching Piston from Davy Crockett Weapon - Schofield Barracks (2) Fired Launching Piston from Davy Crockett Weapon – Schofield Barracks
F-3	(3) Rear Body Pieces Projectile, Atomic Supercaliber 279mm Practice M390 – Schofield Barracks (4) Rear Body Piece Projectile, Atomic Supercaliber 279mm Practice M390 – Schofield Barracks
F-4	(5) Fragmented Windshield of Projectile, Atomic Supercaliber 279mm Practice M390 - Schofield Barracks (6) Former Target Davy Crockett Range – Schofield Barracks
F-5	(7) Oxidized Fragment Cartridge, 20mm Spotting M101 – Schofield Barracks (8) Oxidized Fragment Cartridge, 20mm Spotting M101 – Schofield Barracks
F-6	(9) Oxidized Fragment Cartridge, 20mm Spotting M101 – Schofield Barracks (10) Fuze Housing Scrap Cartridge, 20mm Spotting M101 – Schofield Barracks
F-7	(11) Tail with Fins of Cartridge, 20mm Spotting M101 – Schofield Barracks
F-8	(12) Tail with Fins of Cartridge, 20mm Spotting M101 – Schofield Barracks
F-9	(13) 106mm Recoilless Rifle Scrap on Davy Crockett Range – Schofield Barracks (14) 81mm Mortar Scrap on Davy Crockett Range – Schofield Barracks
F-10	(15) 40mm Scrap on Davy Crockett Range – Schofield Barracks (16) 3.5 Inch Rocket Scrap on Davy Crockett Range – Schofield Barracks





(1) Fired Launching Piston from Davy Crockett Weapon - Schofield Barracks



(2) Fired Launching Piston from Davy Crockett Weapon – Schofield Barracks





(3) Rear Body Pieces Projectile, Atomic Supercaliber 279mm Practice M390 –  
Schofield Barracks



(4) Rear Body Piece Projectile, Atomic Supercaliber 279mm Practice M390 –  
Schofield Barracks





(5) Fragmented Windshield of Projectile, Atomic Supercaliber 279mm Practice M390  
Schofield Barracks



(6) Former Target Davy Crockett Range – Schofield Barracks





(7) Oxidized Fragment Cartridge, 20mm Spotting M101 – Schofield Barracks



(8) Oxidized Fragment Cartridge, 20mm Spotting M101 – Schofield Barracks





(9) Oxidized Fragment Cartridge, 20mm Spotting M101 – Schofield Barracks



(10) Fuze Housing Scrap Cartridge, 20mm Spotting M101 – Schofield Barracks



(11) Tail with Fins of Cartridge, 20mm Spotting M101 – Schofield Barracks



(12) Tail with Fins of Cartridge, 20mm Spotting M101 – Schofield Barracks





(13) 106mm Recoilless Rifle Scrap on Davy Crockett Range  
Schofield Barracks



(14) 81mm Mortar Scrap on Davy Crockett Range – Schofield Barracks





(15) 40mm Scrap on Davy Crockett Range – Schofield Barracks



(16) 3.5 Inch Rocket Scrap on Davy Crockett Range – Schofield Barracks

# **APPENDIX G**

## **MAPS/DRAWINGS REFERENCES**



## **MAPS/DRAWINGS REFERENCES**

Map No.      Historical Maps/Drawings

### **SCHOFIELD BARRACKS**

- G-1            1955  
US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, Map entitled *Schofield Barracks & East Range Showing Impact Areas, Training Areas & Artillery Firing Positions* dated 1955, DPW-031207-002.
- G-2            1959  
US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, An Interim Range Map of Schofield Barracks & East Range entitled *Schofield Barracks Military Reservation*, dated 1 October 1959, DPW-022607-028
- G-3            1969  
US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, Map from Headquarters, United States Army, Pacific Office of the Signal Office entitled *Key Sheet Post Cable Map Target Range Area Schofield Barracks*, dated 9 April 1969, DPW-031207-001.
- G-4            1973  
US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public Works, Map Edition 2-USARPAC Schofield Barracks Range entitled *Schofield Barracks and Vicinity*, dated 1 September 1973, DPW-022607-059.

### **MAKUA MILITARY RESERVATION**

- G-5            1954  
US Army Garrison Schofield, Honolulu, HI (SCH), Map developed by M & I Engineering Division HUSAEAPAC showing *Kaena Point Military Reservation, Mokuleia Training Area and Makua Training Area*, dated 1 August 1954, Department of Public Works, DPW-022607-004.
- G-6            1964  
US Army Garrison Schofield, Honolulu, HI (SCH), Map Edition 2-DMATC Series W833 Sheet 5321 entitled *Kaena*, dated circa 1964, Department of Public Works, DPW-022607-032.

**POHAKULOA TRAINING AREA**

- G-7            1963  
US Army Garrison Schofield Honolulu, HI, Map Sheet 1 Series W833S  
entitled *Pohakuloa Training Area* dated 1 February 1963, Department of  
Public Works, DPW-022607-012.
- G-8            1965  
US Army Garrison Schofield, Honolulu, HI, U.S. Army Mapping Center  
entitled *Island of Hawaii Pohakuloa Training Area* dated 1 February 1965,  
Department of Public Works, DPW-022607-015.
- G-9            1976  
US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public  
Works, Map Sheet 2 Series W833S entitled *Pohakuloa Training Area*,  
dated 1 November 1976, DPW-022607-013.
- G-10          1979  
US Army Garrison Schofield, Honolulu, HI (SCH), Department of Public  
Works, Map Sheet 1 Series W833S entitled *Pohakuloa Training Area*,  
dated 1 April 1979, DPW-022607-014.

## **MAP G-1**

**1955**

**US Army Garrison Schofield, Honolulu, HI  
(SCH), Department of Public Works, Map  
entitled *Schofield Barracks & East Range*  
*Showing Impact Areas, Training Areas & Artillery*  
*Firing Positions* dated 1955, DPW-031207-002.**

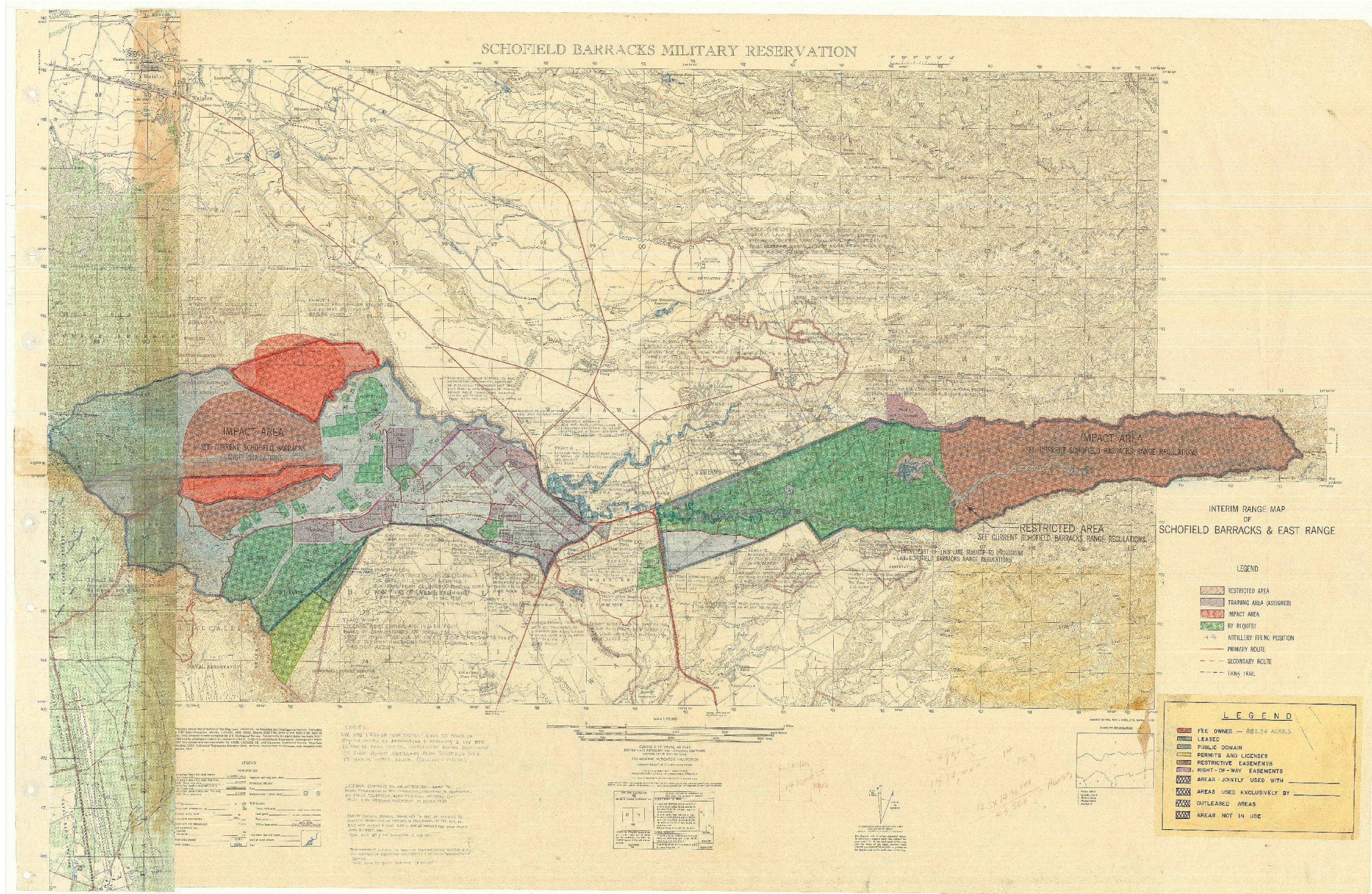


## **MAP G-2**

**1959**

**US Army Garrison Schofield, Honolulu, HI  
(SCH), Department of Public Works, An Interim  
Range Map of Schofield Barracks & East Range  
entitled *Schofield Barracks Military Reservation*,  
dated 1 October 1959, DPW-022607-028**





