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## APPENDIX A

### TRAINING DEVICES

*The most efficient and direct method of teaching conduct of fire is by firing combat ammunition under field conditions. However, ammunition training allowances and range limitations often restrict such training to subcaliber firing on reduced or miniature ranges.*

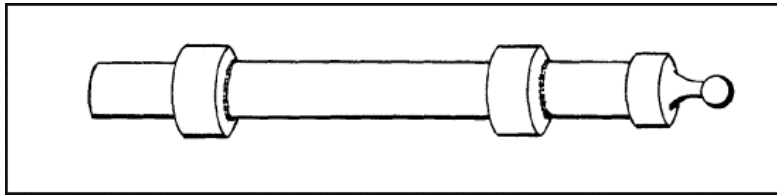
#### Section I. THE 60-mm SUBCALIBER ASSEMBLY

The 60-mm subcaliber assembly is a training device for use with the 4.2-inch mortar system.

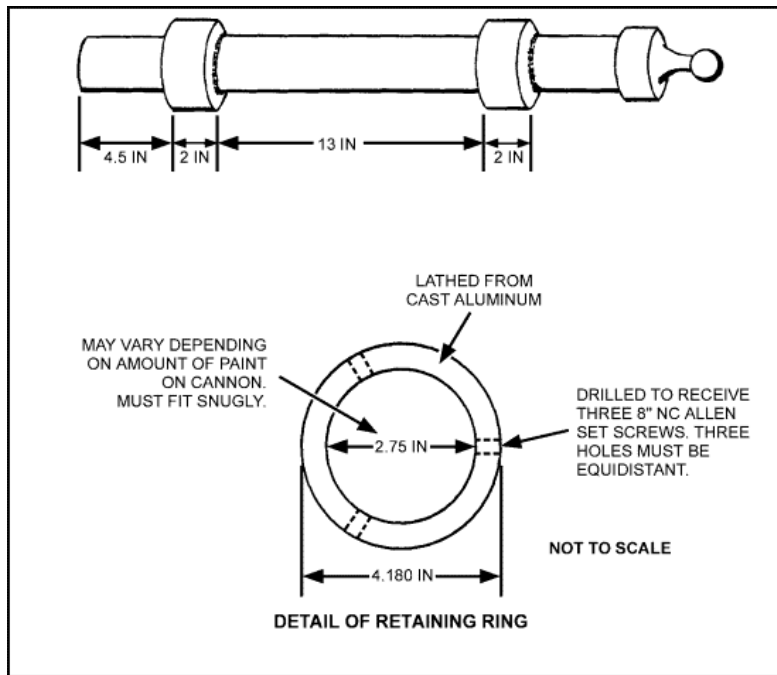
##### A-1. DESCRIPTION

The subcaliber assembly consists of a 60-mm barrel modified for inserting into a 4.2-inch barrel. The M2 60-mm barrel is the only barrel authorized for use. The components of the assembly are an insert, filler block, and filler block retriever.

- a. The insert (Figure A-1) consists of a 60-mm mortar barrel, which is fitted with two aluminum rings that allow it to fit snugly into the 4.2-inch barrel. The aluminum rings also prevent the rifling in the barrel from being scored (Figure A-2).

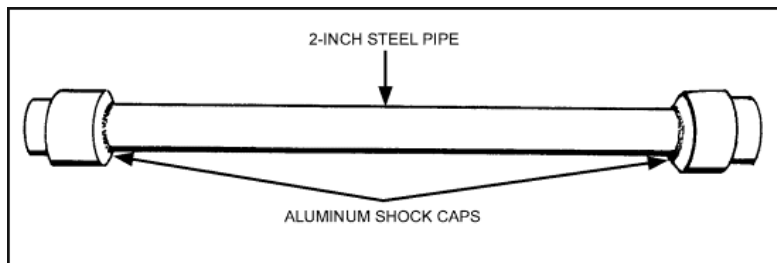


**Figure A-1. The 60-mm mortar insert.**

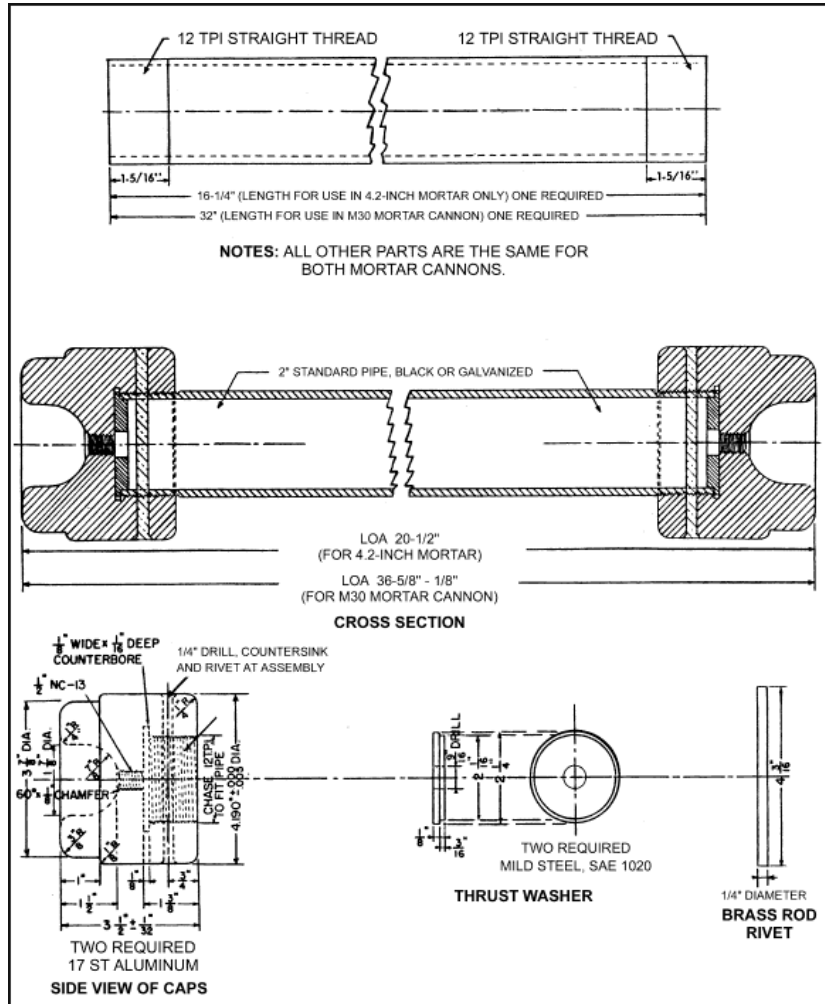


**Figure A-2. Aluminum rings.**

b. The filler block (Figure A-3) consists of a round steel pipe fitted with an aluminum shock cap on either end, which fit snugly into the barrel without scoring it. Either aluminum cap receives the spherical projection of the 60-mm barrel and distributes the recoil shock. The center of each cap is threaded to receive the filler block retriever. The shock caps fit over the striker pin of the 4.2-inch barrel, allowing all the shock to be exerted on the base end of the barrel rather than on the striker pin (Figure A-4).



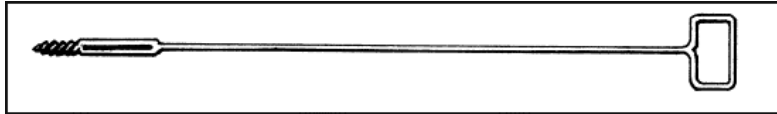
**Figure A-3. Filler block.**



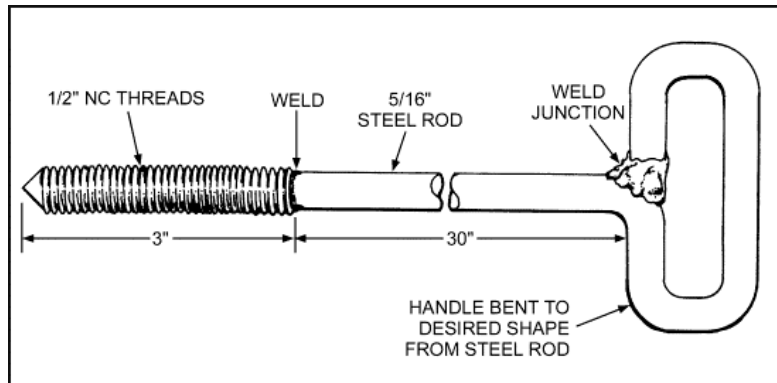
**Figure A-4. Construction details of the filler block.**

c. The filler block retriever (Figure A-5) is used to remove the filler block from the 4.2-inch mortar. It is a steel rod fitted with a handle on one end. The other end

is threaded so that it can be screwed into the shock cap of the filler block (Figure A-6).



**Figure A-5. Filler block retriever.**



**Figure A-6. Construction detail of the filler block retriever.**

**Note:** The subcaliber mortar kit is obtained from the supporting ordnance unit. See TM 9-1015-215-23&P for more information.

#### **A-2. ASSEMBLY**

The subcaliber assembly does not affect the use of the sight, traversing assembly slide, or elevation mechanism of the 4.2-inch mortar. To install the subcaliber assembly, the mortar is mounted, and then the filler block is slid down the barrel. The insert (60-mm barrel with rings) is slid down the barrel, protruding about 1 1/2 inches.

#### **A-3. DISASSEMBLY**

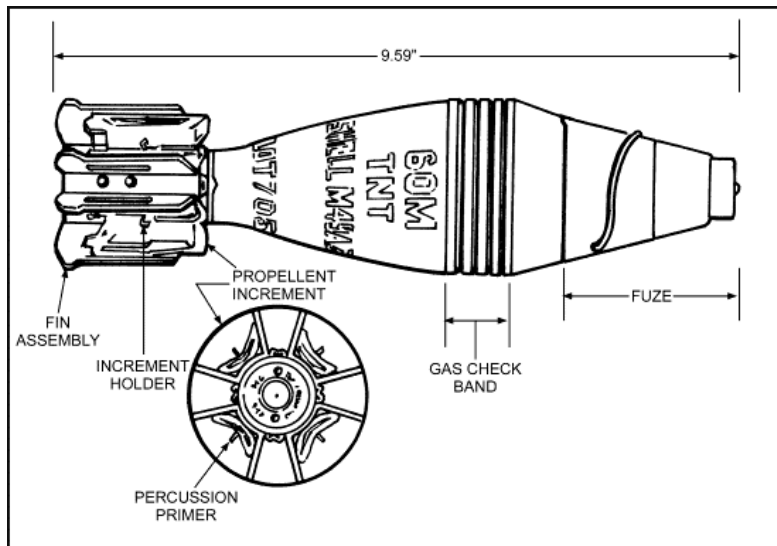
To disassemble the subcaliber assembly, the protruding barrel of the 60-mm mortar is grasped and lifted out of the 4.2-inch barrel. The retriever is screwed into the filler block and lifted out of the block.

#### **A-4. AMMUNITION**

All types of 60-mm mortar ammunition that are listed in FT 60-Q-1, including training, practice, and HE rounds, can be fired from the subcaliber assembly. The 60-mm mortar training round is usually fired on a training range; the practice round and HE round are used on a standard field firing range. When an ammunition shortage prevents field fire training with 4.2-inch rounds, 60-mm practice or HE ammunition can substituted.

a. **High-Explosive Round, M49-Series.** This round is the standard B ammunition for the M224 60-mm mortar.

(1) The M49A2 HE round is painted olive drab. It consists of a hollow body (Figure A-7), fin assembly that screws on the rear of the body, and M525 fuze that is attached to the front of the round. A TNT bursting charge is contained in the body and is ignited by the booster charge in the fuze upon impact. The fin assembly contains the ignition cartridge and provides a means for attaching the propelling increments. The fins keep the projectiles stable in flight. This round weighs 3 pounds, and it can be fired at a maximum range of about 1,800 meters. Each round comes in a separate fiber container complete for firing.



