105-MM HOWITZER
M101-SERIES
TOWED

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HEADQUARTERS, DEPARTMENT OF THE ARMY

FEBRUARY 1963
105-MM HOWITZER, M101-SERIES, TOWED

FM 6-75, 26 February 1963, is changed as follows:

Page 40. Paragraph 38d is superseded as follows:

   d. Range Quadrant Adjustment.

   (1) Center the cross-level bubble.

   (2) Check the angle of site scale. It should read 3(300). If the angle of site scale does not read 3(300), loosen the two screws on the scale and move the digit 3 into coincidence with the index. Tighten the screws and recheck.

   (3) Check the angle of site micrometer scale. It should read zero and the knob should be locked. If the angle of site knob is not locked with the scale reading zero, see C 8, TM 9-325.

   (4) With the elevation knob, center the longitudinal-level bubble.

   (5) Check the elevation scale. It should read zero. If the elevation scale does not read zero, loosen the two screws on the moveable index and slip the index so that it is in coincidence with the zero. Tighten the two screws and recheck the setting.

   (6) Check the elevation micrometer scale. It should read zero. If it does not read zero, loosen the three locking screws on the knob, slip the scale so that the zero is in coincidence with the elevation micrometer index. Tighten the screws and recheck the setting.
(7) Recheck both bubbles, all scales and indexes.

(8) The adjustment is complete when both bubbles are centered and all scales are at zero except the angle of site scale which should read 3(300).

Page 43. Paragraph 40g is superseded as follows:

*\textit{g. Adjust the range quadrant as follows:}

\begin{enumerate}
\item Cross-level the quadrant.
\item Check the angle of site scale and micrometer scale to ascertain that reading is locked at 300.
\item Adjust elevation scale and elevation micrometer scale to read zero. See paragraph 38d.
\end{enumerate}

Page 54. Paragraph 50d is superseded as follows:

*\textit{d. Place the quadrant on the leveling plates being careful not to reverse the line-of-fire arrow; the bubbles should center.}

\textbf{Note.} Do not disturb the lay of the tube.

Page 56. Paragraph 52e is superseded as follows:

*\textit{e. Range quadrant test. Level the tube with the gunner's quadrant, cross-level the range quadrant. Check the angle of site scale and angle of site micrometer to ascertain that reading is locked at 300. Center the longitudinal-level bubble by turning the elevation knob. The elevation scale and elevation micrometer scale should read zero; if they do not, adjust the scales.}

\textit{Located in back of manual, table I.}

Sequence 9, Assistant gunner column. In lines 2 and 3, “sets sight at 300 and centers bubbles;” is changed to read “verifies that angle of site is locked at 300; centers bubble;”
Located in back of manual, table II.

Sequence 2, Assistant gunner column, step 1. In line 2, "is set at 300" is changed to read "is locked at 300."

Sequence 2, No. 2 column. "Caution" (lines 37 and 38) is rescinded.

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,

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

Distribution:
To be distributed in accordance with DA Form 12-11 requirements for 105 MM Howitzer, M 101-Series, Towed.
FM 6–75, 26 February 1963, is changed as follows:

*Page 18,* paragraph 20. Line 5 “(aiming posts)” is changed to read “(aiming post or collimator).”

*Page 18,* paragraph 20. The following note is added immediately below the last line of text:

*Note.* See figure 7.1.

*Page 18.* Figure 7.1 is added as follows:

*Page 28,* paragraph 29. Line 3 “the aiming posts” is changed to read “the infinity aiming reference collimator (or aiming posts).”

*Page 30.* Paragraph 29d is added as follows:

*d.* The infinity-aiming reference collimator is an optical instrument which simulates an azimuth reference target at infinity. The collimator is aligned with the vertical reticle of the panoramic telescope as directed by the gunner.

(1) The collimator is emplaced from 4 to 17 meters from the left side of the howitzer.

(2) While the howitzer is being laid, number 4 alines the optical system of the collimator on the center of the telescope ro
Figure 7.1. Infinity-aiming reference collimator and auxiliary equipment.

tating head and cross-levels the reticle pattern.

(3) After the howitzer is laid, the gunner directs number 4 in aligning the 0 line of the collimator reticle with the vertical reticle of the panoramic telescope.