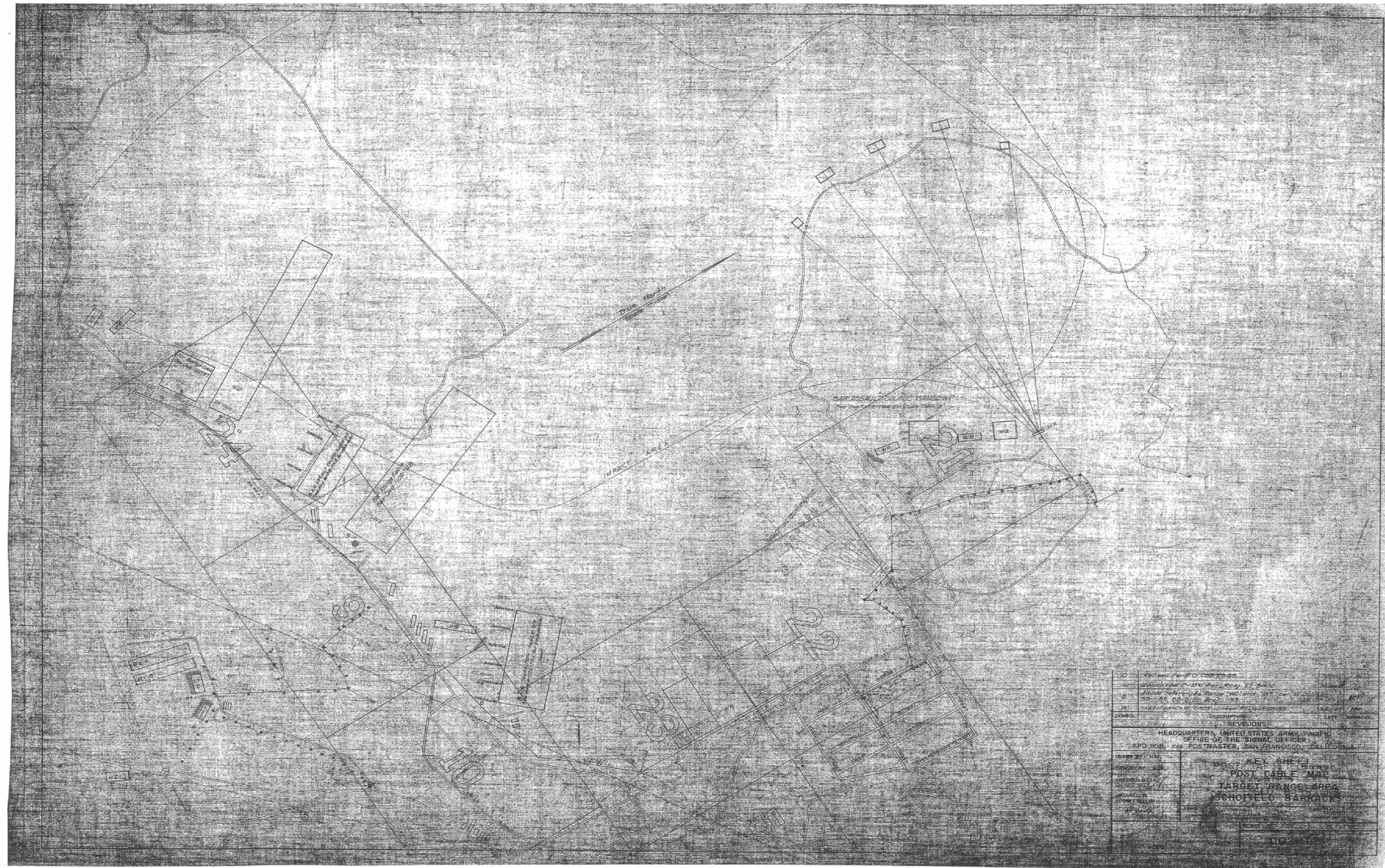
Appendix G - Maps/Drawings References  
Map G-2



## **MAP G-3**

**1969**

**US Army Garrison Schofield, Honolulu, HI  
(SCH), Department of Public Works, Map from  
Headquarters, United States Army, Pacific Office  
of the Signal Office entitled *Key Sheet Post Cable  
Map Target Range Area Schofield Barracks*,  
dated 9 April 1969, DPW-031207-001.**



*Appendix G - Maps/Drawings References*  
*Map G-3*



## **MAP G-4**

**1973**

**US Army Garrison Schofield, Honolulu, HI  
(SCH), Department of Public Works, Map  
Edition 2-USARPAC Schofield Barracks Range  
entitled *Schofield Barracks and Vicinity*,  
dated 1 September 1973, DPW-022607-059.**



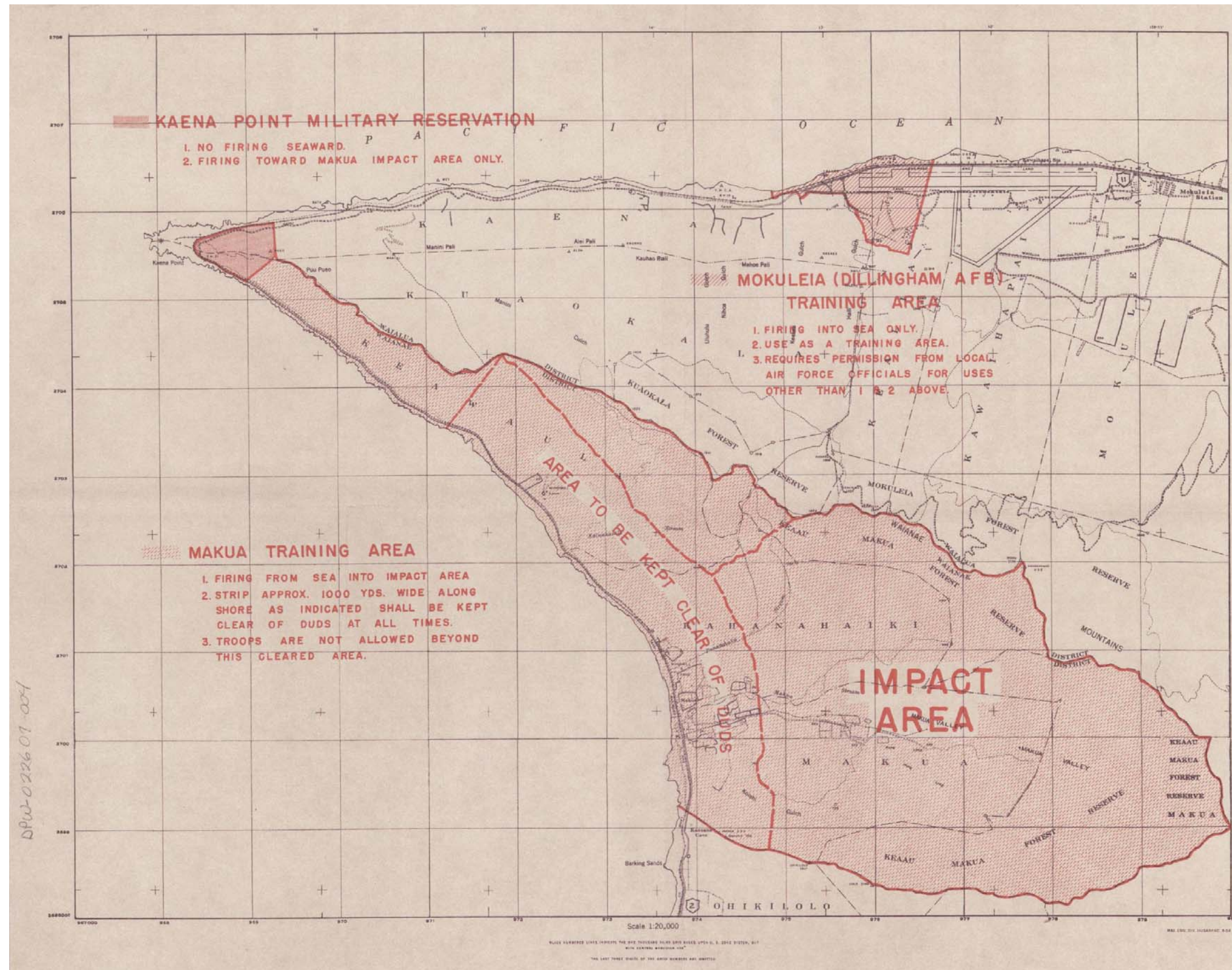




## **MAP G-5**

**1954**

**US Army Garrison Schofield, Honolulu, HI  
(SCH), Map developed by M & I Engineering  
Division HUSAEPAAC showing *Kaena Point  
Military Reservation, Mokuleia Training Area and  
Makua Training Area*, dated 1 August 1954,  
Department of Public Works, DPW-022607-004.**