**Figure A-7. HE round, M49A2.**

**Note:** For more information see TM 9-1300-203 and FT 60-L-5.

(2) Before firing, the fuze must be checked. The safety wire is removed, and the round is held vertically while pressing the bore riding safety pin inward to check tension. If the pin becomes unseated, the round is considered unsafe and should not be fired. **ANY ROUND THAT IS ISSUED WITHOUT A BORE RIDING SAFETY PIN SHOULD NOT BE FIRED.**

b. **Practice Round, M50A2.** This round is designed to give mortar crews practice in firing and technique of fire without the expense incident to firing HE ammunition. On impact, the practice round emits a puff of white smoke that is clearly visible to the observer. This round differs from the HE round described above in color and filler only. It is painted blue.

**Note:** The firing table for this round is FT 60-L-5.

#### **A-5. CARE AND CLEANING**

The care and cleaning procedure described in TM 9-1015-215-10 applies to the subcaliber assembly.

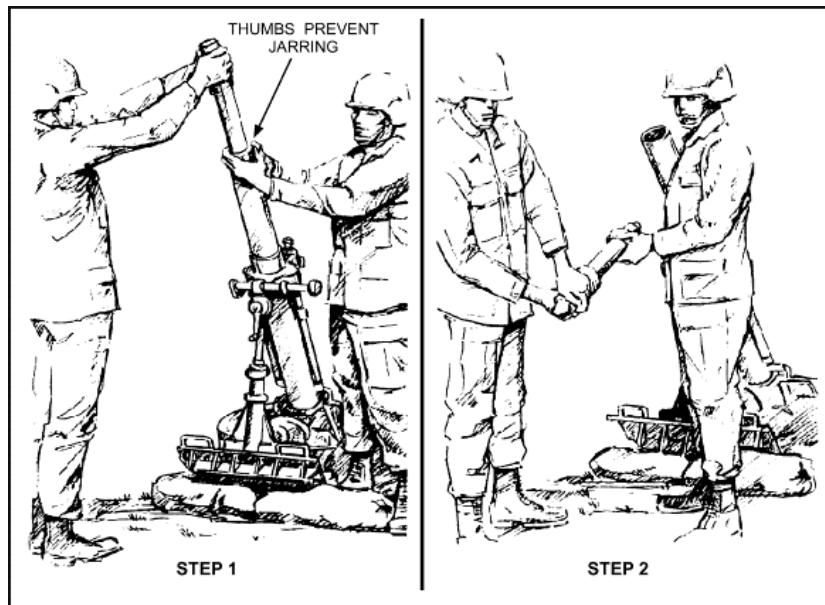
#### **A-6. SAFETY**

The safety precautions for 4.2-inch ammunition must be observed along with the following safety rules:

a. **During Firing.** Personnel never move forward of the OP area nor do they pound an ignition cartridge into the fin assembly since the primer could detonate.

b. **Misfire Procedure.** The procedure before actual removal of the round is the same as that used with service ammunition.

(1) To remove the round, the assistant gunner gently removes the 60-mm barrel from the 4.2-inch barrel by grasping the 60-mm barrel around the muzzle with both hands and lifting (Figure A-8), ensuring that no part of his hands protrudes over the muzzle. The gunner guides the 60-mm barrel with his thumbs. When the base aluminum ring of the 60-mm barrel reaches the end of the 4.2-inch barrel, the gunner firmly grasps the base aluminum ring to prevent it from dropping and jarring the barrel. The gunner grasps the base end of the 60-mm barrel and lifts it to the horizontal. **HE DOES NOT STAND BEHIND IT.**



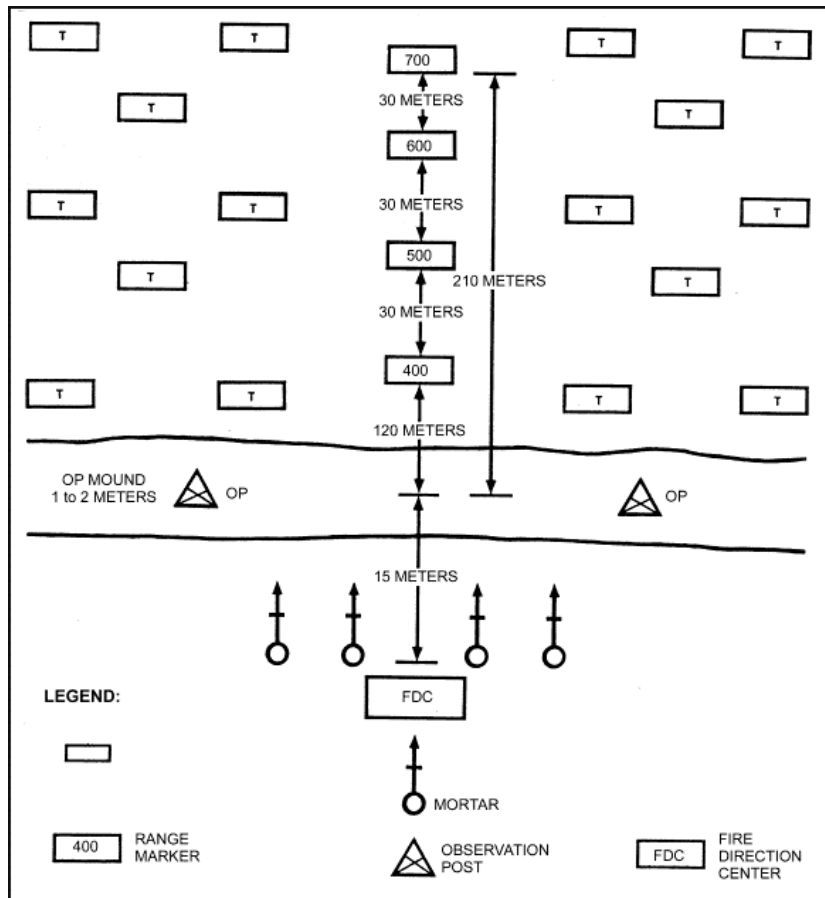
**Figure A-8. Misfire procedure (60-mm subcaliber device).**

(2) The assistant gunner, hands still positioned around the 60-mm barrel, extends the thumbs of both hands over the edge of the muzzle. When the barrel reaches the horizontal, the gunner continues to lift the base end of the barrel until the round slides forward (Figure A-8). Once the barrel is horizontal, the base end is not lowered until the misfire has been removed.

(3) The assistant gunner's thumb stops the round when the round reaches the muzzle. He then removes it from the barrel and hands it to an ammunition bearer. The gunner shakes the 60-mm barrel to empty any foreign material from the bore and reinserts it into the 4.2-inch barrel. The assistant gunner swabs the bore.

#### **A-7. RANGE CONSTRUCTION**

The construction of a training round range is easily accomplished, requiring a minimum of space and effort. The range is measured in meters (Figure A-9) and consists of a target (impact) position area, OP position area, mortar position area, and FDC position area. A range 30.5 meters wide is adequate.



**Figure A-9. Training range.**

a. The target position area consists of range markers in hundreds of up to 700 meters with various targets staggered throughout. The range markers are placed at 30-meter intervals (each interval represents 100 meters on the ground), the first marker being 120 meters from the OP positions (marked 400). The markers are rectangular, 30.5 by 45.5 centimeters. Targets should be constructed to represent various objects such as trees and houses; however, barrels or boxes placed throughout the area are adequate. These targets and markers can be constructed from scrap lumber and can be made portable, which allows the target area to be



cleared for other purposes. When all practice targets look alike, they should be painted different colors to assist the FO.

b. The OP position area is between the firing position and target area. It should afford full observation of the target area; normally, a mound should suffice. When the range is in use, telephone communication is established between the OP and FDC.

c. The mortar position area is 15 meters to the rear and off-line from the OP position; mortars are mounted laterally 6 meters apart. A mask should exist between the target area and firing position. If it does not, a target cloth screen might need to be placed between the target area and firing position.

d. The FDC is established close enough to the mortar position to permit voice communication between the two. Wire or radio communication is established between the FDC and OP.

#### **A-8. OPERATION**

Mortarmen are assembled at the OP for an orientation on range organization.

a. Mortarmen are assigned as FDC members, as crew members at the mortar position, and as FOs, and periodically rotate assignments during training. Training is conducted in the following sequence:

- (1) The OP sends a fire request to the FDC to begin a registration point adjustment.
- (2) The FDC computes a fire command and sends it to the mortars.
- (3) The mortar crew members lay the mortars and fire.
- (4) Adjustment is continued until the registration point has been established.
- (5) The FDC then directs the OP to adjust the sheaf when ready.
- (6) The section is then given a command of referred deflection.
- (7) From this point on, various targets can be engaged using different types of adjustment.

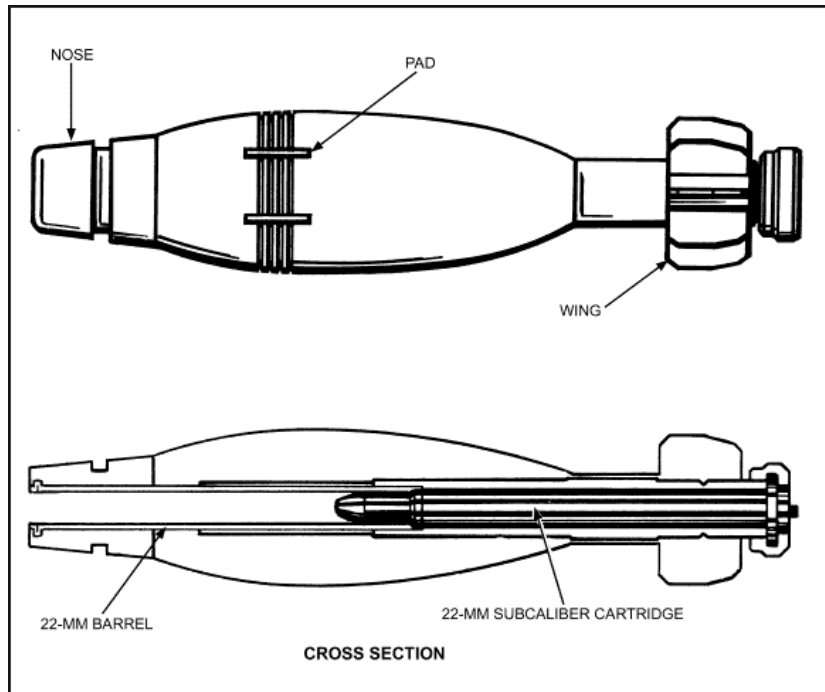
b. As the range is laid out in meters, all corrections and computations are in meters; however, the mil-relation formula applies. To obtain the best results, the FDC allows each square on the target grid or M16 plotting board to equal 25 meters.

## Section II. SABOT, M1

This section provides the technical information required to employ the sabot. However, trainers should exercise imagination and ingenuity in developing training situations for employing the system.

### A-9. DESCRIPTION

The 81-mm sabot (inert), M1, assist crews in reaching technical and tactical proficiency, thus, strengthening their ability to be effective on the modern battlefield. With the 22-mm subcaliber practice cartridge, the sabot (M1) provides an economical means of training personnel in all phases of mortar gunnery. These devices consist of two major components: the 81-mm sabot and 22-mm subcaliber cartridge (Figure A-10).