(4) To lay for direction during firing, the gunner sets the announced deflection on the panoramic telescope and alines the appropriate number on the panoramic
telescope reticle with the same number in the appropriate direction on the collimator reticle. This procedure for laying also compensates for weapon displacement (fig. 8.1).

Note. For positive identification, an area at least 7 mils in diameter must be seen at all times on the collimator reticle.

Page 30. Figure 8.1 is added as follows:

Page 87, paragraph 83b(6). Line 1 “Aiming posts” is changed to read “The infinity-aiming reference collimator (or aiming posts).”

Pages 87 and 88, paragraph 83c, Test No. 2 and 11. Third item in Action of Candidate column is changed to read “Lays on collimator (aiming posts).”

Page 92, paragraph 86b(1). Line 1 “Aiming posts” is changed to read “The infinity-aiming reference collimator (or aiming posts).”

Page 92, paragraph 86b(2) is rescinded.

Page 93, paragraph 86b(4). Line 1, the words “The far post or” are deleted.

Page 93, paragraph 86c(1). Item 1 in Action of Candidate column is changed to read “Lays the piece to correct for collimator or aiming post displacement.”

Page 93, paragraph 86c(2). Item 2 in Action of Candidate column is changed to read “Directs assistant in aligning the collimator (or aiming posts).”

Page 93, paragraph 86d(1)(a). Line 1 is changed to read “If the reticle of the Panoramic
Figure 8.1. Gunners sight picture of collimator when correcting for displacement.
telescope does not match with the reticle pattern of the collimator, or if using aiming posts, the far aiming post does not appear.”

Page 94, paragraph 86d(2). Subparagraphs (b) and (c) are superseded as follows:

(b) The collimator (or aiming posts) are not properly aligned.

(c) The vertical reticle of the telescope does not match the reticle pattern of the collimator. If aiming posts are used, the vertical reticle of the telescope is not on the aiming posts.

Located in back of manual, table I.

Sequence 8, No. 4 column. Last item is changed to read “Removes the aiming posts or collimator from the traveling position, assembles them (it) and places them (it) to the right of the piece.”

Sequence 12, Gunner column.

Line 1 is changed to read “*Directs alignment of aiming posts or the infinity-aiming reference collimator.”

Line 3 is changed to read “scope, or illuminates the reference collimator reticle, and refers the vertical hairline of the panoramic telescope to the center of the reticle.”

Line 6 is changed to read “telescope, or directing number 4, alines the zero line of the collimator with the vertical reticle of the panoramic telescope. (Minor adjustment may be made by both the gunner and number 4, to insure exact coincidence.)”
Sequence 12, No. 4 column. The following item is added:

"If the infinity-aiming reference collimator is used, assists the gunner in orienting it."

Located in back of manual, table III.

Sequence 3, Chief of Section column. Line 1, "TARGET (TANG, etc.)" is changed to read "TARGET (TANK, etc.)."

Bottom of table, ONE-MAN, ONE-SIGHT SYSTEM portion, 2d column, Note below item 5 is superseded as follows:

Note. The reticle on the panoramic telescope M12A7D, is graduated for shell HE, Charge 5. When firing charge 7, with this telescope, at ranges under 2,400 meters; use one-half of the true range for laying on the target. For shell HEP-T, use one-third of the true ranges under 2,000 meters. No range correction is necessary for shell HE, charge 7 on the M12A7H panoramic telescope.

Located in back of manual, table IV.

Sequence 5, No. 4 column is changed to read "Recovers, and stows the reference collimator (aiming posts if required)."

Table V is superseded (located in back of this change).
### Table V. Trajectory Characteristics, Shell HE, Charge 7; Shell HEP-T