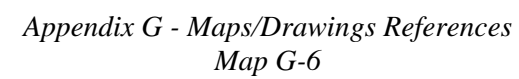


## **MAP G-6**

**1964**

**US Army Garrison Schofield, Honolulu, HI  
(SCH), Map Edition 2-DMATC Series W833  
Sheet 5321 entitled *Kaena*, dated circa 1964,  
Department of Public Works, DPW-022607-032.**





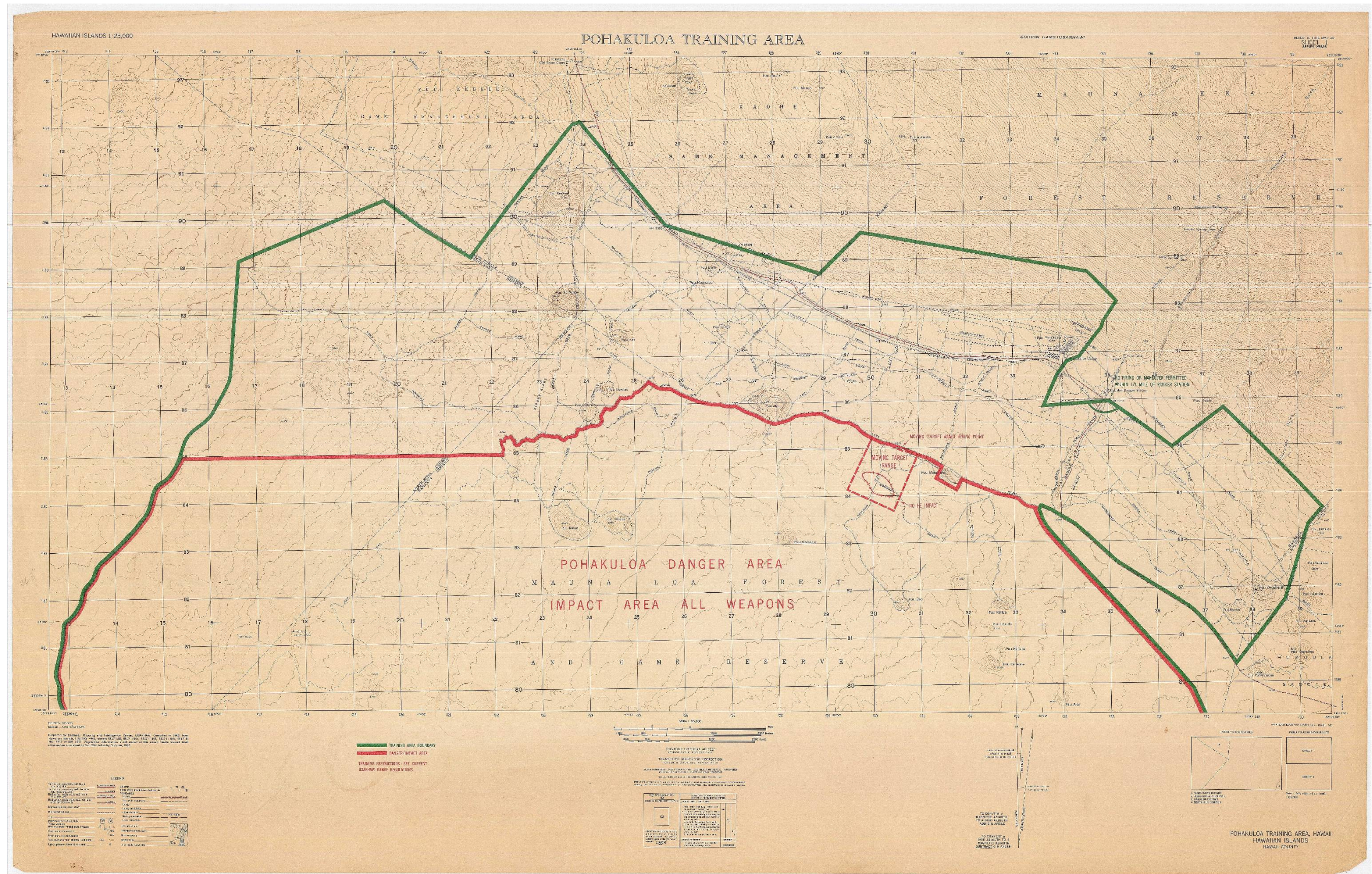


## **MAP G-7**

**1963**

**US Army Garrison Schofield Honolulu, HI, Map  
Sheet 1 Series W833S entitled *Pohakuloa  
Training Area* dated 1 February 1963,  
Department of Public Works, DPW-022607-012.**





Appendix G - Maps/Drawings References  
Map G-7

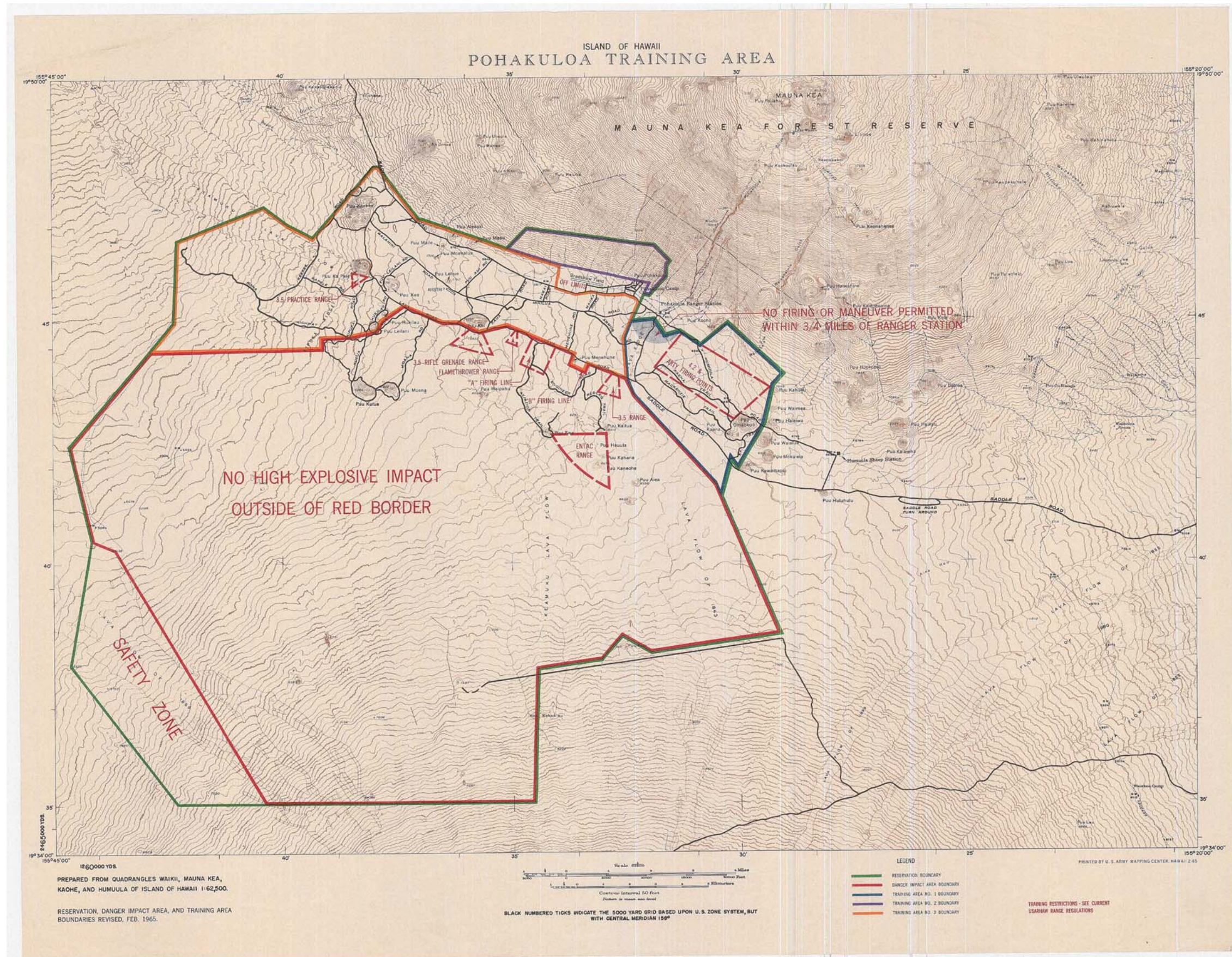


## **MAP G-8**

**1965**

**US Army Garrison Schofield, Honolulu, HI, U.S.  
Army Mapping Center entitled *Island of Hawaii  
Pohakuloa Training Area* dated 1 February 1965,  
Department of Public Works, DPW-022607-015.**