**Figure A-10. Sabot, M1, and cross section.**

- a. The sabot is designed to fire the subcaliber cartridge (Figure A-11) through the barrel. The subcaliber cartridge, when loaded into the sabot, approximates a round of service ammunition both in size and weight. The entire assembly is then fired

from the mortar just as in service firing. The subcaliber projectile travels from 70 to 435 meters, depending on the charge and elevation selected. The projectile emits a puff of smoke and an audible report upon impact, but no fragmentation. At the time of firing, the sabot is also expelled from the mortar and impacts 2 to 15 meters from the mortar (Figure A-12, D). It is then recovered, cleaned, and reloaded.

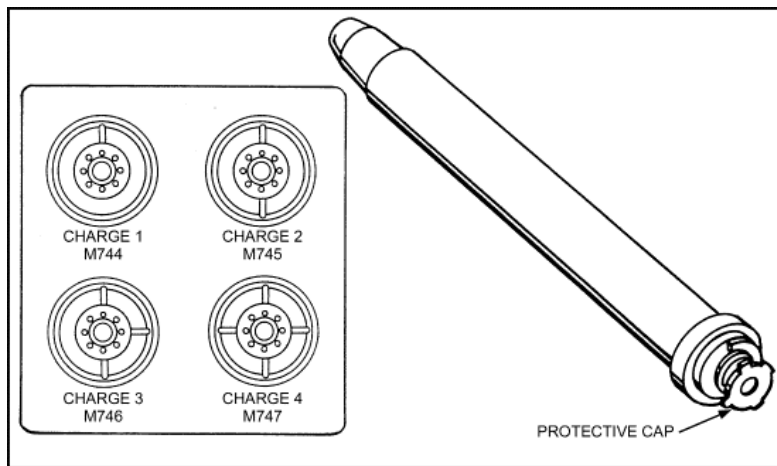


Figure A-11. Subcaliber cartridge. Figure 1.

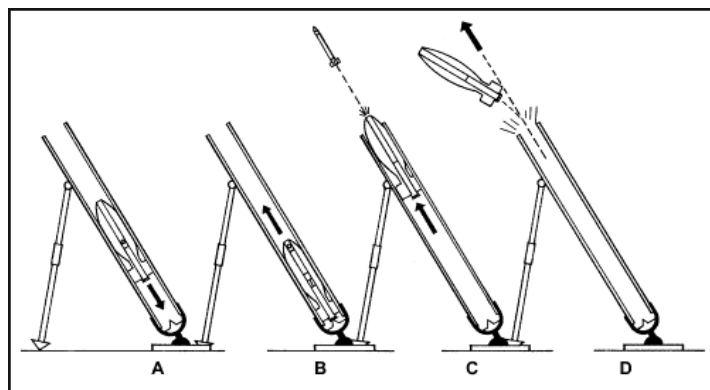
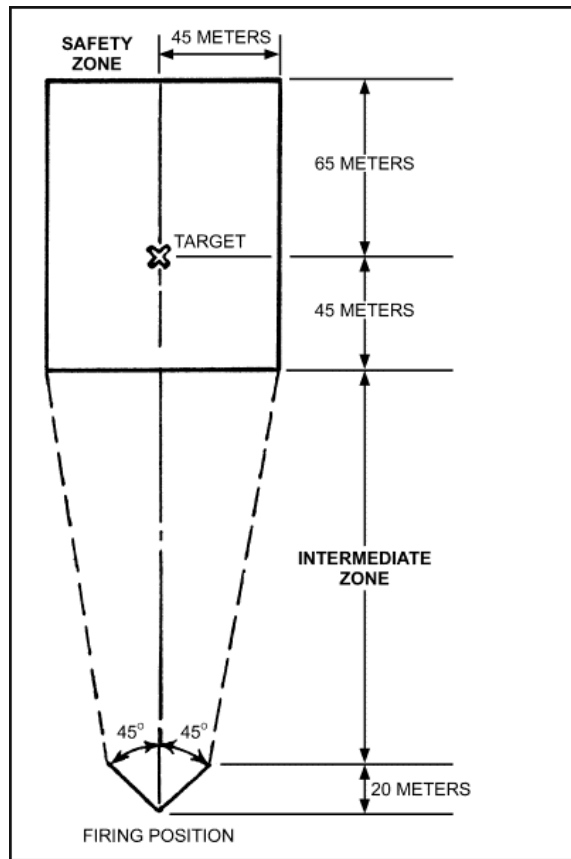


Figure A-12. Firing of mortar training device and cartridge.

b. A scale ratio of 1:10 is used to relate the range and deviation between the subcaliber projectile and standard 81-mm service projectile. Thus, the minimum range requirement for firing through charge 4 is an area 500 meters deep, and wide enough to accommodate the desired number of targets plus a 45-meter safety zone on each side of the flank targets (Figure A-13).



**Figure A-13. Minimum range area.**

#### **A-10. ADVANTAGES**

The advantages of using the 81-mm sabot are:

- Provides the capability for firing in training areas where the firing of conventional mortar ammunition is prohibited.
- Saves time and expenses of long-distance traveling to suitable mortar ranges.
- Saves the expense of firing service ammunition.
- Simplifies operation, maintenance, and training.
- Follows identical mortar crew procedures as service firing, excluding appropriate charge and fuze settings.
- Uses the same equipment required for service firing.

Mortar units using the 81-mm mortar sabot require little training in preparation to use the device. The sabot is used with all standard 81-mm mortar equipment regardless of model. It accommodates prescribed squad drill procedures and can be used by mechanized and ground-mounted mortar sections and squads.

**Note:** Refer to TM 9-1315-249-12&P for detailed information.

#### **A-11. DISADVANTAGES**

The disadvantages of using the 81-mm sabot are:

- Causes excess carbon buildup in the barrel due to subcaliber ignition.
- Increases deterioration of the barrel.

#### **A-12. EQUIPMENT**

The following equipment is required to conduct training with the 81-mm sabot:

- All TOE mortar section/platoon equipment.
- Three 81-mm sabots for each mortar.
- Cleaning equipment.
- A piece of canvas or other heavy material, 3 meters by 15 meters, for placement in front of each mortar to catch the sabot when fired. This prevents damage to the sabot and reduces the cleaning time required during firing.
- If mortars cannot be mounted in defilade, a mask of target cloth, canvas, or other suitable material can be built between the mortars and impact area.

#### **A-13. AMMUNITION**

The ammunition used in the M1 and M3 sabots is described herein.

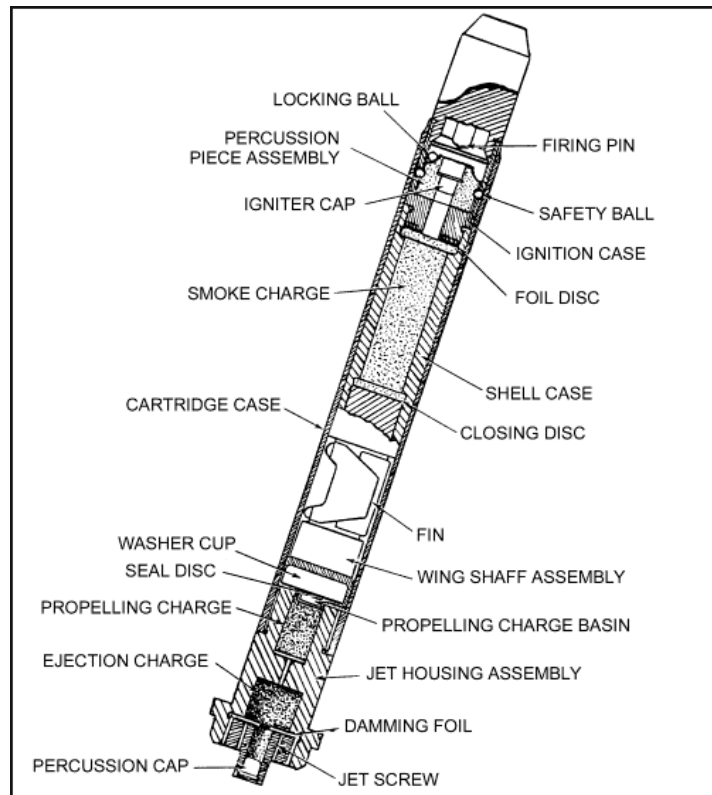
a. **The 81-mm Sabot.** The aluminum alloy sabot has dimensions and a configuration similar to 81-mm service ammunition.

(1) The sabot body contains a 22-mm smooth-bore barrel to receive the 22-mm subcaliber cartridge, which is loaded before firing. The boom of

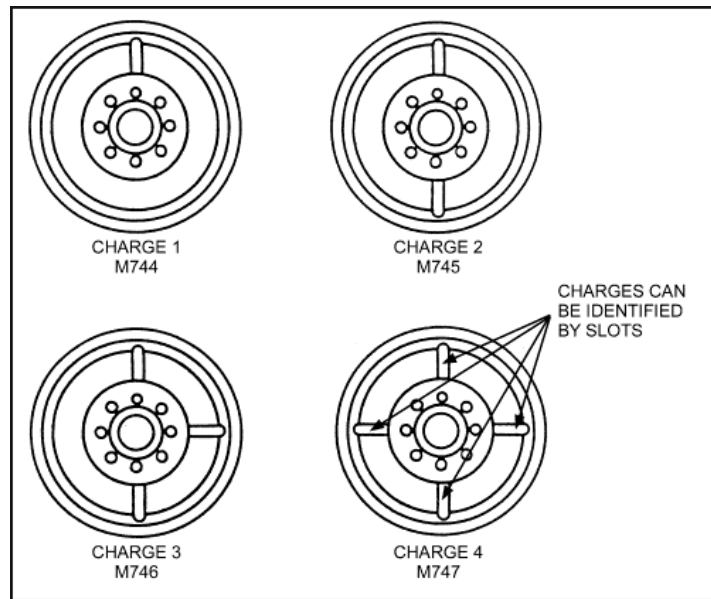
the sabot has fins similar to the fins of the service ammunition, and the body has pads to guide the sabot as it travels out of the barrel. Upon firing, the loaded sabot is ejected from the barrel; the sabot lands on the ground within 15 meters of the mortar while the subcaliber projectile continues its flight to the impact area.

(2) When not loaded with a subcaliber cartridge, the sabot can be used as a dummy round for crew drill or the squad leader can "load" it with an expended cartridge case to induce a "misfire." The sabot can be reloaded and fired repeatedly for training. It is stored without the subcaliber cartridge in a packing box containing three sabot devices.

b. **The 22-mm Subcaliber Cartridge.** The 22-mm subcaliber cartridges (Figure A-14) are boxed and issued by charge: M744, charge one; M745, charge two; M746, charge three; M747, charge four. The charges can readily be identified day or night by the number of slots in the base of the subcaliber cartridge case (Figure A-15).



**Figure A-14. The 22-mm subcaliber cartridge cross-section.**



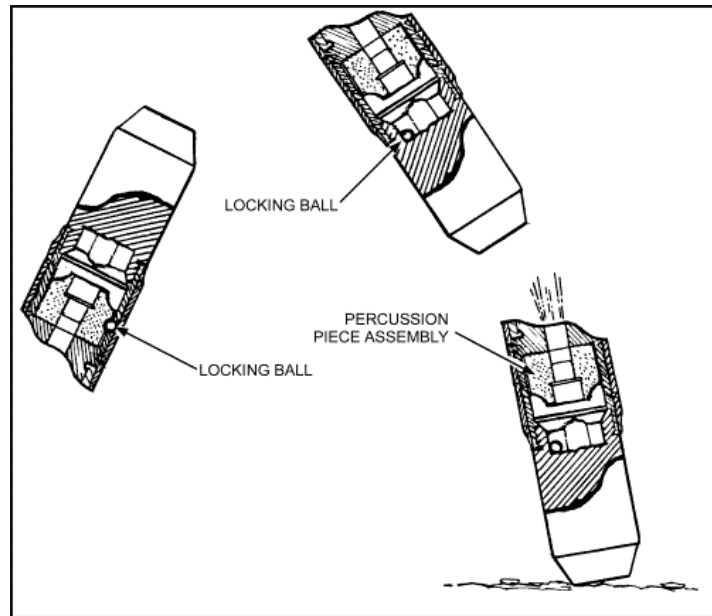
**Figure A-15. Base of subcaliber cartridges--charge one through four.**

(1) The 22-mm cartridge consists of the projectile with stabilizer fins and cartridge case. The projectile body contains the impact fuze and a smoke signal charge. The propelling and ejection charges are contained in two separate chambers located in an assembly threaded onto the base of the cartridge case. A flash hole between the chambers permits ignition of the propelling charge by the ejection charge.

