

**UNITED STATES MARINE CORPS**  
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MM1407  
24 Feb 04

**STUDENT OUTLINE**

**BORESIGHT A M252 81MM MORTAR**

**LEARNING OBJECTIVES**

TERMINAL LEARNING OBJECTIVE. Given a mounted, SL-3 completed, M252 81mm mortar and a M45 boresight, boresight a M252 81mm mortar using the distant aiming point method by achieving a zero mil tolerance for deflection and elevation within 5 minutes. (41TR.02.02)

ENABLING LEARNING OBJECTIVES

- a. Given a list of choices, identify the characteristics of a M45 boresight in accordance with TM 09922A-10/1. (41TR.02.02a)
  - b. Given a list of choices and a diagram of a M45 boresight, identify the nomenclature of a M45 boresight in accordance with TM 09922A-10/1. (41TR.02.02b)
  - c. Given a mounted, SL-3 complete M252 81mm mortar and a M45 boresight, mount a M45 boresight to a M252 81mm mortar in accordance with TM 09922A-10/1. (41TR.02.02c)
1. **NOMENCLATURE**. The boresight consists of an elbow telescope, telescope clamp, body, two strap assemblies and clamp assembly.
    - a. The elbow telescope establishes a definite line of sight.
    - b. The telescope clamp maintains that line of sight in the plane established by the centerline of the V-slides.
    - c. The body incorporates two perpendicular V-slides. It contains level vials (preset at 0800 mils elevation) that are used to determine the angle of elevation of 0800 mils and whether the V-slides are in perpendicular position. It also provides the hardware to which the straps are attached.
    - d. Two strap assemblies are supplied with each boresight and marked for cutting in the field to the size required for any mortar.
    - e. The clamp assembly applies tension to the strap assemblies to secure the boresight against the mortar barrel.
  2. **GENERAL DATA**
    - a. Weight: 2.5 pounds

- b. Field of View: 12 degrees (211 mils)
- c. Magnification: 3 power.

3. **PRINCIPLES OF OPERATION.** The boresight is constructed so the telescope line of sight lies in the plane established by the centerlines of the V-slides. When properly secured to a mortar barrel, the centerline of the contacting V-slide is parallel to the centerline of the barrel. Further, the cross level vial, when centered, indicates the centerlines of both slides, the elbow telescope and the barrel lie in the same vertical plane. Therefore, the line of sight of the telescope coincides with the axis of the barrel, regardless of which V-slide of the boresight is contacting the barrel. The elevation vial is constructed with a fixed elevation of 0800 mils. The purpose of boresighting is to remove the error for deflection and elevation in the M64A1 sight unit.

4. **PREPARING THE M252 81MM MORTAR FOR BORESIGHTING**

- a. Remove the boresight, clamp assembly and straps from the carrying case. Grasp the boresight by the body to prevent damaging the telescope.
- b. Place the ring over the hook and attach the strap snap to the eye provided on the strap shaft.
- c. If necessary, release the catches and reset the straps to the proper length.
- d. Remove any burrs or projecting imperfections from the seating area of the mortar barrel to ensure proper seating of the boresight. Attach the boresight to the barrel below and touching the upper stop band on the M252 mortar.

5. **BORESIGHTING PROCEDURES/SIGHT DISTAINT AIMING PIONT METHOD**

- a. Once the mortar has been mounted, place the M64A1 sight unit into position in the sight bracket. Place a deflection of zero mils and an elevation of 0800 mils on the scales. Align the vertical cross line of the sight on an aiming point (at least 200 meters) by moving the bipod. If necessary use the traversing mechanism; however, keep the mortar within two turns of center traverse. Level the M64A1 sight.
  - (1) Center the cross level vial by rotating the boresight slightly around the outside diameter of the mortar barrel. Loosening the clamp screw and lightly tapping the boresight body make slight movements. When the bubble centers, tighten the clamp screw.
  - (2) Elevate the mortar barrel until the boresight elevation level vial is centered. The mortar is now set at 0800 mils (45 degrees) elevation.
  - (3) Using the elevation control knob, elevate or lower the sight unit until the elevation level bubble is centered. If necessary, cross level the sight unit.
  - (4) Recheck all level bubbles.