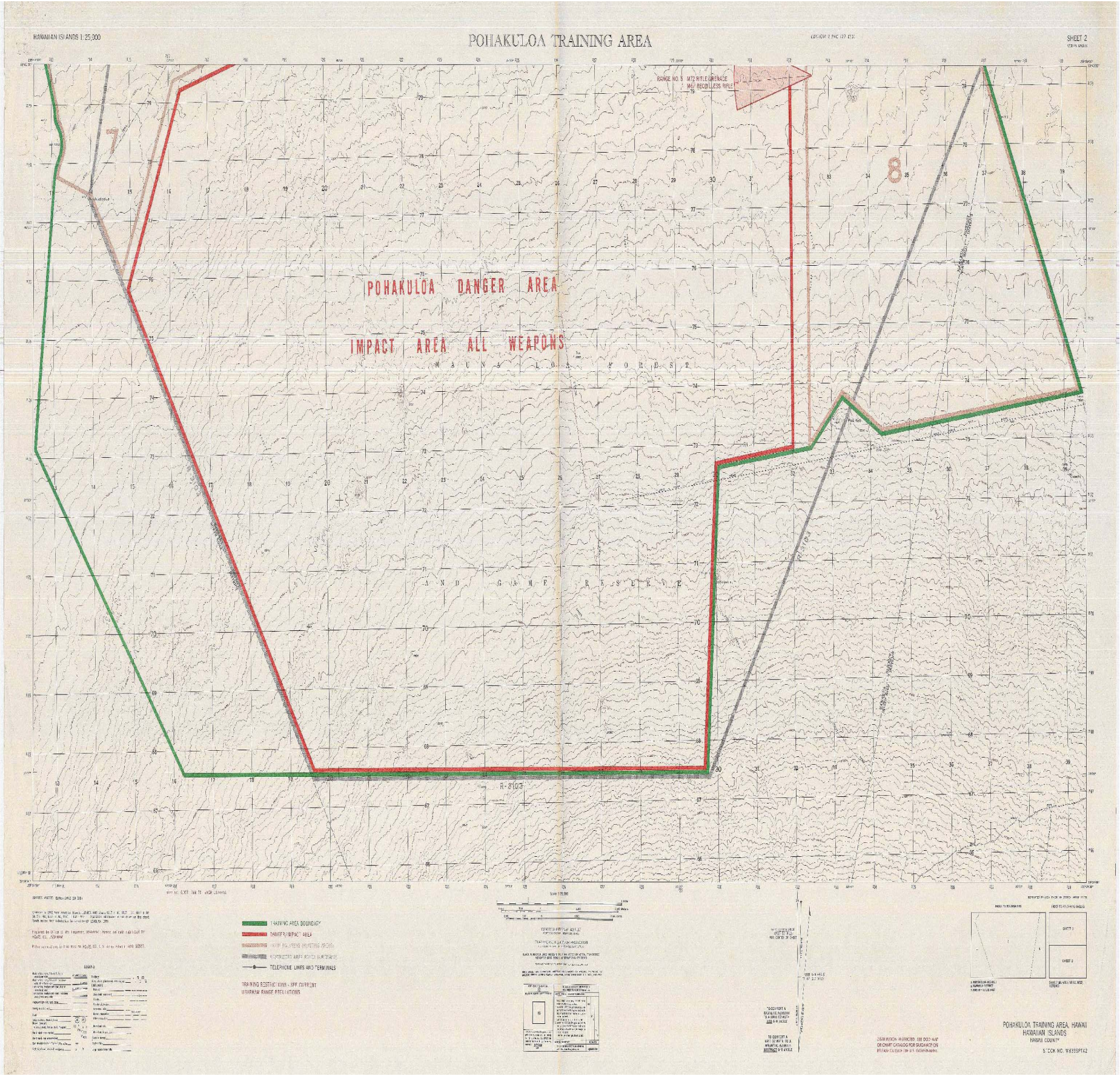


## **MAP G-9**

**1976**

**US Army Garrison Schofield, Honolulu, HI  
(SCH), Department of Public Works, Map Sheet  
2 Series W833S entitled *Pohakuloa Training Area*,  
dated 1 November 1976, DPW-022607-013.**





Appendix G - Maps/Drawings References  
Map G-9

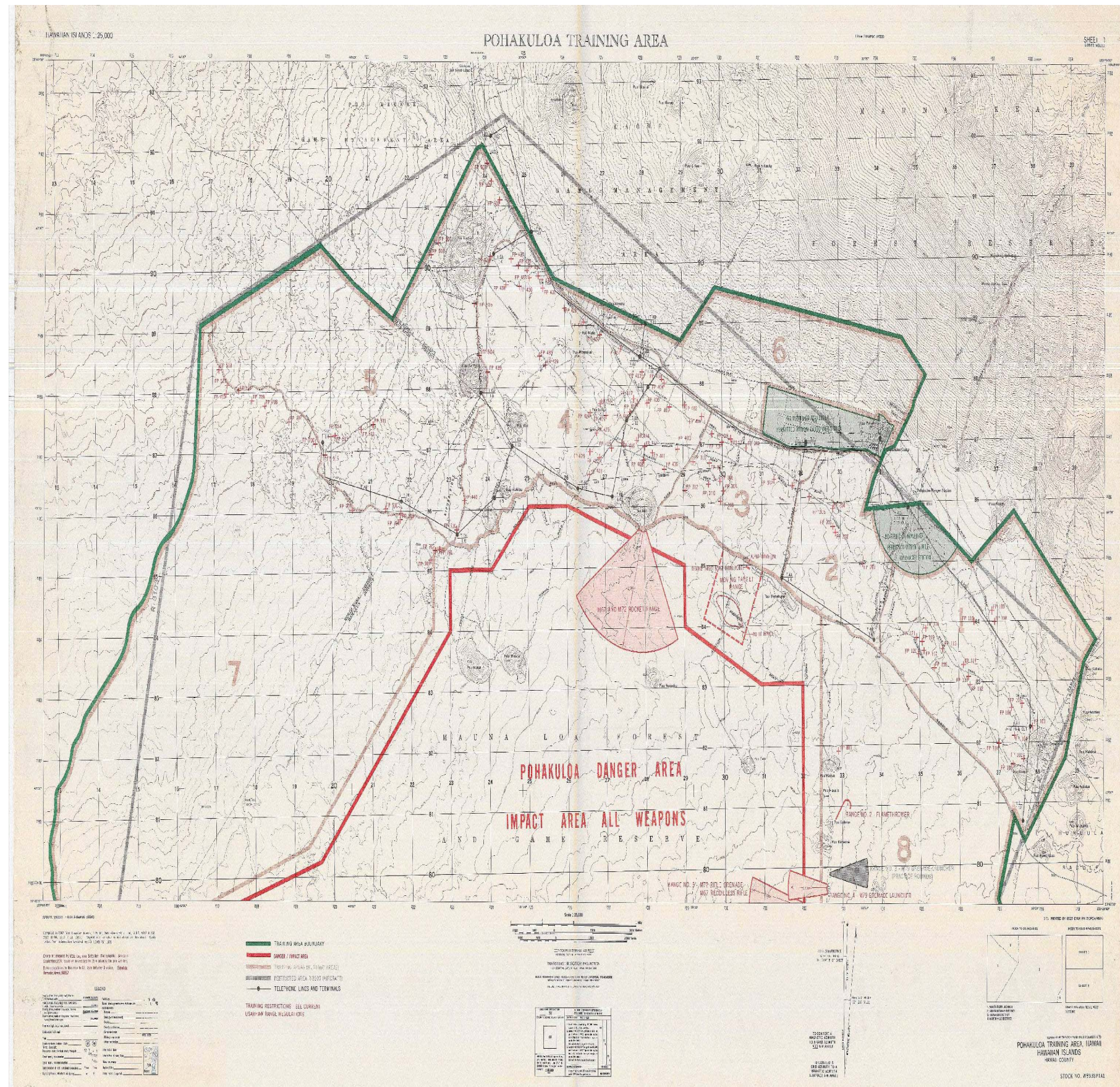


## **MAP G-10**

**1979**

**US Army Garrison Schofield, Honolulu, HI  
(SCH), Department of Public Works, Map Sheet  
1 Series W833S entitled *Pohakuloa Training Area*,  
dated 1 April 1979, DPW-022607-014.**







# **APPENDIX H**

## **ACKNOWLEDGEMENTS**

## **ACKNOWLEDGEMENTS**

**U.S. Army Corps of Engineers (USACE)  
St. Louis District  
ATTN: CEMVS-EC-P  
1222 Spruce Street  
St. Louis, MO 63103-2833**

The Ordnance and Technical Services Branch of the U.S. Army Corps of Engineers St. Louis District (CEMVS-EC-P) prepared this Report. The following St. Louis District personnel were significantly involved in the process:

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Alan Foreman	314-331-8114	EC-S, Civil Engineer (Aerial Photo/CADD)
Ida Morris	314-331-8040	EC-P, Project Assistant
Shelia Thomas	314-331-8793	EC-P, Historian/Researcher



# **APPENDIX I**

## **POINT OF CONTACTS (POC)**

**Point of Contacts  
Schofield Barracks & Associated Training Areas**

The following agencies and personnel assisted in the process of gathering information for this report. Their cooperation is greatly appreciated.