**Shell HE, Chg. 7.**

<table>
<thead>
<tr>
<th>Range (meters)</th>
<th>Elevation (mils)</th>
<th>Trajectory characteristics</th>
<th>Firing data</th>
<th>Range (meters)</th>
<th>Elevation (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>2</td>
<td>Within these ranges, the trajectory is flat enough to prevent an 8-foot tank from passing under it. A range of 400 meters is ideal for opening fire on the target.</td>
<td>Start firing using a 400 meter range setting.</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>200</td>
<td>5</td>
<td></td>
<td></td>
<td>200</td>
<td>3</td>
</tr>
<tr>
<td>300</td>
<td>7</td>
<td></td>
<td></td>
<td>300</td>
<td>5</td>
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<tr>
<td>400</td>
<td>10</td>
<td></td>
<td></td>
<td>400</td>
<td>7</td>
</tr>
<tr>
<td>500</td>
<td>12</td>
<td></td>
<td></td>
<td>500</td>
<td>9</td>
</tr>
<tr>
<td>600</td>
<td>15</td>
<td>Within these ranges, bracket adjustment of the target is required. 200 meter range changes should be made until a bracket is obtained.</td>
<td>1. Start firing with the estimated range at the closest 100 meter range.</td>
<td>800</td>
<td>15</td>
</tr>
<tr>
<td>700</td>
<td>17</td>
<td></td>
<td></td>
<td>900</td>
<td>18</td>
</tr>
<tr>
<td>800</td>
<td>20</td>
<td></td>
<td></td>
<td>1,000</td>
<td>20</td>
</tr>
<tr>
<td>900</td>
<td>23</td>
<td></td>
<td></td>
<td>1,100</td>
<td>22</td>
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<tr>
<td>1,000</td>
<td>25</td>
<td></td>
<td></td>
<td>1,200</td>
<td>25</td>
</tr>
<tr>
<td>1,100</td>
<td>28</td>
<td></td>
<td></td>
<td>1,300</td>
<td>28</td>
</tr>
<tr>
<td>1,200</td>
<td>31</td>
<td></td>
<td></td>
<td>1,400</td>
<td>31</td>
</tr>
<tr>
<td>1,300</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,400</td>
<td>37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,500</td>
<td>40</td>
<td>At ranges over 1,400 meters, bracket adjustment of the target is also required. 400 meter range changes should be made until a bracket is obtained.</td>
<td>1. Start firing with the estimated range at the closest 100 meter range.</td>
<td>1,500</td>
<td>34</td>
</tr>
<tr>
<td>1,600</td>
<td>43</td>
<td></td>
<td></td>
<td>1,600</td>
<td>37</td>
</tr>
<tr>
<td>1,700</td>
<td>46</td>
<td></td>
<td></td>
<td>1,700</td>
<td>40</td>
</tr>
<tr>
<td>1,800</td>
<td>49</td>
<td></td>
<td></td>
<td>1,800</td>
<td>44</td>
</tr>
</tbody>
</table>

1. Start firing with the estimated range at the closest 100 meter range.
2. Adjustment on the target by bracketing (overs and shorts) is required.
3. Make 200 meter range changes until a bracket is obtained.
By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General, United States Army,
Chief of Staff.

Kenneth G. Wickham,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-11 requirements for 105 MM Howitzer, M101 Series, Towed.
# 105-MM HOWITZER
## M101-SERIES
### TOWED

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* This manual supersedes FM 6–75, 1 December 1960, including C 1, 15 May 1962.

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I. Purpose and Scope

a. This manual is a guide to assist commanders and chiefs of sections in developing 105-mm howitzer M101A1, towed sections into teams that will operate effectively in battle.

b. This manual prescribes the duties of the section personnel in—
   (1) Section drill.
   (2) Preparation for firing and traveling.
   (3) Firing.
   (4) Tests and adjustments.
   (5) Maintenance and inspections.
   (6) Decontamination of equipment.
   (7) Destruction of equipment.

c. This manual is applicable to both nuclear and nonnuclear warfare without modification.

d. To improve this manual, users are encouraged to submit recommended changes and comments. The procedure is as follows:
   (1) Key comments to the specific page, paragraph, and line.
   (2) Include supporting reasons with each comment.
   (3) Send direct to U. S. Army Artillery and Missile School, ATTN: AKPSIPL, Fort Sill, Okla.
2. Composition of the Howitzer Section

The personnel of the howitzer section are the—

a. Chief of Section (CS).
b. Gunner (G).
c. Assistant Gunner (AG).
d. Five cannoneers, numbered 1 through 5.
e. Prime Mover Driver (D).

3. Duties of the Chief of Section

The chief of section is the noncommissioned officer in command of the section. He is responsible for the—

a. Training and efficiency of personnel.
b. Performance of duties in drill, firing, tests and adjustments, inspection, and maintenance.
c. Observance of safety precautions.
d. Preparation of field fortifications.
e. Camouflage discipline; local security; and chemical, biological, and radiological security discipline.

g. Police and improvement of the section area.

4. Equipment

Section equipment is shown in figure 2.

Figure 2. Section equipment, 105-mm howitzer.
5. Definitions

a. Front.