(2) When the 22-mm subcaliber cartridge is inserted into the sabot, the sabot is ready for firing. The protective plastic cap covering the percussion cap of the subcaliber cartridge is removed before dropping the sabot into the mortar barrel. When fired, the cartridge's percussion cap strikes the firing pin and is ignited. The percussion cap ignites an ejection charge in the jet housing assembly. The propelling gases emerge through the eight holes in the jet screw assembly and initiate travel of the sabot and subcaliber cartridge up the mortar barrel. At the same time, the ejection charge ignites the subcaliber projectile propelling charge contained in the jet housing assembly. This propels the subcaliber projectile out of the cartridge case and through the 22-mm barrel of the sabot. When the sabot clears the muzzle, the subcaliber projectile clears the barrel. The sabot impacts on the ground within 15 meters of the mortar while the subcaliber projectile continues its trajectory.



(3) After the subcaliber projectile has left the sabot barrel, the impact fuze is activated. The percussion assembly, which contains the primer for the fuzing mechanism, is held in position within the ignition case by two safety balls. When the projectile clears the sabot barrel, the safety balls move outward, freeing the percussion piece. The stabilizing fins open as the projectile clears the sabot barrel, providing in-flight stability. When the projectile ascends to its maximum ordinate, a locking ball keeps the percussion piece from moving forward, preventing the cap from contacting the pin. This feature precludes premature functioning should the projectile strike a tree branch or other object (Figure A-16).

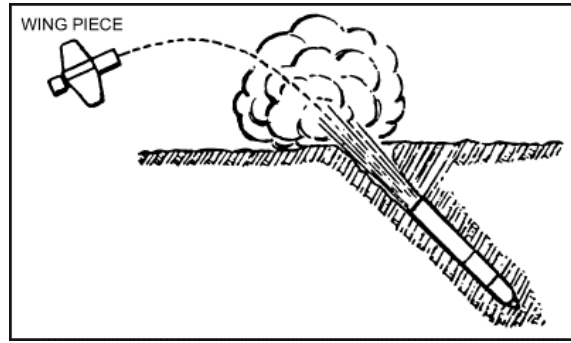


**Figure A-16. Safety device.**

(a) As the projectile descends from the high point of its trajectory, the locking ball falls into an empty space in the projectile head and the fuzing mechanism is fully armed.

(b) At the moment of impact, the percussion piece moves forward, allowing the igniter cap to strike the firing pin. The igniter cap initiates the smoke charge, and gas pressure produced by the burning smoke charge ejects the wing assembly from the base of the case. The smoke charge produces a yellow cloud of smoke.

The initial release of the smoke by the wing shaft assembly produces a sound (Figure A-17).



**Figure A-17. Optical and acoustical observation of target strikes.**

(4) To prepare for firing, the bore and chamber of the sabot are inspected for cleanliness. The flange nut is removed from the sabot by unscrewing counterclockwise. The 22-mm cartridge is inserted into the chamber of sabot, and the flange nut is screwed onto the sabot hand tight. The plastic protector cap is removed from the percussion cap. The ground in front of the mortar should be covered with canvas or a heavy plastic or vinyl-type material to protect the sabot from dirt or mud. The flange nut is removed, the expended cartridge case is extracted, and the sabot is cleaned. The sabot is reloaded with a new subcaliber cartridge, and it is ready to be fired again.

**WARNING**

**Personnel must not stand in front or to the rear of the sabot when inserting the cartridge.**

**A-14. SAFETY**

Sabot training devices are safe to handle and fire. The following safety precautions must be enforced.

**WARNING**

**The 81-mm sabot is inert and can be stored and handled as a**

**at which time it will be handled as a live mortar round. The sabot can function as a cannon and should be secured in the same manner as any other weapon. When loaded and ready to fire, all safety precautions used during handling of service ammunition are observed.**

a. The 22-mm subcaliber cartridge contains propellant and smoke charge, and is always stored and handled as live ammunition.

**Note:** The general safety precautions for fixed ammunition are located in TM 9-1300-206 and AR 385-63.

b. Practice ammunition is never fired over heads of troops.

c. Personnel never enter the danger area during the firing of the practice ammunition.

**Note:** Duds are disposed of as prescribed in TM 9-1315-249-12&P.

#### **A-15. MALFUNCTIONS**

See Chapter 3, paragraph 3-13 for a detailed discussion of malfunctions.

#### **A-16. REMOVAL OF A MISFIRE**

After failure to fire, misfire removal procedures are followed to remove the round from the weapon. If the primer cap of the 22-mm cartridge is dented, the cartridge is removed carefully from the sabot by unscrewing the flange nut, and then tagging the cartridge for disposal according to local SOP. If the primer is not dented, cause of failure to fire could be due to a malfunction of the mortar. Misfire procedures for live rounds also apply when firing the sabot. The only difference is in handling of the round after it has been removed from the mortar.

a. If the primer of the subcaliber cartridge is dented, the cartridge is carefully removed from the sabot, ensuring that the sabot is pointed downrange and that no one is to the front or rear. The subcaliber cartridge is removed to a designated area for disposal IAW local SOP.

b. If the primer is not dented, the round can be refired upon determination of the cause of the misfire.

#### **A-17. ITEM DESCRIPTION AND SUPPLY DATA**

The equipment shown in Table A-1 is available at the ammunition supply facility, except for an 81-mm sabot.

DESCRIPTION	NATIONAL STOCK NO.	PART NO.	DODAC NO.
Sabot, 81-mm Practice: M1 (Inert)	1015-00-328-5666	9287906	
Cartridge, Subcaliber, 22-mm Practice: Charge 1, M744	1305-00-334-5920	92787907	1305-A680
Cartridge, Subcaliber, 22-mm Practice: Charge 2, M745	1305-00-334-5922	9287908	1305-A681
Cartridge, Subcaliber, 22-mm Practice: Charge 3, M746	1305-00-334-5934	9287909	1305-A682
Cartridge, Subcaliber, 22-mm Practice: Charge 4, M747	1305-00-334-5935	9287910	1305-A683

**Table A-1. Equipment description and supply data.**

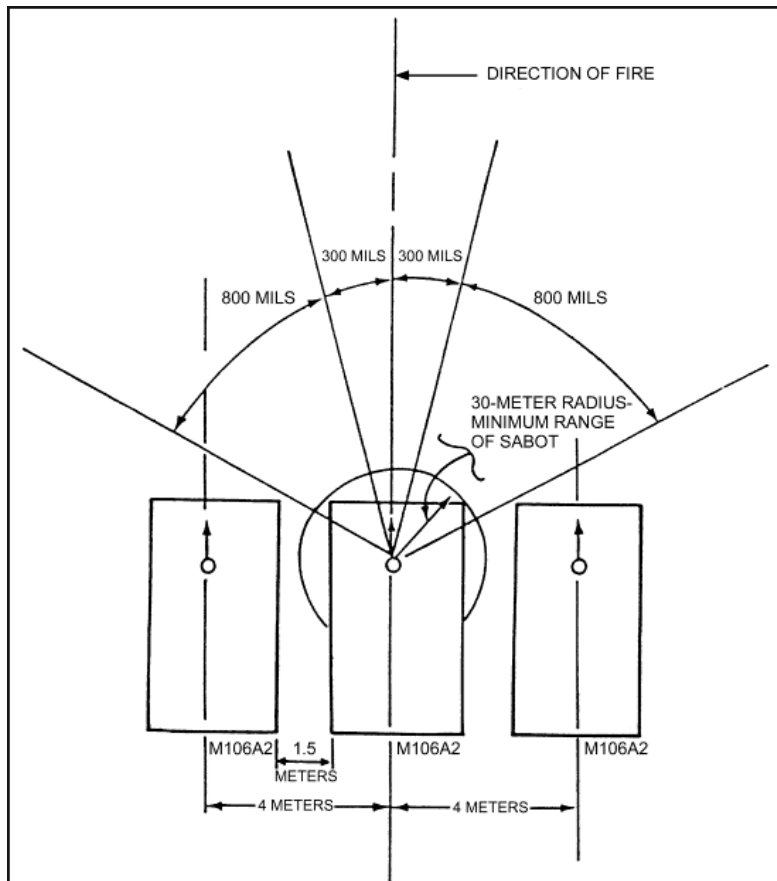
#### **A-18. TRAINING**

An advantage of sabot training is that the unit commander can observe the actions of all members of the indirect fire team while performing all the tasks that are employed during live firing. This enhances the ability of the commander to evaluate the proficiency of all elements of the team, to identify and isolate problem areas, and to begin corrective training. Also, all members of the team are able to view the entire operation and to understand how they fit into the overall plan.

a. **Preparation.** The amount of time spent preparing for training determines the benefits received from using the 81-mm sabot. Three steps must be accomplished before training with the 81-mm sabot:

- Construction of a scaled firing range (permanent, semi-permanent, and temporary).
- Construction of a map of the firing range.
- Instruction of personnel on the use of equipment.

- (1) Sometimes it is desirable for gunners to observe the impact of the sabot. However, mortars are usually mounted in a defilade position so that a mask exists between the impact area and the firing position. If such a mask does not exist, one can be constructed of target cloth or other suitable material. The mask must be removed when firing direct lay missions.
- (2) A heavy canvas or other suitable material should be placed on the ground to a distance of 15 meters in front of each mortar to catch the sabot. On a permanent sabot range, it is desirable to construct a permanent impact area for the sabot--a sawdust or sandpit covered with heavy canvas would be ideal.
- (3) When positioning the mortars, the lateral distance between the center of the baseplates should not exceed 4 meters. Special corrections can be applied to fire for effect if the weapons are more than 4 meters apart, but it is unrealistic to habitually apply special corrections during training.
- (4) When using the sabot with each of the weapons separated by 3.5 to 4 meters, some special techniques must be used. Aiming posts should be identified by squad to preclude a mix-up of aiming posts between two mortars. Numbers, colors, or any other easily discernible method can be used.
- (5) Problems can be encountered when traversing carrier-mounted mortars during large deflection changes of more than 300 mils left or right of direction of fire (Figure A-18). The carriers should be traversed to avoid the possibility of hitting adjacent carriers with the sabot. Due to the minimum range of the sabot, it must be fired only over the rear of the carrier with the ramp in the up position.



**Figure A-18. Large deflection changes.**

b. **Section Procedures.** When firing the sabot, organic fire control equipment, and traversing and elevating mechanisms are used to lay the mortars for direction and elevation. The crew consists of the gunner, assistant gunner, ammunition bearer, and driver.

- The gunner and assistant gunner perform their duties as though firing service ammunition.
- The ammunition bearer and driver perform their assigned duties.
- Personnel can be rotated for cross training.