(5) The reading on the coarse elevation scale of the sight unit should be 0800 mils and the reading on the fine elevation scale should be zero. If adjustment is necessary, proceed as indicated below.

(a) Loosen the two screws that secure the coarse elevation scale and slip the scale until the 08-mil mark on the scale coincides with the reference mark on the housing. Tighten the two screws to secure the scales.

(b) Loosen the two screws on the elevation control knob and slip the fine elevation scale until the zero mark on the micrometer scale coincides with the reference mark on the housing. Tighten the two screws to secure the micrometer scale.

(6) Recheck all level bubbles.

(7) Check again to ensure the sight setting reads zero on the deflection scale and elevation 0800 mils.

(8) Traverse the mortar no more than two turns from center of traverse and align the vertical crosshair line of the boresight on the original aiming point. Adjust the boresight to keep the cross level bubble centered since the mortar could cant during traversing. (If the mortar is initially mounted on the aiming point, it decreases the amount of traverse needed to align the cross line on the aiming point.) Also, the elevation level bubble may need to be centered.

(9) After the boresight is aligned on the aiming point, level the sight by centering the cross level bubble. Rotate the deflection micrometer knob until the sight is aligned on the aiming point. The coarse deflection scale should read zero mils and the fine deflection scale should read zero. If adjustment is necessary, loosen the two-boresight locking screws on the deflection control knob and slip the fine deflection scale until the arrow on the index is aligned with the zero mark on the micrometer scale. Set zero on the coarse deflection scale by pressing down on the coarse deflection scale, rotating it, then releasing it.

(10) Once the sight picture in the boresight and the sight picture in the M64A1 sight match and the scales read zero, again push in on the scalloped deflection micrometer scale and line the red boresight index line with the red boresight index arrow. Then tighten the screws.

(11) Check all level bubbles, sight unit, and boresight.

(12) If error exists, repeat the procedure outlined above.

(13) When both sights have the same sight picture, all four bubbles are level, scales are slipped to zero, screws are tightened, and the red boresight index line is lined up with the red boresight index arrow then announce "Gun#\_\_\_ boresighted."

(14) This must be completed in 5 minutes.

## 6. REMOVAL

a. Loosen the clamp screw, releasing the boresight from the barrel.

b. Swing the elbow telescope until it is about parallel with the elevation level bubble.

c. Release the clamp assembly and straps by removing the ring from the hook and the strap shaft.

d. Stow the clamp assembly and straps in the corner compartment. Put the boresight in the center compartment of the carrying case

**REFERENCES :**

TM 09922A-10/1 Operator's Manual for Mortar, 81mm, M252; pages 2-44 through 2-57.

**EXAM ID:** MM1407P

**EXAM TITLE:** Boresight a M252 81mm Mortar Performance Examination

**TLO/ELO:** 41TR.02.02

**STUDENT INSTRUCTIONS:**

1. You are an infantry mortarman and must boresight a M252 81mm mortar using the distant aiming point method.
2. You have 5 minutes to mount the boresight and boresight the mortar.
3. To achieve mastery, you must perform each of the performance steps correctly within the allotted time.

**PERFORMANCE STEPS AND/OR PERFORMANCE STANDARDS:**

Performance Steps	Master	Non-Master	Remarks
1. Attach the boresight to the cannon, flush with the upper stop.			
2. Ensure the sight data reads 6400 for the deflection and 0800 for the elevation.			
3. Level both bubbles on the M64A1 sight.			
4. Cross level the boresight.			
5. Level the elevation for the boresight.			
6. Level the M64A1 sight for elevation by turning the elevation control knob.			
7. Loosen the screws on the elevation control knob and slip the scale to zero mils.			
8. Tighten the screws on the elevation control knob.			
9. Identify a distant aiming point at least 200 meters away.			
10. Ensure the boresight vertical hairline is on a definite edge of the distant aiming point by traversing while looking through the boresight and cross leveling.			
11. Refer the vertical hairline of the M64A1 sight to the same definite edge of the distant aiming point.			
12. Slip the deflection fine scale to zero mils.			
13. Loosen the screws on the deflection fine scale and align the red index line to the red index arrow.			
14. Tighten the screws on the deflection control knob.			
15. Ensure the 64 on the deflection course scale is aligned to the course deflection index arrow.			