**25<sup>th</sup> ID & USARHAW  
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William (Bill) Bouley, Explosives and Radiation Safety  
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808-656-9540 (Com)

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808-656-0608 (Com)  
808-656-3740 (Fax)

**US Army Joint Munitions Command (JMC)  
Low Level Radioactive Waste (LLRW) Disposal Team  
Attention: AMSJM-SF  
1 Rock Island Arsenal  
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# **APPENDIX J**

## **REPORT DISTRIBUTION**

## **REPORT DISTRIBUTION**

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Army Safety Office ATTN: Mr. Greg Komp 223 23 <sup>rd</sup> Street, Suite 980 Arlington, VA 22202	1 1 CD
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25 <sup>th</sup> ID & USARHAW ATTN: Installation Fire and Safety (Sammy Houseberg, Director) Bldg 106 WAAF Stop 216 851 Wright Ave Schofield Barracks, HI 96857-5000	1 1 CD
Installations Management Command (IMCOM) West (Northwest Office) Katheryn LaFrenz Safety Manager ATTN: IMNW-OPD-S/LaFrenz Building 60 1 Rock Island Arsenal Rock Island, IL 61299-6200	1 1 CD

# REPORT PLATES

## REPORT PLATES

- 1     **Schofield Barracks and Makua Military Reservation Island of Oahu –**  
      Vicinity Map
- 2     **Schofield Barracks Oahu, Hawaii – 1950's, 1960's, and 1970's Ranges Shown**  
      Over 1965 Aerial Photo
- 3     **Schofield Barracks Oahu, Hawaii – Survey Points with Davy Crockett Range**  
      SDAD
- 4     **Makua Military Reservation Oahu, Hawaii – 1964 Potential Davy Crockett**  
      Range with SDAD
- 5     **Pohakuloa Training Area Hilo, Hawaii – Vicinity Map**
- 6     **Pohakuloa Training Area Hilo, Hawaii – Potential Davy Crockett Ranges with**  
      SDAD

Thematic Computer-Aided Design and Drafting (CADD) map files completed in association with this Archives Search Report are based on historic cartographic, aerial and site visit data collected during this investigation. The thematic maps were created using Intergraph's Microstation.

The thematic maps were created by scanning and warping selected historic data to reference points collected from non-stable selected base maps such as U.S. Geological Survey (USGS) 7.5 minute, quadrangle sheets or National Imaging and Mapping Agency (NIMA) maps. The horizontal scale and horizontal datum of the base maps is generally known. In this case the datum used was 1983 North American Datum, State Plane Coordinate System Hawaii Zone 1 and Hawaii Zone 3. Attempts have been made to rectify the data to the referenced base maps. However, distortions in scale and contortions of the features are present. These distortions are a result of inaccuracies in the source data, as well as the processes of scanning and rectifying the data. Much of the data on the maps lack sufficient information to support a determination of accuracy.

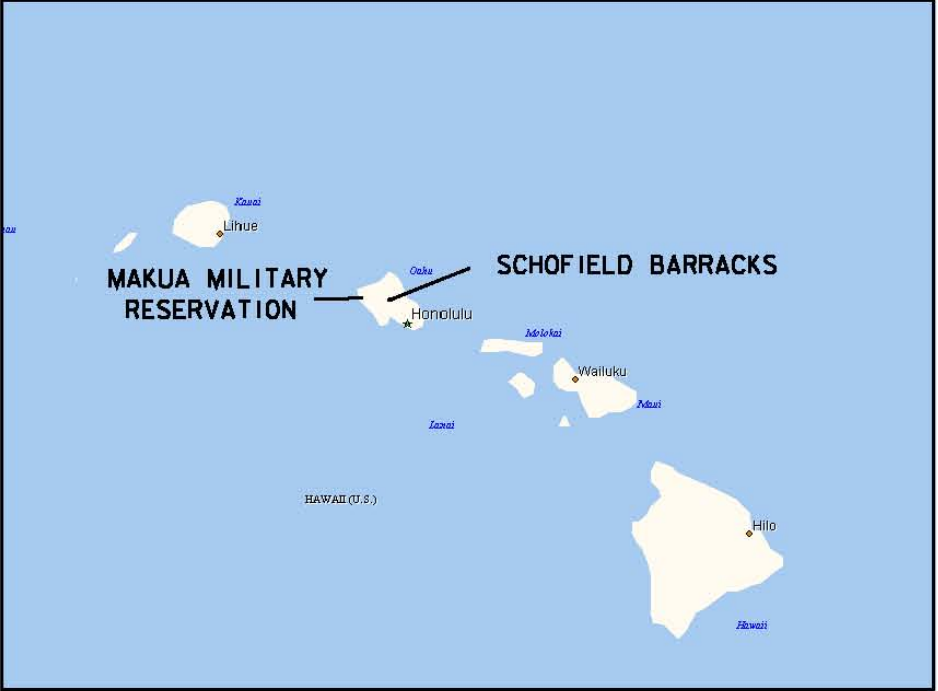
Many of the historic maps used were hand-drawn or built on locations that were inaccurate by modern standards. In general, historic map inaccuracies are unknown and not quantifiable. The unknown inaccuracies may then be magnified by the georeferencing process. Therefore, thematic maps generated from historic maps and drawings will have accuracy no greater than the least accurate source.

The historical aerial photography has been semi-rectified (georeferenced) to the base map; however, the photos have not been corrected for photogrammetric displacements such as those due to topography or the altitude of the aircraft at the time of imaging. They are not orthorectified images. Locations of features noted on aerial photography are not exact due to the rectifying of both the image and the base map.



The horizontal and vertical locations of selected features noted in the ASR and located on the thematic maps have been established utilizing Global Positioning System (GPS) technology. These coordinates were acquired using the Federal Version PLGR96+ GPS

receiver. Features located utilizing GPS techniques are so noted in the ASR. The PLGR+96 uses the Precise Positioning Service (16 m SEP) and Wide Area GPS Enhancement (WAGE) 4 m CEP.


The lineage and source of the historic data used to generate the thematic maps is unknown. The majority of Federal Geographic Data Committee (FGDC) Metadata fields are therefore unknown. A metadata file that gives all available pertinent information has been provided with this product. The statements above are inclusive of all available information regarding the historic data sources and the thematic maps generated. The thematic maps are not original digital mapping data; are scanned and warped data with selected unique feature annotation. The intended purpose of the mapping data is for photo-interpretation and not design. The vector data and associated symbology is unique to the intended purpose. The majority of the digitized features are not part of the current Tri-Service CADD Standards list of features and associated line types and symbology (ie. range fans, pits, disturbed land). The mapping data produced does comply with applicable Tri-Service Standards.