(1) During the conduct of firing, realistic commands are announced to the section. For example, SECTION, NUMBER TWO, ONE ROUND, DEFLECTION TWO SEVEN EIGHT FIVE (2785), CHARGE THREE, ELEVATION ONE ZERO SIX SIX (1066). Each command requires the section to respond as though service ammunition were being fired. The ammunition bearer then:

- (a) Secures a sabot and selects the appropriate 22-mm subcaliber cartridge; in this case, charge 3 (three slots in the base of the cartridge case).
- (b) Removes the flange nut.
- (c) Ensures that the sabot is pointed downrange and no one is to the rear.
- (d) Loads the subcaliber cartridge into the sabot.
- (e) Replaces the flange nut.
- (f) Removes the plastic cap from the primer and passes the round to the assistant gunner.

(2) The assistant gunner fires the round just as he would service ammunition. After the sabot impacts, it is retrieved, cleaned, and is ready to refire. (Retrieving the sabot after each round is recommended unless a fire-for-effect mission is underway. Retrieval prevents damage to either the sabot being fired or a sabot laying on the ground, which could occur by the rounds impacting together.)

**WARNING**

**Weapons must not be fired during sabot retrieval to avoid injury to personnel downrange. Normally, it is best for only one round to be fired before retrieval to avoid damage to sabots. Do not fire over the head of maneuvering troops.**

(3) The barrel should be cleaned after every 10 rounds to reduce the possibility of a misfire, and the sabot should be cleaned after each firing. There is considerable buildup of carbon in the barrel during firing; if not removed, there is a decrease in range.

c. **Forward Observer Procedures.** Regardless of which unit provides the FO fire support, the FO procedures are the same.

(1) The observer-target (OT) factor determined by the FO is based upon a scale of 1:10 rather than thousands of meters--for example, an OT distance of 380 meters is scaled to 3,800 meters, resulting in an OT factor of 4.

(2) The FO measures deviation just as he would in service firing--by using the mil scale in his binoculars or aiming circle, compass, or finger method discussed in FM 23-91, Chapter 4. The FO corrects for deviation by multiplying the measured deviation by the OT factor and announcing his corrections to the nearest 10 scale meters--for example, "Right eight zero (80)."

(3) The FO can use any of the methods of range adjustment that are used during service firing. However, when using the bracketing method, caution should be exercised in establishing the range bracket, since the FO usually assumes his rounds are much closer to the target than they actually are. For example, if the round is 60 meters (600 scale meters) short of the target, the FO should announce, "Add eight hundred (800)," to obtain a range bracket.

(4) Only missions that use point-detonating fuzes can be fired with the sabot. This includes direct-lay and direct-alignment (fire without an FDC) missions. Also, coordinated illumination can be conducted with the illumination provided by handheld flares or flares fired from an M203.

(5) Air observer training can be conducted using a helicopter. The aircraft should fly at an altitude of about 200 feet and to the rear of the firing position. The air observer should be told "SHOT" at least 10 seconds before the mortar fires to properly position the aircraft for observation.

(6) Due to range dispersion, credit for a target hit should be given whenever the subcaliber projectile impacts within  $\pm 25$  meters in range and left or right 4 meters of the adjusting point. This "target hit" area could be outlined in engineer tape for each target to help in accurate spotting by the FO, who is the responsible member of the indirect fire team for determining target hits. Table A-2, illustrates the range and deflection dispersion for each subcaliber projectile.

<b>CHARGE</b>	<b>RANGE (in meters)</b>	<b>RANGE DISPERSION (in meters)</b>	<b>DISPERSION (in meters)</b>
1	70-195	$\pm 21$	LEFT or RIGHT 2.5
2	140-235	$\pm 26$	LEFT or RIGHT 4.0



3	210-330	±30	LEFT or RIGHT 5.0
4	280-435	±39	LEFT or RIGHT 6.0

**Table A-2. Range and deflection dispersion.**

d. **Fire Direction Center Procedures.** FDC procedures prescribed in FM 23-91 are used without modifications when controlling fires of the 22-mm subcaliber projectile. The most current firing tables for the subcaliber projectile are used when computing ranges, elevations, and maximum ordinate.

e. **Individual Skills.** The sabot is well suited to train, cross train, and test soldiers in individual skills. One method is to establish a series of concurrent stations near a sabot range firing position. Both firing and nonfiring tasks can be performed by having all unit members actively training at the same time and performing several tasks in a short period, which keeps interest high. The suggested concurrent stations are as follows:

- Station 1. Refer and realign aiming posts; boresight.
- Station 2. Ammunition handling, fuze setting, cutting charges (both sabot and service ammunition).
- Station 3. Direct lay (M1 sabot required).
- Station 4. Direct alignment (M1 sabot required).
- Station 5. Indirect fire (M1 sabot required).
- Station 6. Adjustment of fire.

(1) The sabot can be used to simulate the live-fire collective tasks. To support the realistic firing afforded by the sabot, the platoon and section leaders can also perform the following tactical training in conjunction with sabot firing:

- Assembly area procedures.
- Camouflage and concealment.
- Road marches and convoy procedures.
- Reconnaissance of the firing position.
- Occupation of the firing position.
- Displacement by section.
- Maintenance of weapons, vehicles, and equipment.
- Fire support planning.
- Fire support coordination.

(2) The unit can plan an operation for firing the sabot as if live fire were actually going to occur. A sample sequence that allows the unit to train against the ARTEP standards follows:

(a) The platoon/section leader arranges for--

- A time to fire on the sabot range.
- Sabot ammunition.
- Vehicles.
- Weapons.
- Food.
- An assembly area close to the firing position but not in view.

(b) At the appointed time, the unit crosses their starting point en route to the assembly area while practicing--

- Road march and convoy procedures.
- Unit loading plan.

(c) Upon arrival at the assembly area, the unitX

- Opens the fire control net.
- Boresights mortars.
- Constructs firing charts.
- Receives the platoon/section leaders orders for occupation of the firing position.
- Maintains vehicles.

(d) The reconnaissance party departs the assembly area and upon arrivalX

- Locates positions for the mortars, FOs, and FDC.
- Lays wire between the FDC and mortar positions.
- Orients the aiming circle and prepares to lay the section for direction.
- Plans for the occupation of the position by the rest of the section.
- Transmits orders for the rest of the unit to displace to the firing position.

(e) Upon arrival at the firing position, the unit--

- Occupies designated positions.
- Plans fires based on the tactical situation presented in the assembly area.
- Assigns target numbers.
- Lays the mortars.
- Prepares ammunition.
- Conducts firing.

(f) At the conclusion of firing, the unit displaces to its company area to perform maintenance of vehicles, weapons, and equipment.

(g) While monitoring sabot firing, the unit leader can make valuable use of the close proximity of each element to each other. He can allow members of the element to visit another element to observe their duties and procedures. He can also call all unit members together at the conclusion of a task to critique and set the stage for the mission or task.

(3) Live-fire missions, such as Engage an Area Target and Fire Final Protective Fire, can be easily performed with only one firing position for the 81-mm sabot. Tasks that require the mortars to displace can be trained and tested by setting up more than one impact area or by plotting multiple firing points (Figure A-19).

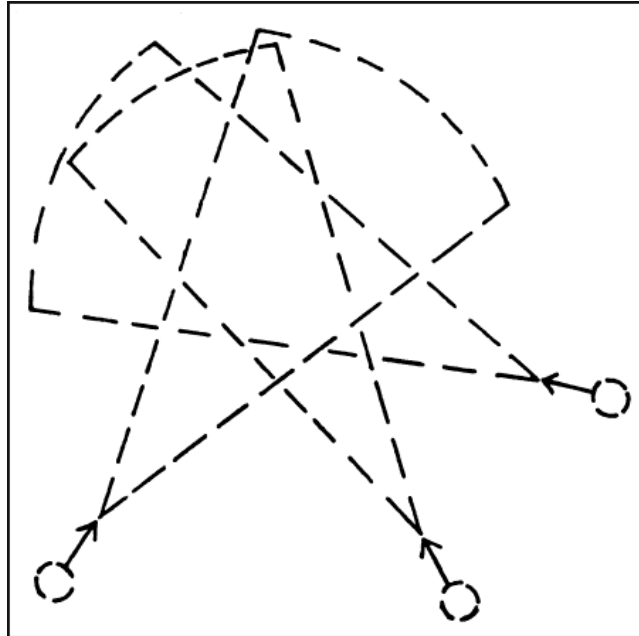


Figure A-19. Multiple firing points.

### Section III. SHORT-RANGE TRAINING ROUND

This section provides the technical information required to employ the SRTR. Trainers should exercise imagination and ingenuity in developing training situations for employing the SRTR. The SRTR enables units to train in locations where mortar training facilities are limited or do not exist. The SRTR cartridge provides an economical means of realistically training personnel in all phases of mortar gunnery.

#### **A-19. DESCRIPTION**

The SRTR is effective for training all elements of the indirect fire team. It provides the FO with a sound and visual signal by which he can spot rounds and make adjustments. The FDC computes data received from the FO, who observes the impact of the SRTR on a 1:10 scaled range. The gunner places data obtained from the FDC on the mortar and the assistant gunner drops an SRTR down the barrel. The entire indirect fire team functions the same as if they were firing service ammunition with one exception--the FO observes the SRTR impact on a 1:10 scaled range instead of the service ammunition at a normal distance in an impact area. The characteristics of the SRTR are as follows:

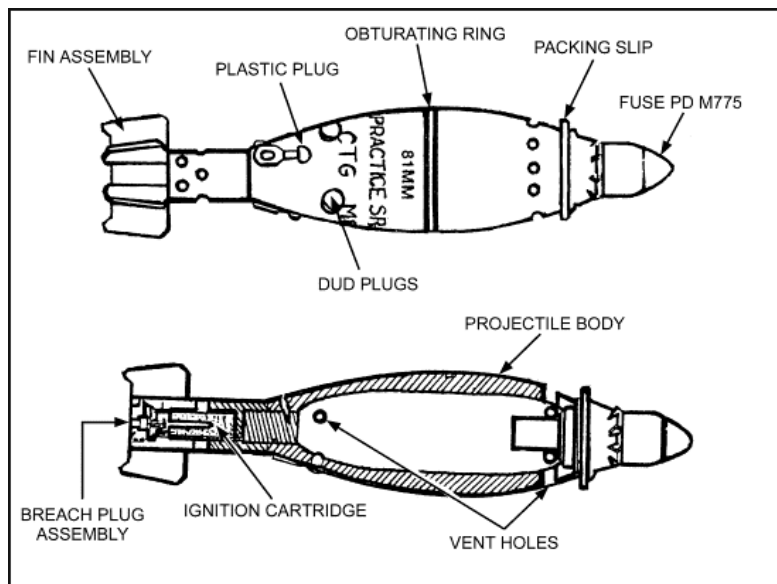
- Overall length: 14.5 inches.
- Firing weight: 6.84 pounds.
- Maximum range: 458 meters.
- Minimum range: 47 meters.

**Note:** The 1:10 scale is based on 81-mm 300-series ammunition.

#### **A-20. COMPONENTS**

The SRTR practice cartridge consists of eight major components (Figure A-20).

- Fuze, point detonating M775.
- Projectile body.
- Obturating ring.
- Plastic charge plugs.
- Dud plugs.
- Fin assembly.
- Ignition cartridge, M987.
- Breach plug assembly.