(1) The front, howitzer coupled, is the direction in which the prime mover is pointed.

(2) The front, howitzer uncoupled, is the direction in which the muzzle points.

b. Right (left). The right (left) of one facing to the front.

6. References

Publications applicable to the 105-mm howitzer M101 series, towed, are listed in the appendix.
CHAPTER 2
SECTION DRILL

Section I. GENERAL

7. Purpose

This chapter prescribes the—

a. Objectives and instructions for section drill.
b. Commands and formations for section drill.

8. Objectives

The objective of section drill is the attainment of efficiency: precision coupled with high speed.

9. Instructions

Section drill will be—

a. Conducted in silence except for commands and reports.
b. Repeated until reactions are automatic, rapid, and efficient.
c. Supervised so that mistakes are discovered, reported, and corrected immediately.
d. Supervised by battery officers to insure uniformity and efficiency.
e. Conducted so that each member of the section can perform all duties within the section.

Section II. COMMANDS AND FORMATIONS

10. Forming the Section

To form the section, the chief of section takes his post and gives one of the following commands:
a. To form the section the command is FALL IN. The section—
(1) Moves at double time.
(2) Forms in single rank at close interval, with the gunner on the right, the assistant gunner, the cannoneers in numerical order, and the driver at the left of the rank.
(3) Centers on the chief of section at a distance of 3 paces (fig. 3).

b. To form the section in a particular place, the commands may be 1. IN FRONT (REAR) OF YOUR PIECE, 2. FALL IN. The section—
(1) Moves and forms a single rank as in a above.
(2) Faces the direction of fire.

c. To form the section in a particular direction the commands may be 1. ON THE ROAD FACING THE PARK, 2. FALL IN. The Section—
(1) Moves and forms a single rank as in a above.
(2) Faces the direction indicated in the command.

d. At the first formation for a drill or exercise, the caution “as a section” precedes the command.

Figure 3. Section in formation.
11. To Call Off

With the section in formation, the command is CALL OFF.

a. All personnel except the gunner execute eyes right.

b. The section calls off in sequence: “Gunner, Assistant Gunner, 1, 2, 3, 4, 5, Driver.”

c. As each man calls out, he turns his head smartly to the front.

12. To Take Posts

The command is 1. CANNONEERS, 2. POSTS.

a. The command is general and may be given in or out of ranks, at a halt, or marching.

b. All movements are executed at double time and are terminated at the position of attention.

c. The section moves to posts as shown in figures 4, 5 and 6.

13. To Change Posts

To train all members of the section in all duties, posts should be changed frequently. With the section in formation, the commands are—

a. 1. CHANGE POSTS, 2. MARCH.

(1) Number 5 moves at double time to the post of the assistant gunner.

(2) The assistant gunner and numbers 1 through 4 take two left steps, each cannoneer taking the position of the next higher numbered cannoneer.
Figure 4. Posts, uncoupled.
Figure 5. Posts, uncoupled, march ordered.
Figure 6. Posts, prepared for action.

b. 1. SECTION CHANGE POSTS, 2. MARCH.
   (1) The leftmost man moves at double time to the post of gunner.
   (2) All other men move as in a above.

14. To Mount

To mount, the following commands may be given:

a. 1. PREPARE TO MOUNT, 2. MOUNT.
   (1) At the preparatory command, the section moves at double time to positions shown in figure 4.
Figure 7. Posts, coupled mounted.
(2) At the command of execution, personnel mount and take positions as shown in figure 7.

(3) Each cannoneer is assisted by the man directly behind (or in front) to insure rapid mounting, and to prevent injuries.

(4) Before the chief of section mounts he will verify that the load is properly coupled, that personnel and equipment are aboard and that the tail gate and safety strap are secure.

(5) If any member of the section is not to mount, he is designated and cautioned to stand fast. 1. PREPARE TO MOUNT, DRIVER STAND FAST, 2. MOUNT.

b. MOUNT. The section moves directly to the positions shown in figure 7.

15. To Dismount

To dismount the following commands may be given:

a. 1. PREPARE TO DISMOUNT, 2. DISMOUNT.

   (1) At the preparatory command, personnel assume a standing position in order to dismount rapidly.

   (2) At the command of execution, personnel jump to the ground and take positions as shown in figure 4.

b. DISMOUNT. The section moves without delay to positions as shown in figure 4.
16. To Fall Out

The command FALL OUT is given to provide rest and relief during drill or firing.

a. During Drill.