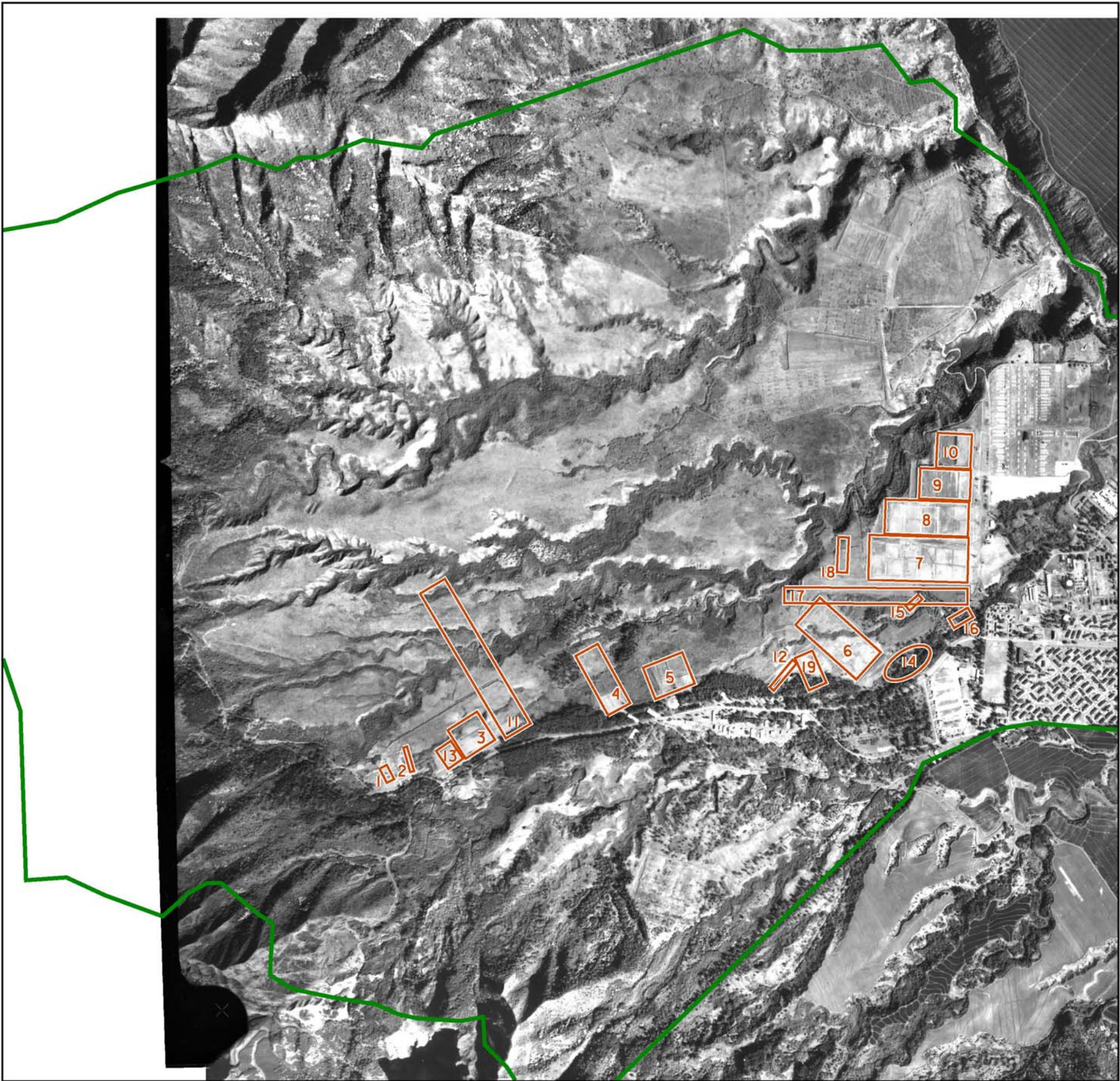
LEGEND

-  SCHOFIELD BARRACKS
-  MAKUA MILITARY RESERVATION



	U.S. ARMY CORPS OF ENGINEERS ST. LOUIS DISTRICT	
SCHOFIELD BARRACKS AND MAKUA MILITARY RESERVATION ISLAND OF OAHU  VICINITY MAP		
PROJ. DATE: ****DATE-TIME****	DATE OF X: YEAR ****DESIGN#FILE#SPECIFICATION****	PLATE NO. 1





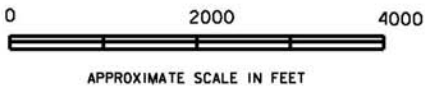


KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
1	KR-1 HAND GRENADE, 3.5 INCH ROCKET LAUNCHER, M72 LAW, 40MM LAUNCHER M203 INERT ONLY AKA WA ROCKET LAUNCHER AND RIFLE GRENADES
2	KR-2 LIVE HAND GRENADE RANGE AKA WB HAND AND RIFLE GRENADE AND ROCKET LAUNCHER RANGE
3	KR-4 90 MM RECOILESS RIFLE, 106 MM RECOILESS RIFLE, M-72 LAW, .50 CALIBER MACHINE GUN (1973) AKA WC-2 CLOSE COMBAT RANGE
4	KR-6 SQUAD AND PLATOON IN THE ATTACK-LIVE FIRE AKA WE BAR TRANSITION
5	KR-7 SMALL ARMS NIGHT FIRING AND DAYLIGHT SHOTGUN FIRING AKA WF-1 AND WF-2 CARBINE TRANSITION RANGE
6	TR-1 M60 MACHINE GUN ZERO, FAMILIARIZATION AND QUALIFICATION AKA WH-1 BAR TRANSITION AKA WH-3 TANK GUNNERY RANGE-MOVING TARGETS, SUB-CALIBER
7	CR-2 KNOWN DISTANCE RANGE FOR RIFLE AKA WJ M1 RIFLE, CARBINE AND BAR KNOWN DISTANCE RANGE
8	CR-3 TRAINFIRE RECORD RANGE AKA WK M1 RIFLE, CARBINE AND BAR KNOWN DISTANCE RANGE
9	CR-4 TRAINFIRE FIELD FIRING RANGE AKA WL M1 RIFLE, CARBINE AND BAR KNOWN DISTANCE RANGE
10	CR-5 25 METER TRAINFIRE ZERO RANGE AKA WM M1 RIFLE, CARBINE AND BAR KNOWN DISTANCE RANGE
11	KR-5 GENERAL PURPOSE WEAPONS FIRE AND DEMONSTRATION RANGE-SMALL ARMS AKA WD MACHINE GUN DEMONSTRATION AND FAMILIARIZATION RANGE
12	KR-8 SUB-CALIBER FIRING 90 MM RECOILESS RIFLE, 106 MM RECOILESS RIFLE AKA WG 500 INCH AND 1000 INCH GENERAL PURPOSE TANKS
13	WC-1 SUB MACHINE GUN RANGE
14	TR-3 FLAMETHROWER
15	TR-2 M60 MACHINE GUN ASSAULT FIRING AKA WI MORTAR FIELD TARGET FIRING RANGE
16	TR-5 TRAINFIRE TARGET DETECTION
17	CR-1 1000 YARD KNOWN DISTANCE RANGE
18	CR-2A 90MM RECOILESS RIFLE, 106 MM RECOILESS RIFLE
19	CR-1A M60 MACHINE GUN FIELD FIRING RANGE

LEGEND

-  PROPERTY LOCATION  
 FEATURE LOCATION



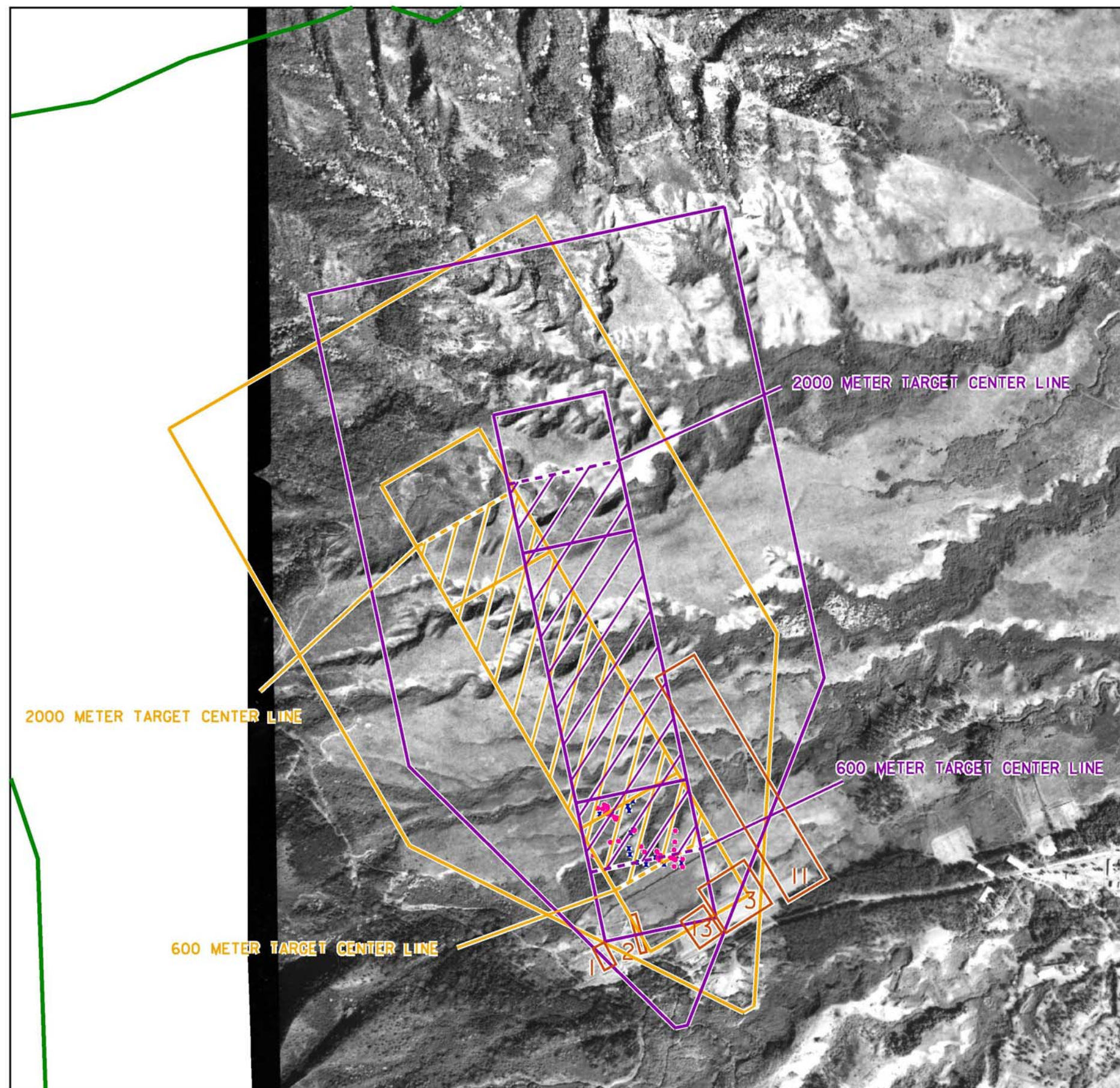
U.S. ARMY CORPS OF ENGINEERS  
ST. LOUIS DISTRICT