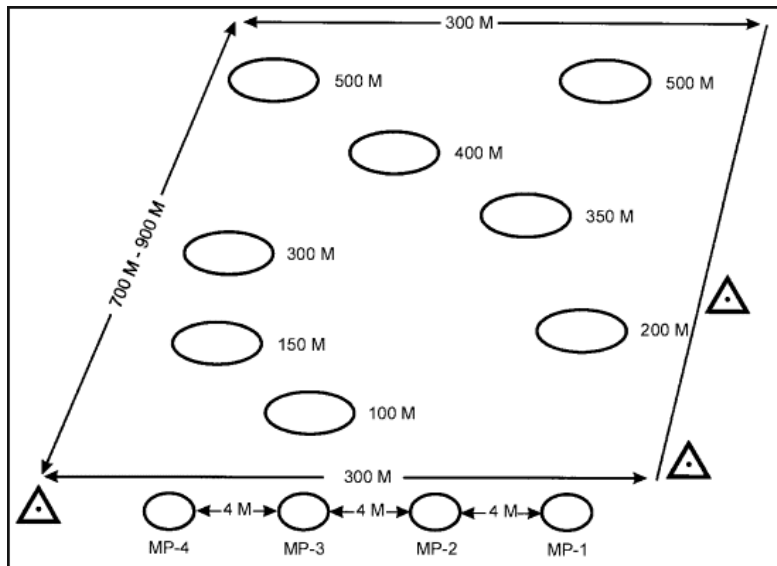


**Figure A-20. SRTR practice round.**

The SRTR is designed as a training round for the 81-mm mortar (M29 and M252) and the 120-mm mortar (Figure A-20). The SRTR is designed to be fired, recovered, refurbished, and refired. The round is fired from the mortar the same as service ammunition. When fired, the SRTR travels from 47 to 458 meters, determined by charge and elevation. Upon impact, the SRTR emits a flash, bang, and smoke discharge but no fragmentation.

**A-21. RANGE RECOMMENDATIONS**

A scale of 1:10 is used to relate the range and deviation between the SRTR projectile and the standard 81-mm service projectile. The minimum range requirement for firing, through charge 3, is an area 700 to 900 meters in depth and 300 meters in width. This is necessary to accommodate the desired number of targets and provide a maneuver area to operate in. When using 81-mm mortars, the mortars can be no closer than 4 meters apart, but can be as far apart as the range permits (check with the local range control regulations). The range must be cleared of all unexploded ammunition, concrete, and steel objects (Figure A-21).



**Figure A-21. SRTR scaled range.**

#### **A-22. ADVANTAGES**

The SRTR is used with all 81-mm mortars and 120-mm mortars by way of the M303 insert. It also accommodates prescribed crew drill procedures, and it can be used by mechanized and ground-mounted elements. The SRTR has the following advantages:

- Provides the ability for firing in training areas where the firing of service ammunition is not allowed.
- Saves time by eliminating long-distance traveling to suitable mortar ranges.
- Saves in cost of firing service ammunition.
- Can be taught to operate and maintain in a short period of time.
- Has the same procedures used by the entire indirect fire team when firing service ammunition, excluding appropriate charge and fuze settings.
- Uses all of the equipment required when firing service ammunition.

#### **A-23. AMMUNITION**

The projectile body is made from cast iron and is machined to accept the M775 fuze, the tail fin, three charge plugs, three dud plugs, and the obturator ring. It is painted blue with white lettering and one brown band to identify it as a practice round. The charge and dud plugs are fitted into holes drilled in the base of the projectile body. The obturator ring is plastic and shaped like a split ring so that it will expand to fit over the projectile body and

will seat into the band groove. The M775 fuze assembly includes a pyrotechnic spotting cartridge, which is retained in the fuze body by a threaded aluminum cup. This assembly is threaded into the nose of the projectile body. The M775 fuze replicates the M734 multi-option fuze used with service ammunition. Even though the M775 has four fuze settings for ammunition bearer training, it will only function upon impact. The tail fin assembly is threaded onto the stud at the base of the projectile body. Inside the tail fin is the propellant cartridge. It is a primed 12-gauge shotgun shell casing loaded with a double base propellant. The breech plug/firing pin is threaded into the rear of the tail fin and retains the propellant cartridge in the fin cavity.

a. Prepare the M880 short-range training ammunition for firing.

(1) The M880 is issued ready to fire. When the round is unpacked, inspect the following:

- No red showing on top of fuze.
- Packing clip is in place.
- Obturating ring is present and flush with body.
- Three plastic charge plugs seated in body.
- Three dud plugs seated in body.
- Ignition cartridge inside fin assembly.
- Breech plug seated in fin assembly.

**WARNING**

**1. If red can be seen above the windshield on the fuze, the fuze has been armed. Place the entire round in the dud pit until you are ready to defuze the round.**

**2. If the packing clip is loose, attempt to place the packing clip back into the fuze. If it will not go back into the fuze, place the entire round into the dud pit until you are ready to defuze the round.**

(2) To prepare a newly issued round for firing, set the desired charge by pulling one of the plastic charge plugs from the body of the round. Set the desired fuze setting by rotating the multi-option fuze clockwise or counterclockwise until the desired fuze setting is lined up with the notch on the body of the round. Present the round to the squad leader for his inspection. When the assistant gunner is ready to fire the round, pull the packing clip from the round and hand it to him.

**WARNING**

**Do not pull the packing clip from the round until the assistant gunner is ready to fire the round.**

**Note:** The fuze setting is for training only and will not affect the functioning of the fuze.

(3) Charge settings for the round are as follows:

- (a) Charge 0--pull all the plastic charge plugs from the body.
- (b) Charge 1--pull two of the plastic charge plugs from the body.
- (c) Charge 2--pull one of the plastic charge plugs from the body.
- (d) Charge 3--do not pull any of the plastic charge plugs from the body.

(4) To refurbish a previously fired round, ensure that the round is clean. All portholes must be free of dirt to allow the gas to escape, and all of the threads must be clean.

(5) Inspect the refurbishing kit to ensure that all equipment is present.

- Three plastic charge plugs.
- One obturating ring.
- One M987 ignition cartridge.
- One breech plug.
- One M775 point detonating fuze.
- Three dud plugs.

**WARNING**

**1. If any red can be seen above the fuze windshield, place the fuze in the dud pit and dispose of the fuze IAW unit sop.**

**2. If the packing clip is loose, attempt to place the packing clip back into the fuze. If it will not go back into the fuze, place the fuze into the dud pit and dispose of the fuze IAW unit sop.**

**3. Inspect the breech plug firing pin for freedom of movement. If it does not move freely, a misfire could occur or premature ignition of the ignition cartridge could take place when assembling the round.**

(6) To assemble the round do the following:



- (a) Install the three plastic plugs with the tangs pointed to the rear of the projectile body.
- (b) Install the three dud plugs.
- (c) Secure the fin assembly onto the projectile body hand tight.
- (d) Install the obturating ring onto the projectile body.

**CAUTION**

If the obturating ring does not seat flush or below the surface of the projectile body, send the body back to the maintenance table for further cleaning. If the obturating ring still does not seat flush, the body must be disposed of.

- (e) Install the fuze assembly hand tight and flush with the top of the round.
- (f) With the round laying horizontally on the table, install the M987 ignition cartridge into the tail fin assembly.

**WARNING**

**Do not force the ignition cartridge into the tail fin assembly.**

- (g) Install the breech plug by hand and use the breech plug wrench to secure the breech plug hand tight.
- (7) Place the round back into its canister until it is ready to be fired.

**Note:** Do not refurbish the M880 round if it will not be fired that same day.

- (8) To fire the round, follow the same procedures as if the round was newly issued.

b. Clean and service the M880 SRTR.

- (1) Fill two trash cans with water and leave another trash can empty.
- (2) Dip the spent M880 into the first water bucket and scrub off the heavy dirt with a wire brush.

(3) Place the M880 round on the work table and secure the projectile body with the strap wrench.

(4) Remove the fuze (if necessary, use the long handle pliers) and discard.

**WARNING**

**When the fuze is removed from the body, it must be inspected to ensure that it has detonated by inspecting the coin to see if it is missing.**

(5) Using the breech plug wrench, unscrew the breech plug and discard.

(6) Using the fin wrench, unscrew the fin assembly from the projectile body.

(7) Place the tail fin assembly upright on the cartridge block, place the punch into the tail fin assembly, strike the punch with the ball peen hammer, and drive out the spent ignition cartridge. Discard the spent ignition cartridge.

(8) Place the tail fin assembly into the second wash bucket and clean it with a wire brush for the final cleaning. Ensure that all dirt and residue are removed from the round.

(9) Remove all remaining plastic plugs and the obturating ring from the projectile body and discard them.

(10) Place the projectile body into the second wash bucket and remove all dirt and residue. Take the M16 bore brush and thoroughly clean the vent holes and the thread.

(11) With a clean, dry rag, dry both components of the M880. Ensure no dirt or residue are present on the projectile body and tail fin assembly.

(12) Examine the M880 for cracks and any type of damage that may prevent the projectile from being refired. If there is evidence of cracks or some type of damage, discard the entire projectile body and tail fin assembly.

(13) If the M880 is not going to be fired the same day, lightly oil the projectile body and tail fin assembly. Screw the tail fin assembly back on the body and store it in its canister.

**Note:** The M880 must be recovered, cleaned, and serviced within 24 hours after it is fired.

c. Recover a previously fired M880 round from downrange.

**WARNING**

**Failure to follow the proper recovery procedures may result in personal injury.**

- (1) Ensure the range is closed and all weapon systems have ceased firing.
- (2) Issue a shovel, a grappling hook, heavy duty leather work gloves, and an ammunition box to the assistants.
- (3) Walk downrange with the assistants and locate the M880 round.
- (4) Pick up the round and verify that the round has functioned by observing that all of the dud plugs on the body are missing. Have a second soldier verify that all of the dud plugs are missing.

**WARNING**

**When picking up the M880, ensure that your hand and fingers are not covering the vent holes.**

- (5) If all of the dud plugs are missing, place the round in the ammunition box.

**WARNING**

**If any of the dud plugs are present and the fuze has not functioned, place the round in a marked pit and follow the defuzing procedures outlined in paragraph A-23d.**

**Note:** It may be necessary to dig the round out with the shovel. The grappling hook may be used to assist in recovering the round.

- (6) Ensure that each hole left by the M880 round is filled.
- (7) Once the M880 rounds have been recovered, transport them to the maintenance table.

d. Defuze a dud M880 round.

**Note:** The dud M880 round may be defuzed when first located or at the end of that day's firing as long as it is recovered within 24 hours after it has been fired.

(1) Set the defusing device (boom box) on the platform with the holes facing downrange and away from the troops. Pull out the four retaining pins that secure the top portion of the boom box, then pull the top off the base of the boom box.

(2) Turn the round until the packing clip portion of the round is facing upward.

(3) With the chisel over the fuze, secure the top portion of the boom box to the base, then attach the four retaining pins.

(4) Kneeling on the opposite side of the holes on the boom box, strike the chisel with the 4-pound hammer until the chisel moves freely from the base of the boom box to the top of the boom box.

**WARNING**

**1. All personnel must be on the solid side of the boom box before the chisel is struck with the hammer.**

**2. When defuzing an M880 round, ear plugs and goggles must be worn.**

(5) Remove the cover of the boom box and inspect the fuze to verify that the spotting charge has functioned.

**WARNING**

**If the spotting charge has not functioned or the fuze has pulled away from the thread well, transport it to the dud pit and dispose of it IAW the unit SOP.**

(6) Remove the M880 round from the boom box and return the cartridge to the firing line for cleaning.

**A-24. TRAINING USAGE**

SRTR training enables the unit commander to observe the actions of the indirect fire team and the tasks being performed by the indirect fire team. This enhances the ability of the commander to evaluate the proficiency of all elements of the training, to identify and isolate problems, and to begin corrective training. All members of the team can view the overall operation to understand each member's part.

a. The time used for preparation determines the benefits gained from training with the SRTR. Three steps must be accomplished before training begins:

(1) Build a scaled firing range (permanent, semi-permanent, or temporary).