(1) The command may be given at any time.

(2) The section remains in vicinity of drill area.

b. When Firing.

(1) The command may be given when firing is temporarily suspended.

(2) The section remains in vicinity of, but clear of the piece.

(3) The settings and layings are not disturbed.
CHAPTER 3
DUTIES OF THE HOWITZER SECTION

Section I. PREPARATIONS FOR FIRING

17. Purpose

This chapter prescribes duties for—

a. Preparing the howitzer for firing (table I).

b. Firing by indirect laying (table II).

c. Firing by direct laying (table III).

d. Preparing the howitzer for traveling (table IV).

Table I. Duties in Prepare for Action
(Located in back of manual)

Table II. Duties in Firing, Indirect Laying
(Located in back of manual)

Table III. Duties in Direct Laying
(Located in back of manual)

Table IV. Duties in Preparation for Traveling
(Located in back of manual)

18. At the Position

a. The howitzer is emplaced under direct supervision of the chief of section.

b. Preparation of the firing position prior to occupation is governed by time factors and unit SOP. The following preparation will, however, facilitate the occupation:
(1) Mark the position with a stake to indicate the place over which the panoramic telescope is to be located.

(2) Place another stake at a distance of 50 to 100 meters, in the approximate direction of fire, at which the tube can be pointed.

c. Spade pits should be dug if time permits. The spades may be seated by firing in soft ground, but carriage displacement will be greater than if the spades had been dug in initially.

d. A recoil pit must be dug for high-angle fire. After the piece is emplaced, elevate it to maximum elevation. Dig the recoil pit to provide a 50-inch clearance between the breech and the ground, and clearance throughout traverse limits. The pit should be covered when not firing high-angle in order to facilitate service of the piece.

19. To Prepare for Action

a. The command is PREPARE FOR ACTION.

(1) The command may be given with the howitzer in position or approaching the position.

(2) Duties of individuals are given in table I.

(3) Each man takes his post (fig. 6) when he has completed his duties.

b. All duties are conducted at double time.

c. If the howitzer is not to be prepared for action at the firing position, a supplementary command DO NOT PREPARE FOR ACTION must be given.
Section II. FIRING

20. Firing by Indirect Laying

The vast majority of targets will be attacked by indirect laying. Indirect laying is a method of taking targets under fire by placing the line of sight of the panoramic telescope on an aiming point other than the target (aiming posts). To provide timely and accurate fire, the section must be indoctrinated with a sense of urgency. Every effort must be made to execute the timely and effective delivery of fire. A detailed list of duties is contained in table II.

21. Firing by Direct Laying

Some targets may be attacked by direct laying. This is a method of taking the target under fire by sighting directly on the target. Since such targets are usually capable of returning fire, the following factors must be emphasized:

a. Speed and accuracy in laying.
b. High standards of training.
c. Section operation as an independent unit.

22. Methods of Direct Laying

a. Sighting System. The two-man, two-sight system is the principal sighting system to be used with the weapon.

(1) The gunner establishes lead with the panoramic telescope.

(2) The assistant gunner establishes range with the elbow telescope.
b. **One-Man, One-Sight System.** The one-man, one-sight system in which the gunner lays for both deflection and elevation may be used if required. However, the two-man, two-sight system provides faster laying, better accuracy, and a greater assurance of first round hits.

c. **Laying Method.** Central laying is used.

(1) The gunner places the appropriate vertical reticle of the telescope on the center of the target.

(2) The assistant gunner places the appropriate range line of the elbow telescope on the center of the target.

d. **Tracking the Target.** After lead and range are laid on the target, continuous tracking is maintained during the firing sequence.

e. **Specific Duties in Firing.** Specific duties in firing by direct laying are shown in table III.

23. **Range Card**

a. The chief of section is responsible for the defense of his assigned sector. He should also be prepared to deliver fire in all sectors (directions).

b. During reconnaissance of the position and shortly after occupation of position, the chief of section will—

(1) Measure or estimate the ranges to prominent terrain features and likely avenues of approach.

(2) Establish reference points as required.