SCHOFIELD BARRACKS  
OAHU, HAWAII

1950's, 1960's, AND 1970's RANGES SHOWN  
OVER 1965 AERIAL PHOTO

PROJ. DATE:	DATE OF X: YEAR	PLATE NO. 2
####DATE-TIME####	####DESIGN#FILE#SPECIFICATION####	



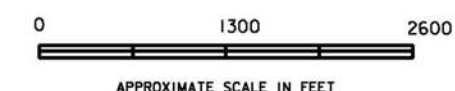


# KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
1	KR-1 HAND GRENADE, 3.5 INCH ROCKET LAUNCHER, M72 LAW, 40MM LAUNCHER M203 INERT ONLY AKA WA ROCKET LAUNCHER AND RIFLE GRENADES
2	KR-2 LIVE HAND GRENADE RANGE AKA WB HAND AND RIFLE GRENADE AND ROCKET LAUNCHER RANGE
3	KR-4 90 MM RECOILESS RIFLE, 106 MM RECOILESS RIFLE, M-72 LAW, .50 CALIBER MACHINE GUN AKA WC-2 CLOSE COMBAT RANGE
11	KR-5 GENERAL PURPOSE WEAPONS FIRE AND DEMONSTRATION RANGE- SMALL ARMS AKA WD MACHINE GUN DEMONSTRATION AND FAMILIARIZATION RANGE
13	WC-1 SUB MACHINE GUN RANGE

# LEGEND

	PROPERTY LOCATION
	FEATURE LOCATION
	DAVY CROCKETT RANGE FIRST SURFACE DANGER AREA DIAGRAM (SDAD)
	DAVY CROCKETT RANGE SECOND SDAD
	DAVY CROCKETT RANGE FIRST SDAD POTENTIAL TARGET AREA
	DAVY CROCKETT RANGE SECOND SDAD POTENTIAL TARGET AREA
	SURVEY POINTS RANGE SAFETY
	SURVEY POINTS USACE

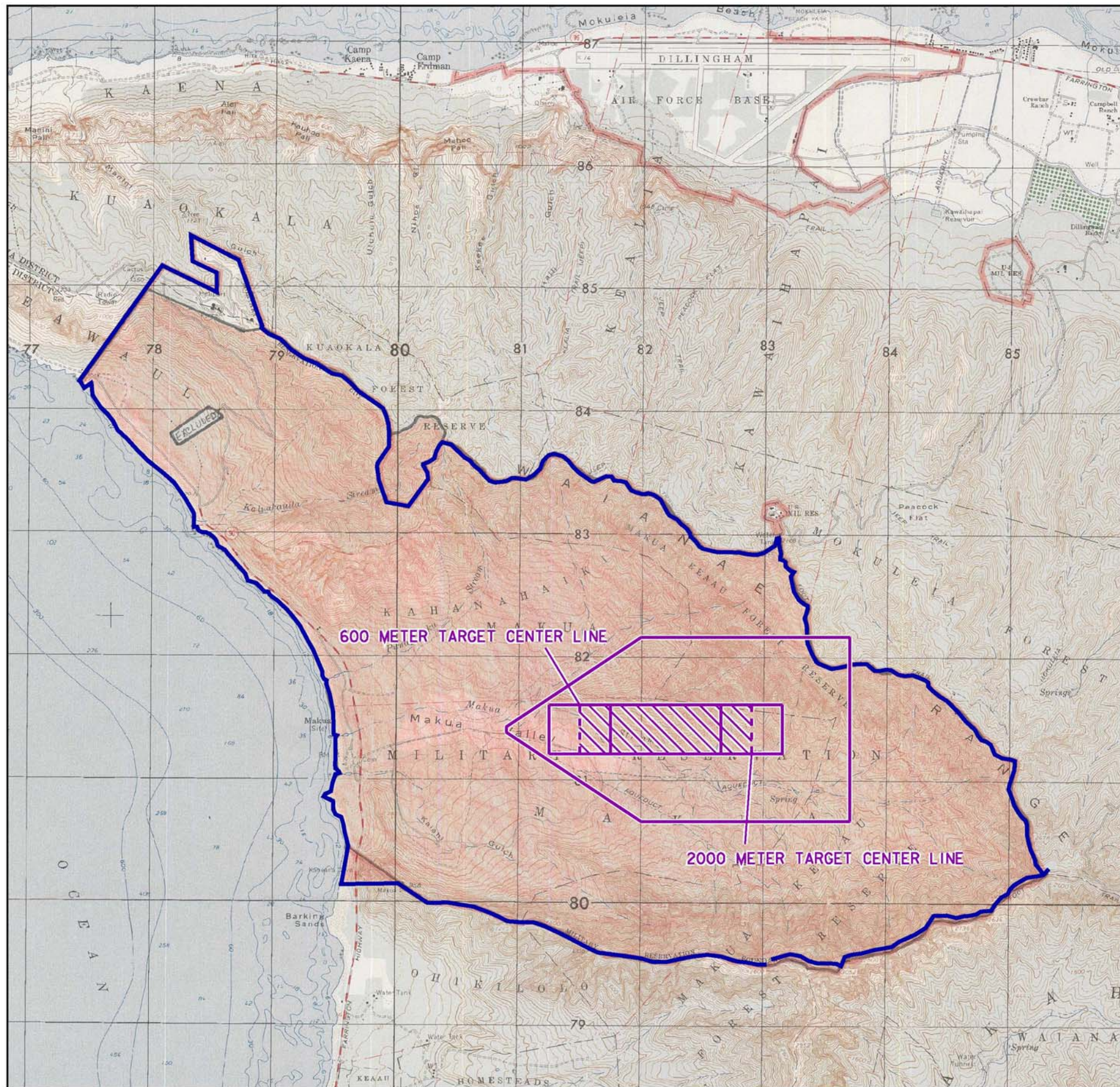


U.S. ARMY CORPS OF ENGINEERS  
ST. LOUIS DISTRICT

SCHOFIELD BARRACKS  
OAHU, HAWAII  
SURVEY POINTS WITH  
DAVY CROCKETT RANGE SDAD  
OVERLAYING 1965 AERIAL PHOTO

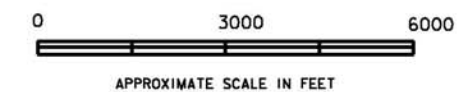
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#### LEGEND

- MAKUA MILITARY RESERVATION
- DAVY CROCKETT RANGE SURFACE DANGER AREA DIAGRAM (SDAD)
- POTENTIAL TARGET AREA



U.S. ARMY CORPS OF ENGINEERS  
ST. LOUIS DISTRICT

MAKUA MILITARY RESERVATION  
OAHU, HAWAII

1964 POTENTIAL DAVY CROCKETT RANGE  
WITH SDAD

PROJ. DATE:

DATE OF X: YEAR

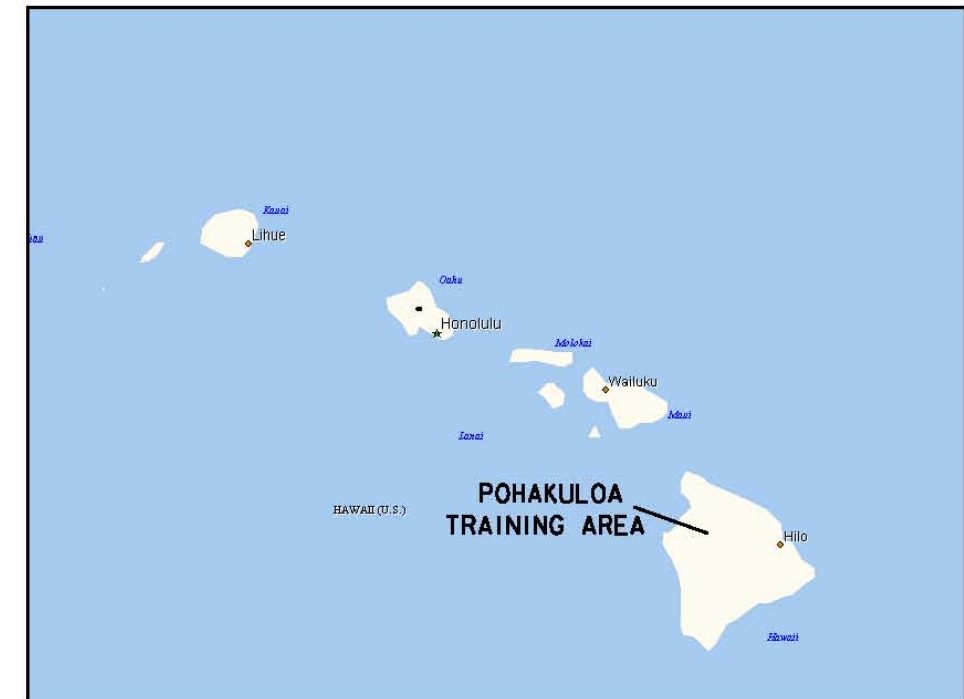
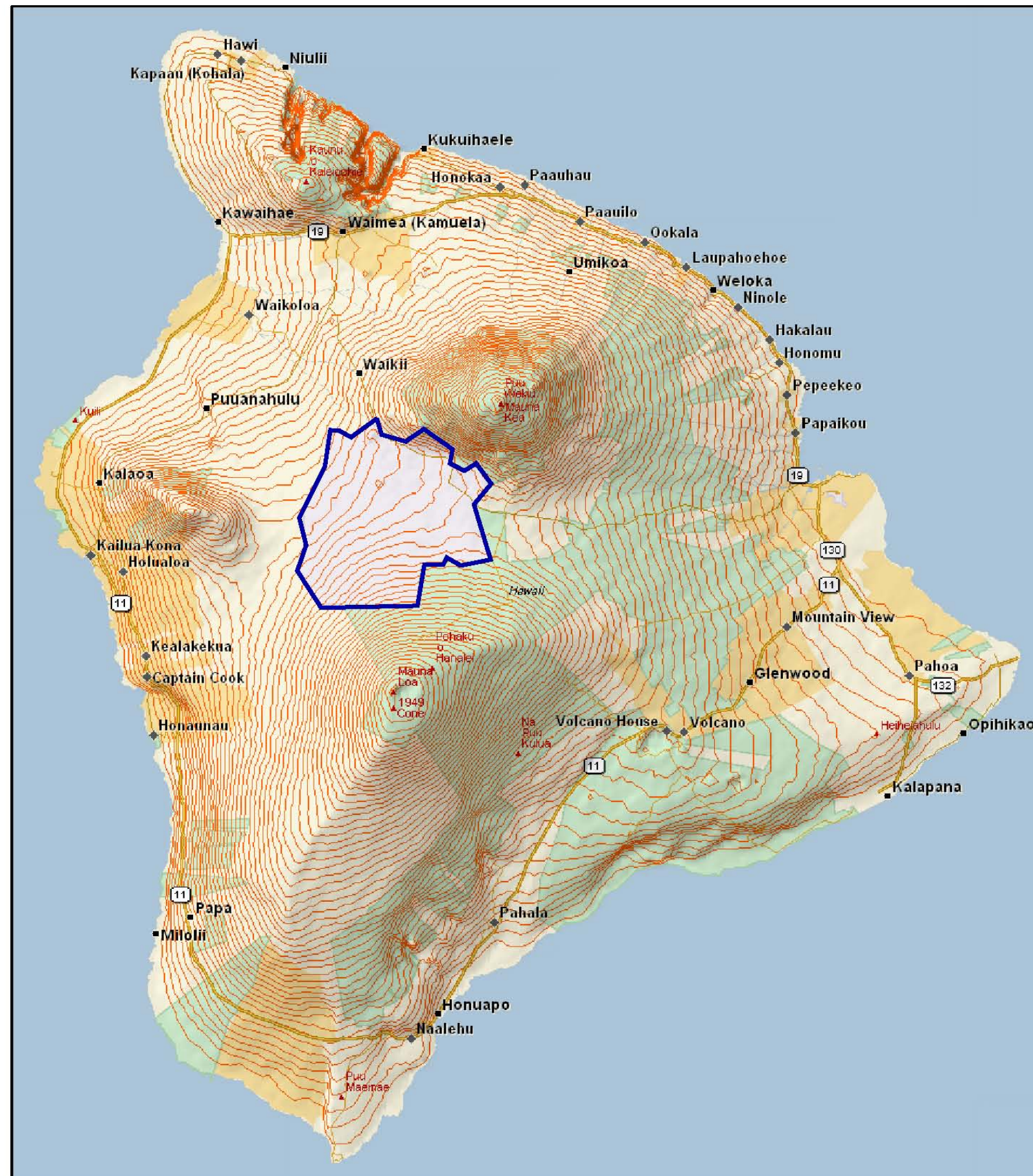
PLATE NO.

4

####DATE-TIME####

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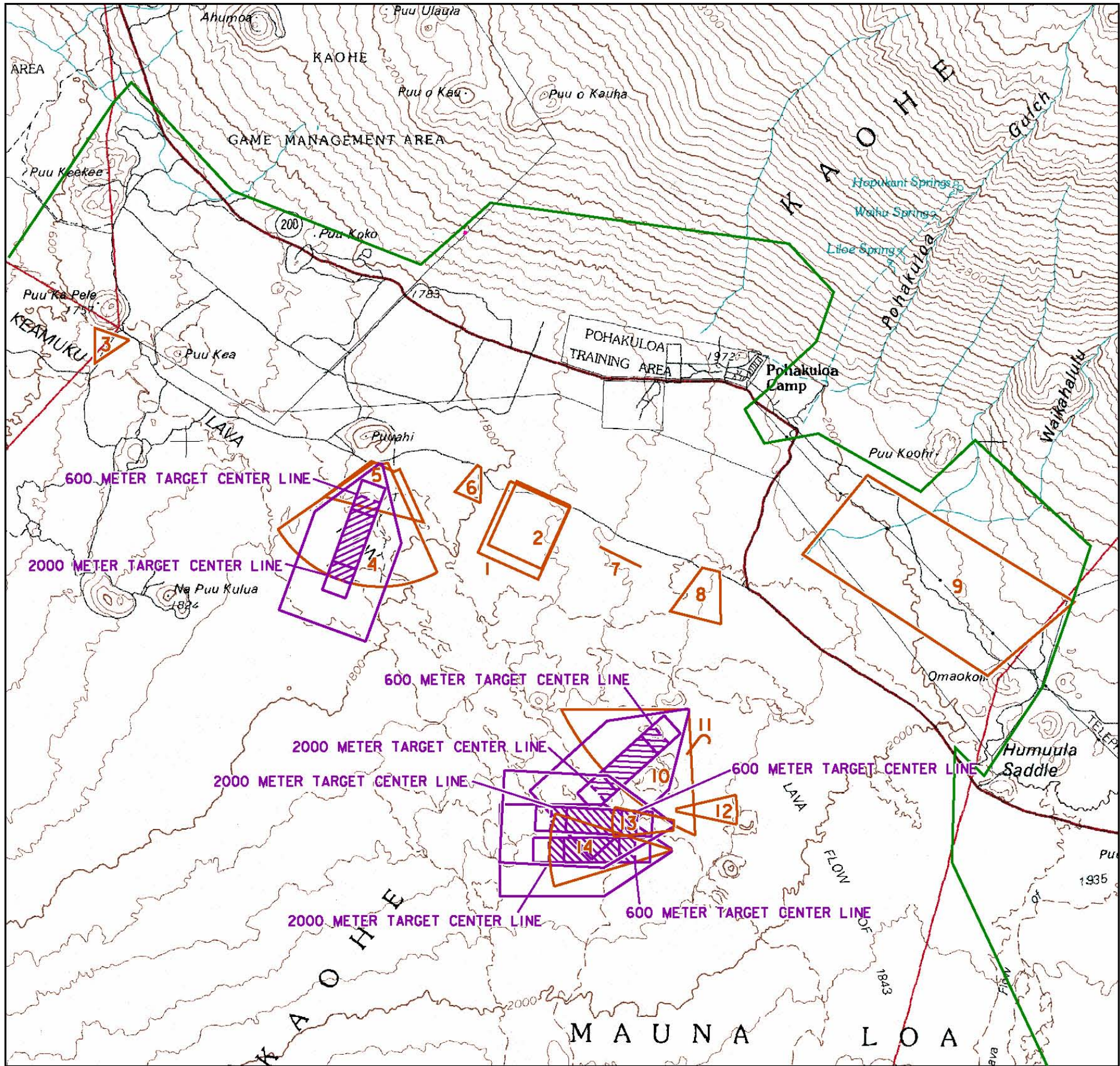
# LEGEND

POHAKULOA TRAINING AREA (APPROXIMATE)



	U.S. ARMY CORPS OF ENGINEERS ST. LOUIS DISTRICT	
POHAKULOA TRAINING AREA HILO, HAWAII ISLAND OF HAWAII  VICINITY MAP		
PROJ. DATE: *****DATE-TIME****	DATE OF X: YEAR *****SIGNOFF SPECIFICATIONS*****	PLATE NO. 5



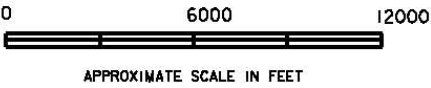


KEY TO FEATURES:

FEATURE NUMBER	FEATURE DESCRIPTION
1	MOVING TARGET RANGE
2	AKA "A" FIRING LINE AKA MOVING TARGET RANGE
3	3.5 PRACTICE RANGE
4	M67 AND M72 ROCKET RANGE PUU AHI
5	AKA 3.5 RIFLE GRENADE RANGE
6	FLAMETHROWER RANGE
7	"B" FIRING LINE AKA MENEHLINE TANK RANGE
8	3.5 RANGE
9	4.2 & ARTY FIRING POINTS
10	ENTAC RANGE
11	RANGE NO. 2 FLAMETHROWER
12	RANGE NO. 3 M79 GRENADE LAUNCHER PRACTICE ROUNDS
13	RANGE NO. 4 M79 GRENADE LAUNCHER
14	RANGE NO. 5 M72 RIFLE GRENADE AND M67 RECOILLESS RIFLE

LEGEND

- PROPERTY LOCATION
- FEATURE LOCATION
- DAVY CROCKETT RANGE SURFACE DANGER AREA DIAGRAM (SDAD)
- POTENTIAL TARGET AREA



	U.S. ARMY CORPS OF ENGINEERS ST. LOUIS DISTRICT	
	POHAKULOA TRAINING AREA HILO, HAWAII	
	POTENTIAL DAVY CROCKETT RANGES WITH SDAD	
PROJ. DATE: ####DATE-TIME####	DATE OF X: YEAR ####DESIGN/FILE/SPECIFICATION####	PLATE NO. 6