(2) Construct a map of the firing range.

(3) Train the personnel with the SRTR. Personnel should be trained in the recovery, refurbishment, and maintenance of the M880 before range firing begins.

b. Gunners should not be allowed to observe the impact of the SRTR, unless firing a direct-lay mission. Normally, mortars are mounted in a defilade position so that mask exists between the impact area and the firing position. If mask does not exist, using a referred deflection of 0700 when firing is recommended.

c. When positioning 81-mm mortars, the lateral distance between the center of each baseplate should have a minimum distance of 4 meters (40 meters when firing service ammunition, 1:10 scale for the SRTR = 4 meters).

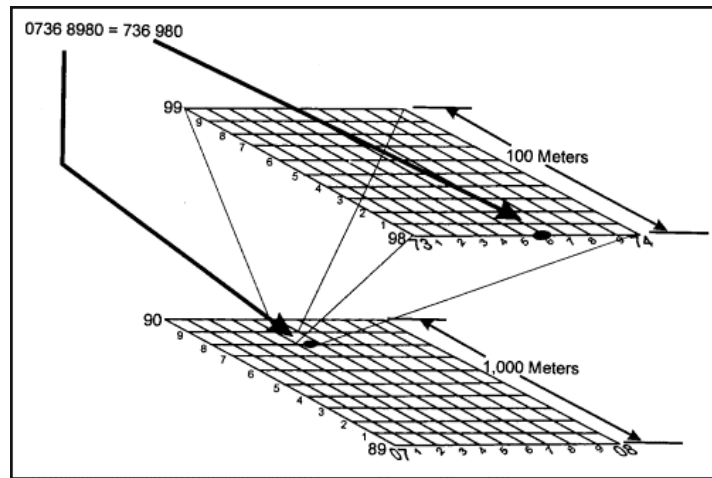
d. The SRTR can also be fired from the 120-mm mortar using the M303 81-mm insert. When positioning 120-mm mortars, the lateral distance between the center of each baseplate should be a minimum of 6 meters (60 meters when firing service ammunition, 1:10 scale for the SRTR = 6 meters).

#### **A-25. CONSTRUCTION OF A SCALED MAP**

The range limitations associated with the M880 SRTR make a standard 1:50,000-scale military map difficult to use. Therefore, a new map 1/10 the size (1:5,000) must be constructed.

a. Use a blank sheet of paper to draw grid squares the same size as the 1:50,000-scale map and renumber them based on 100 meters per square.

b. Determine the 8-digit grid coordinates to the mortar position on a 1:50,000-scale military map and convert it to a 1:5,000 scale (Figure A-22).



**Figure A-22. Converting 1:50,000 grid to 1:5,000 grid.**

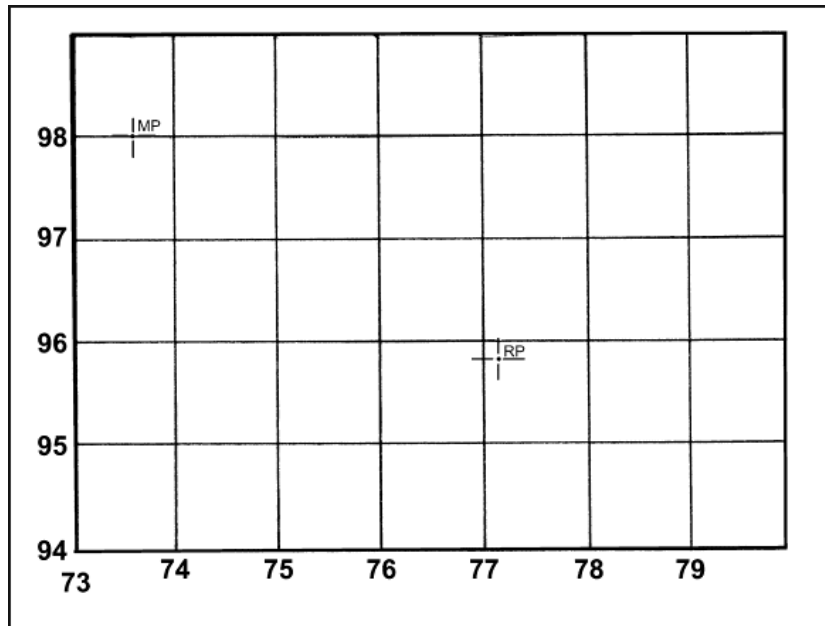
**Note:** The first number of a grid coordinate is the 10,000-meter designator; the second number is the 1,000-meter designator; the third number is the 100-meter designator; and the fourth number is the 10-meter designator.

(1) To make a 1:5,000-scale map, drop the 10,000-meter designator and use the 1,000-meter designator as the first number for each grid. For example, a mortar location of 07368980 becomes 736980. The 7 and the 9 will precede each grid location since they identify the 1,000-meter increments. To make an 8-digit grid from this 6-digit grid, add a 0 at the end of the easting and northing grid location. For example, the mortar grid becomes 73609800. The 0 is the 1-meter designator.

(2) Before constructing the 1:5,000-scale map, determine the direction of fire from the mortar position to the RP. (Surveying a point on the range should be done at least one day before training. If a point on the range has already been surveyed, it can be used to make the map.) For example, if the direction of fire is southeast, the mortar position would be in the northwest corner of the grid sheet. Using the example grid coordinates, the most westerly grid line would be 73 and the second most northerly grid line would be 98. Number the rest of the grid lines accordingly.

c. To plot the mortar position on the 1:5,000-scale map, use the same protractor that is used for the 1:50,000-scale map, but instead of the protractor measuring 1,000 meters, it will measure 100 meters.

d. To determine the direction of fire, place a target downrange, set up the M2 aiming circle at the base gun position, and measure an azimuth to the target. To accurately plot targets on the map, measure the distance by pace count from the base piece to the target and then plot it on the map. This procedure allows the creation of a surveyed firing chart. The FO's location can be plotted in the same manner. After all plotting is done, give a copy of the map to the FO (Figure A-23). He can call for fire using this map the same as if firing service ammunition.



**Figure A-23. Plotting targets on the 1:5,000-scale map.**

e. Before putting the map on the M16 plotting board, determine the grid intersection to represent the pivot point in the same manner as if firing service ammunition.

(1) Place the grid system on the plotting board the same as if firing service ammunition. Number every other black line. Every small green square equals 5 meters and every black square equals 50 meters.

(2) Place the mortar position and target on the plotting board the same as if firing service ammunition. The grids plotted are to the nearest 1 meter instead of 10 meters.

f. To determine the mounting azimuth, line up the mortar position and the RP. Read the azimuth on the azimuth scale at the top of the plotting board. Round off the azimuth to the nearest 50 mils, and superimpose this azimuth over the referred deflection. Number the azimuth scale every hundred mils using the LARS rule (Figure A-24).

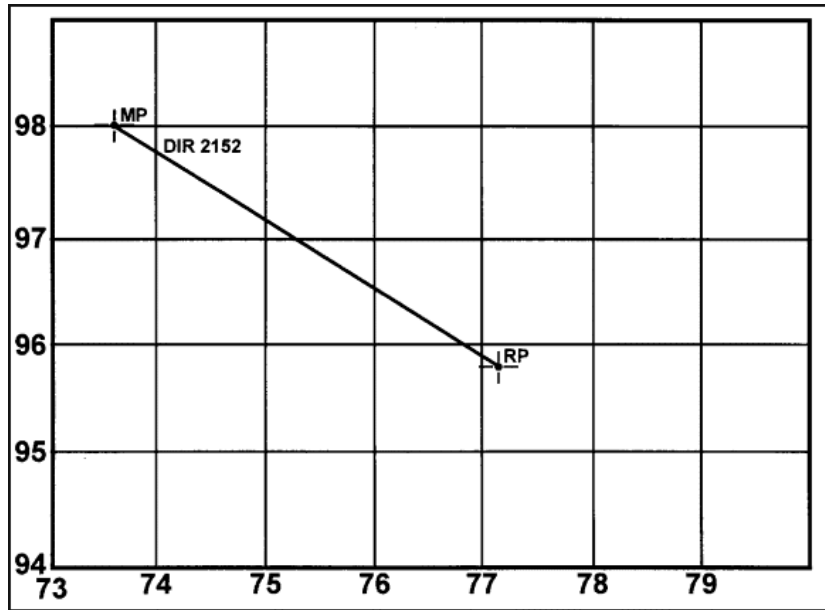


Figure A-24. Determining direction from MP to RP.

g. When firing the M880 SRTR, range control must know exactly where the firing position is. The 1:50,000-scale grid must be annotated on the data sheet (DA Form 2188-R), labeled, and placed in the BP box (Figure A-25).



DATA SHEET						
For use of this form, see FM 23-91. The proponent agency is TRADOC.						
SETUP		WEAPON DATA			FO DATA	
TIME OUT:	UNIT:	WPN:	WPN:	FO:	ALT:	GRD:
TGT PRFX: <u>AB</u>	<u>ECC 2129 IN</u>	DIR:	DIR:			
TGT NO: <u>0100-0150</u>	<u>81 mm CAR: YES</u>	DIS:	DIS:			
ALARM: <input type="checkbox"/> ON <input type="checkbox"/> OFF	<u>(M880) NO</u>					
MIN E:	BP: <u>150,000773</u>	WPN:	WPN:			
MIN N:	<u>0736 8980</u>	DIR:	DIR:			
GD: <input type="checkbox"/> E <input type="checkbox"/> W	E: <u>7360</u>	DIS:	DIS:			
LAT: <input type="checkbox"/> + <input type="checkbox"/> -	N: <u>9800</u>					
LISTER: <input type="checkbox"/> ON <input type="checkbox"/> OFF	ALT:	WPN:	WPN:			
BIT RATE:	AZ: <u>2152/2150</u>	DIR:	DIR:			
KEY TONE:	DEF: <u>2800</u>	DIS:	DIS:			
BLK: <input type="checkbox"/> SNG <input type="checkbox"/> DBL	ELE:					
OWNER ID:						
AMMUNITION DATA						
TEMPERATURE:	TYPE: <input type="checkbox"/> HE <input type="checkbox"/> WP <input type="checkbox"/> RL <input type="checkbox"/> CS <input checked="" type="checkbox"/> TNG ( <u>M880</u> )					
LOT NUMBER						
WEIGHT						
ON HAND						
RECEIVED						

Figure A-25. Example completed DA Form 2188-R.

h. The computer's record (DA Form 2399) is also altered. For safety, as well as range control's information, "M880" should be placed in the "SHELL AND FUZE" spaces in both the FDC ORDER and INITIAL FIRE COMMAND (Figure A-26).

FDC ORDER	INITIAL CHART DATA	INITIAL FIRE COMMAND	ROUND'S EXPENDED
MORTAR TO FFE: <u>SEC</u>	DEFLECTION: <u>2807</u>	MORTAR TO FOLLOW: <u>SEC</u>	①
MORTAR TO ADJ: <u>#2</u>	DEFLECTION CORRECTION: <input type="checkbox"/> L <input type="checkbox"/> R	SHELL AND FUZE: <u>HEQ</u> <u>(M880)</u>	
METHOD OF ADJ: <u>IRD</u>	RANGE: <u>206</u>	MORTAR TO FIRE: <u>#2</u>	
BASIS FOR CORRECTION:	WALT CORRECTION: <input type="checkbox"/> + <input type="checkbox"/> -	METHOD OF FIRE: <u>IRD IN ADJ.</u> <u>IRDS IN FFE.</u>	
SHEAF CORRECTION:	RANGE CORRECTION: <input type="checkbox"/> <input type="checkbox"/>	DEFLECTION: <u>2807</u>	
SHELL AND FUZE: <u>HEQ</u> <u>(M880)</u>	CHARGERANGE: <u>0</u>	CHARGE: <u>0</u>	
METHOD OF FFE: <u>IRDS</u>	ADMUTH: <u>2143</u>	TIME SETTING:	
RANGE LATERAL SPREAD:	ANGLE T: <u>1630</u>	ELEVATION: <u>1201</u>	
ZONE:			
TIME OF OPENING FIRE: <u>W/B</u>			

**Figure A-26. Example completed DA Form 2399.**

**A-26. SAFETY**

The SRTR is safe to handle and fire. The following safety precautions must be enforced.