(3) Prepare a range card (fig. 8).
(4) As time permits, replace estimated ranges with more accurate ranges obtained by pacing, taping, speedometer, maps, or survey.

c. The executive officer will assign numbers to certain prominent terrain features to facilitate target location. For example, the executive commands, TARGET, TANKS POINT NUMBER 2, FIRE AT WILL.

d. As time permits, a deflection and a quadrant for each numbered point should be added to the range card to expedite and increase accuracy in firing.
Table V. Trajectory Characteristics, Shell HE, Charge 7; Shell HEP-T
(Located in back of manual)

e. The field of fire of the section should, if possible, be cleared of obstructions that might hinder fields of fire or observation. Care must be taken not to expose the location of the position.

24. Trajectory Characteristics

Trajectory characteristics for different ranges must be considered prior to taking a target under fire. Information contained in table V provides data, covering the effective direct fire ranges of the weapon.

25. Preparations for Traveling

The command is MARCH ORDER.

a. Duties of individuals are given in table IV.

b. Each man takes his post (fig. 4), when he has completed his duties.

Section III. PREPARATION FOR AIRMObILE OPERATIONS (TYPE A AND B LOADS)

26. General

a. Disassembly, and assembly of the howitzer for airmobile operations requires 10 persons for the type A load, and 15 persons for the type B load. It is required, therefore, that the section be augmented to perform the operation.

b. The special equipment required is lifting bars, nylon webbing, and miscellaneous tools.
c. If the medium cargo helicopter is used, the howitzer can be lifted in one load. The nylon straps are connected to each wheel and the lunette ring and drawbar as in the type A and B loads.

27. Procedures

a. Disassembly—Type A Load.

(1) The assistant gunner and the No. 2 cannoneer remove auxiliary shield from the right side of the howitzer while No. 1 and 3 remove the shield from the left side (special tools required for removal of shields are available in the battery maintenance section) (fig. 9).

(2) No. 1 man removes the sights and breechblock assembly from the breech recess and places them in section chest.

(3) No. 3 places a 12-inch block of wood between the equilibrator rear seat and fulcrum to neutralize the stress of the equilibrator. Places the lifting bars on the carriage between the elevating arcs and the recoil mechanism (length of bars running front and rear), and straps them on with two adjustable nylon straps which are 3 feet long.

(4) No. 5 removes howitzer locking ring and places it in section chest.

(5) The lifting bar is inserted horizontally through the breech recess in the breech ring by No. 1. No. 1, 3, and 5 will carry the portion of the bar extending out the left side and the assistant gunner, No. 2,
and 4 will man the right side. The tube is drawn to the rear of the howitzer and the second lifting bar is placed under the forward portion of the tube before it clears the carriage. The two extra cannoneers will man and support the left portion of the bar at the muzzle end while the chief of section and gunner support the right portion.

(6) The howitzer tube is carried to the assigned helicopter loading point.

(7) The howitzer carriage is towed or man-handled to its assigned helicopter loading point and trails are closed.

(8) The chief of section supervises No. 2, 3, and 4 cannoneers in rigging the howitzer carriage for helicopter lift (fig. 10).
Figure 10. Carriage and recoil mechanism prepared for type A load.

(a) No. 4 cannoneer holds nylon ring with three straps attached.
(b) No. 1 cannoneer places chain on left wheel at top center while No. 2 places chain in same position on right wheel.
(c) No. 4 takes position on the cradle while No. 1, 2, and 3 takes the long strap and slips the loop over the lunette ring and drawbar.
(d) No. 1 takes the nylon strap on the left side and connects the loop in the end to the clevis attached to the wheel. No. 2 man completes the same operation on the right side.
(e) No. 4 places sight mounts in a position which will not interfere with nylon straps.
(f) No. 1 and 2 tape straps with masking tape to prevent them from slipping under sight mounts when slack is taken up during helicopter lift.
(9) The gunner supervises the assistant gunner, No. 5, and one extra cannoneer in rigging the howitzer tube for helicopter lift (fig. 11).

Figure 11. Tube prepared for type A load.

(a) The No. 5 cannoneer holds the nylon ring with two attached straps.

(b) One extra cannoneer threads end with large loop through the breech recess, then passes small end loop through the larger loop to form a slip knot above the breech recess. The assistant gunner runs the other strap around the muzzle end of the tube at the bearing surface located behind the barrel locking ring threads. The extra cannoneer takes a clevis and inserts it on the front strap, placing the loop in the jaws of the clevis, inserts the clevis pin so that it passes through the loop (small), and secures.

b. Reassemble—Type A Load. Procedures outlined in a above are executed in reverse order. It
is imperative that all mechanisms be scrutinized for possible damage and dirt which may render the weapon unsafe to use.

c. Disassembly—Type B Load.