<p style="text-align: center;"><b>WARNING</b></p> <p><b>The SRTR is inert and can be stored and handled as a weapon until it is loaded with the refurbishment kit at which time it will be handled as a live mortar round. When loaded and ready to fire, all safety precautions used during handling of service ammunition are observed.</b></p>
---

- a. The SRTR refurbishment kit contains a propellant and smoke charge, and is always stored and handled as live ammunition.
- b. Practice ammunition is never fired over the heads of troops.
- c. Personnel never go forward of the firing line until a cease fire has been called by the range OIC or safety officer.

**Note:** Duds are disposed of as prescribed in paragraph A-23.

**A-27. MALFUNCTIONS**

See Chapter 3, paragraph 3-13 for a detailed discussion of malfunctions.

**A-28. REMOVAL OF A MISFIRE**

After failure to fire, misfire removal procedures are followed to remove the round from the weapon. Misfire procedures for live rounds also apply when firing the SRTR.

- a. If the primer cap of the SRTR is dented, the whole round is placed in the dud pit for disposal IAW the local SOP.
- b. If the primer is not dented, the round can be refired upon determination of the cause of the misfire.

**A-29. SUPPLY DATA**

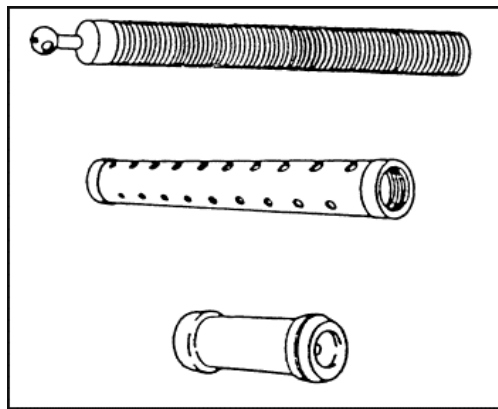
The equipment shown in Table A-3 is available at the ammunition supply facility:

DESCRIPTION	NATIONAL STOCK NO.	PART NO.	DODAC NO.
Cartridge, 81-mm Practice: M880	1315-01-216-7070		1315-C876
Refurbishment kit, M80	1315-01-219-3936	19200	1315-C045

**Table A-3. Supply data for SRTR.**

#### **Section IV. M303 SUBCALIBER INSERT**

The M303 subcaliber insert (Figure A-27) is a low-cost training aid that provides effective training for the entire platoon, including the FO, on a live-fire exercise. It uses 300-series HE, WP, and illumination ammunition. Currently, the FDC will use the M16 plotting board for plotting. The subcaliber insert will be issued to the unit for accountability. The unit is also responsible for maintaining the insert and the DA Form 2408-4.



**Figure A-27. M303 subcaliber insert.**

#### **A-30. CHARACTERISTICS**

This paragraph describes the characteristics of the M303 subcaliber insert.

- a. The 300-series ammunition has a minimum range of 73 meters and a maximum range of 4,789 meters. It can be fired at a sustained rate of three (charge 8) or five (charge 6). It can be fired indefinitely at a period rate of fire. The 300-series

ammunition has a maximum rate of fire of 12 (charge 8) for two minutes and 12 (charge 6) for five minutes.

b. The barrel is a M29A1 that has been refurbished. This is the only M29 barrel approved to use the M303 subcaliber insert. The barrel is 51 inches long and weighs 28 pounds. It has a smooth bore with one circular cooling ring and a removable firing pin.

c. The insert sleeve is 42 inches long and weighs 5.9 pounds. It is tubular shaped with cooling holes. It has a threaded end on top and a smooth end on the bottom. The sleeve slides over the barrel and is threaded onto the barrel until it is flush with the breech cap. It is held in place by three hex screws on the muzzle end. Approximately 2 inches of the M29 cannon will be showing at the muzzle end.

**Note:** After every fire mission, the hex screws on the upper sleeve ring should be checked for tightness to ensure the interior of the 120-mm cannon is not damaged.

d. The filler block is 15.9 inches long and weighs 17 pounds. It is tubular shaped with the top and bottom the same diameter as the interior of the 120-mm cannon. The top and bottom have a concave slope with a threaded hole, which is used in the removal of the filler block.

e. The M303 subcaliber insert comes with a filler block adapter, a 0.0625-inch hex wrench, and a firing pin wrench.

#### **A-31. MAINTENANCE**

Maintenance must be performed on the M303 subcaliber insert before, during, and after firing. This paragraph describes the procedures to follow to perform this maintenance.

##### **a. Before.**

###### *(1) Cannon.*

(a) Update the DA Form 2408-4 to reflect days firing. Ensure that all standards for bore scope and pullover gauging have not been exceeded (within the past 180 days).

(b) Check the M120/M121 mortar for cracks, broken welds, rust, and missing or damaged parts.

(c) Check the M29A1 cannon for foreign matter in the barrel, then wipe dry. Clean and lubricate the exterior surface. Check for bulges, dents, and visible cracks. Check for evidence of gas

leakage (grayish color) around the firing pin located in the base of the spherical projectile.

(d) Check the insert sleeve for cracks, broken welds, rust, and missing or damaged parts. Check that the insert sleeve assembles onto the cannon assembly, can be secured with set screws, and is free of any nicks and burrs.

(2) *Filler block.*

(a) Check the filler block for cracks, broken welds, rust, and nicks or burrs.

(b) Check that the filler block fits with breech plug of the M29A1 cannon, seats in the base of the 120-mm bore, and can be employed or retrieved using the adapter tool.

**b. During.**

(1) Check the bore after approximately every 50 rounds for bulges, dents, and visible cracks. Check for evidence of gas leakage around the firing pin (grayish discoloration).

(2) Dry swab the barrel bore after firing every 10 rounds or after every end of mission (EOD).

**c. After.**

(1) Check DA Form 2408-4 to ensure it reflects the days firing.

(2) Ensure rifle bore cleaning compound (RBC) is used to thoroughly clean the barrel bore after firing and for two consecutive days thereafter. Be sure to wipe dry and lubricate with GPL after each cleaning.

**Note:** For nonfiring periods, clean and lubricate the barrel on a weekly basis.

(3) Check the insert sleeve for cracks, broken welds, rust, nicks, burrs, and damaged parts.

(4) Check the filler block for cracks, broken welds, rust, nicks, burrs, and damaged threads.

(5) Intervals are based on usual conditions. For unusual operating conditions, lubricate more often. When the weapon is not being used, the intervals may be extended if proper lubrication procedures have been

followed. Clean the barrel bore weekly with RBC, and lubricate the barrel, firing pin, insert sleeve, and filler block weekly with GPL.

**WARNING**

**Dry cleaning solvent is flammable. Do not clean parts near an open flame or in a smoking area. Dry cleaning solvent evaporates quickly and has a drying effect on the skin. When used without protective gloves, this chemical may cause irritation to, or cracking of, the skin.**

**Note:** Before firing, dry swab the barrel bore of the M29A1 and the 120-mm cannon. Wipe dry the exterior of all components of the subcaliber insert.

**A-32. MISFIRE PROCEDURES**

This paragraph describes the misfire procedures for an M303 subcaliber insert.

- a. When a misfire occurs, any member of the squad who notices a misfire immediately announces, "MISFIRE!"
- b. All personnel except the gunner move 100 meters to the rear of the mortar. When carrier-mounted, they exit through the cargo hatches and climb over the front of the carrier.
- c. The gunner stands to the left rear and kicks the cannon several times with the heel of his boot to attempt to dislodge the round. If the round fires, the mortar is re-laid and the fire mission continues. If the round fails to fire, the gunner moves to the rear of the mortar, joins the crew, and waits one minute.

**WARNING**

**Keep the head and body away from the front of the cannon. Do not stand behind the cannon. At no time will the buffer housing assembly be loosened.**

- d. After one minute, the gunner returns to the mortar (if carrier-mounted, he remounts the carrier over the front) and feels the cannon for heat using his fingertips.

**WARNING**

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**on the exterior of the cannon or the rate of fire exceeded the sustained rate (four rounds per minute), the gunner rejoins the crew and waits an additional three minutes. (When excessive heat is felt below or around the lower collar stop on the cannon, the subcaliber insert is too hot to handle.)**

e. After three minutes, the gunner returns to the mortar (if carrier-mounted, he remounts the carrier) and feels the 120-mm cannon for heat. If the 120-mm cannon still radiates excessive heat, he attempts to cool it with water or snow.

**Note:** Low and high range pertains to carrier-mounted only.

f. If the cannon is cool enough to handle, the gunner locks down the data on the sight, removes the sight (and extension if carrier-mounted), and places them in a safe place. He then calls the crew forward. The gunner grasps the insert just below the muzzle with both hands ensuring no part of his body is in front of the muzzle and his fingers are not in the holes of the insert. On an M374 HE series misfire, he slides the insert approximately 12 inches out of the 120-mm cannon and releases the insert taking one step with his left foot, bending at the waist, and bringing his hands down alongside the cannon. (The same as if he were firing a round.) On an M301 illumination series misfire, he slides the insert approximately 3 to 6 inches out of the 120-mm cannon. This procedure is to attempt to dislodge the round before removing the insert. If the round fails to fire, the gunner depresses the cannon to its lowest elevation, leaving approximately 1/4 turns on the elevation shaft. If the mortar is in low range (carrier-mounted), the gunner depresses the cannon to its lowest elevation.

**Note:** With an M301 illumination series misfire, if the round fails to fire after releasing the insert 3 to 6 inches out of the cannon, the gunner rejoins the crew for 5 minutes. If the round does not initiate, he continues the procedures in paragraph f.

g. The assistant gunner grasps the insert just below the muzzle with both hands. Ensuring that no part of his body is in front of the muzzle, he lifts the insert. When the upper sleeve ring of the insert sleeve clears the mortar, the gunner grasps the sleeve and helps in removing the insert.

h. When the insert clears the 120-mm cannon, the gunner holds the insert while the assistant gunner positions himself to receive the round. (If carrier-mounted, the gunner stabilizes the insert while the assistant gunner exits the carrier. For added support, the gunner may rest his left elbow on the cross-member of the carrier.) The assistant gunner places his hands just behind the muzzle of the insert. At this time, the assistant gunner gives the command to lift the insert. NEVER LOWER THE BASE OF THE INSERT BELOW HORIZONTAL BEFORE THE

ROUND HAS BEEN REMOVED. The assistant gunner places the meaty portions of his thumbs at the muzzle end and waits for the round to exit the tube. The assistant gunner grasps the round, removes it from the tube, and gives it to the ammunition bearer who disposes of the round according to SOP. The insert is turned upside down to shake out any debris, inserted back into the 120-mm mortar, swabbed, and re-laid to continue the fire mission.

**Note:** If the round is not dislodged, take the entire insert downrange and place it in a dud pit or a designated area ensuring that the cannon is pointing in the direction of fire. Notify EOD personnel.