(1) Same as a(1) and (2) above.

(2) No. 5 cannoneer removes the recoil piston rod outer locking nut.

(3) Same as a(4) above except that six cannoneers from an alternate howitzer section will assist in the removal of the tube and recoil mechanism as a single intact unit. This is accomplished by introducing a third lifting bar and utilizing nylon straps which are wrapped around the tube at the muzzle end and around the recoil mechanism at the center of the piece. The third lifting bar is inserted through the breech for carrying.

(4) Same as a(5) through (8) above (figs. 12 and 13).

Figure 12. Carriage prepared for type B load.
d. Reassembly—Type B Load. Procedures outlined in c above are executed in reverse order.

e. Hookup Procedure.

(1) The gunner positions himself in front of carriage, and, by signals, directs the helicopter to a hovering position directly over the load. No. 4 places the nylon ring in the helicopter cargo hook. During night hookup an additional cannoneer may be positioned at the right side of the helicopter to relay signals to the gunner.

(2) After carriage is lifted the gunner and No. 4 man move to the howitzer tube loading point and repeat the hookup process. Section personnel and their equipment are loaded into the helicopter while the tube is being hooked up and are transported to the position area internally.
CHAPTER 4

TECHNIQUES AND SITUATIONS THAT REQUIRE SPECIAL ATTENTION

28. Precision in Laying

a. Fire control instruments, fuze setters, and elevation and traverse mechanisms must be operated to reduce the effects of lost motion.

b. The gunner and assistant gunner will verify the laying after the breech has been closed.

c. For uniformity and accuracy—

(1) The line of sight for setting and reading a scale or centering a bubble should be at a right angle to the scale or level vial to prevent parallax errors.

(2) The vertical reticle of the panoramic telescope is aligned with the left edge of the aiming posts.

29. Aiming Points

After the howitzer has been laid for direction, it is referred to a primary aiming point, normally the aiming posts and alternate aiming points (distant aiming points) as required.

a. An aiming point must be a sharply defined point, or a clearly visible vertical line.

b. Alternate aiming points (distant aiming points) must be at least 2,000 meters distant. This
distance prevents displacement in firing or traverse from causing more than a ½ mil horizontal change in direction with the same settings on the scales.

c. The aiming posts are placed in alinement with the vertical reticle of the panoramic telescope as directed by the gunner.

(1) The far aiming post is placed at least 100 meters from the piece. This distance is the most desirable for accuracy, visibility, and control of the aiming post lights.

(2) The near aiming post must be set up halfway between the far post and the piece. Equal spacing is accomplished either by pacing, or by measuring with the panoramic telescope and using the aiming post as a stadia rod or by using a wire or cord with the appropriate distances marked in a convenient manner.

(3) If the aiming post is used as a stadia rod, the procedure is as follows:

(a) Number 4 stands at the far aiming post and holds the upper section of an aiming post parallel to the ground and perpendicular to the line of sight.

(b) The gunner measures the length of the aiming post in mils on the reticle of the panoramic telescope.

(c) The gunner directs number 4 to move toward the piece and to emplace the near aiming post at a point where the
upper section measures twice the number of mils it measured at the far aiming post.

(4) For night use, the light on the far aiming post should be placed so that it appears several feet above the light on the near aiming post. The lights placed in this manner establish a vertical line for laying the howitzer.

(5) Unit SOP will specify the deflection at which to place the aiming posts; however, placing the aiming posts at deflection-2800 reduces misalinement and allows for maximum visibility.

(6) Correction for displacement of the aiming posts from the vertical reticle of the panoramic telescope is discussed in table II.

30. Changes in Data During Firing

If it is necessary to change any element of firing data, the executive commands CORRECTION.

a. Piece unloaded. Set off new data and resume firing when the quadrant is announced.

b. Piece loaded. Set off new data and resume firing when the quadrant is announced if no change is required in the fuze, time setting, or charge.

(1) If the data requires a change in the fuze, time setting, or charge, the chief of section will suspend firing and report to the executive, “Number 2 loaded, charge
( ), fuze ( ), time ( ),” stating the elements that are changed.

(2) In continuous fire, changes in data are applied without stopping the fire or breaking its continuity.

31. To Unload the Howitzer

a. Once a completed round is loaded, it should be fired. However, if unloading is required, the command is UNLOAD.

b. If the howitzer has been fired repeatedly and the tube is heated, it should be fired if possible; or if necessary, unload the weapon as quickly as possible.

c. Unloading will be supervised by an officer and the procedure is as follows:

(1) The assistant gunner opens the breech slowly.

(2) Number 1 standing at the breech, receives the ejected round.

d. If the extractor fails to eject the cartridge case, the procedure is as follows:

(1) Number 2 obtains the rammer staff and the unloading rammer head.

(2) The officer inspects the rammer head to insure that it is free from obstruction.

(3) Number 2 inserts the rammer into the bore until the head incloses the fuze and touches the projectile.

(4) Number 2 then pushes on the rammer, and taps the end of the staff lightly with a wooden block if necessary, until the round is dislodged.
(5) Number 1 receives the round as it is pushed out of the breech.

e. If the cartridge case is extracted but not the projectile, the procedure is as follows:
   (1) Number 1 fills the chamber with waste and closes the breechblock.
   (2) Number 2 dislodges the projectile as in $d$ above.
   (3) Number 1 opens the breech, removes the waste and receives the projectile as number 2 pushes the projectile to the rear.

32. Care of Ammunition

To insure uniform results in firing, to prolong the life of the tube, and to avoid accidents, great care must be exercised in handling and storing ammunition. The following requirements should be met:

a. Information contained in TM 9–1900 that are applicable to field service should be followed.

b. Protect the ammunition from damage.
   (1) Leave in containers until just prior to firing.
   (2) Use tarpaulins and dunnage to protect ammunition against weather, dirt, and sun.
   (3) Raise ammunition stacked in the open 6 inches off the ground, and dig drainage ditches around the stacks.
   (4) Allow 6 inches air space between the top of the stack and the covering tarpaulin.
Note. Uniform propellant temperatures must be maintained to provide accurate firing.

c. Explosive elements in fuzes are particularly sensitive to shock and high temperature. The precautions to be observed are as follows:

(1) Protect from weather, direct sunlight and rough handling.
(2) Remove protection and safety devices from fuzes just prior to their use.
(3) Do not attempt to disassemble a fuze.

d. Protection against hostile fire may be accomplished by—

(1) Dispersing ammunition in small stacks.
(2) Store ammunition in trenches and dugouts.
(3) Insure that each stack of ammunition does not contain more than 75 rounds, is not more than four layers high.
(4) Placing stacks of ammunition at least 10-meters apart.

e. Ammunition should be sorted into lot numbers as it is stored.

f. For further information on care of ammunition, see FM 6–40, TM 9–325, TM 9–1300–203, and TM 9–1900.
CHAPTER 5
BORESIGHTING

Section I. GENERAL

33. Description

Boresighting is—

a. The process to verify, and align if required, that the optical axis of the panoramic telescope and the elbow telescope is parallel to the axis of the tube in deflection and elevation.

b. Conducted prior to firing and, when necessary, during lulls in firing.

c. Performed to insure accuracy in laying for elevation and direction.

34. Methods of Boresighting

a. The methods of boresighting this howitzer are:

(1) Testing target method (par. 36–38).
(2) Distant aiming point method (par. 39–41).
(3) Standard angle method (par. 42–44).

b. The method of boresighting to be used will be determined by the unit SOP and the time available.

35. Equipment

The equipment that is needed for boresighting is described below:
a. Front and Rear Boresight.

(1) Front and rear boresights are used to align the tube on the testing target or distant aiming point.

(2) If boresights are not available, cross-hairs are fastened to the muzzle and the firing pin hole in the breechblock bushing is used as the rear sighting guide by removing the firing lock from the breechblock.

b. Testing Target. The testing target provides accurate aiming diagrams for the tube, the panoramic telescope, and the elbow telescope in boresighting and testing. The testing target is prepared as follows:

(1) Mount the testing target on a flat piece of material and fasten it to a stand to provide stability (fig. 14).

(2) Install a blumbline and mil scale for use in leveling or canting the target (fig. 14).

(3) Draw vertical reference lines for use when the trunnions are not level. The testing target must be canted an equal amount and in the same direction (fig. 14).

(4) To facilitate boresighting in darkness, bore \( \frac{1}{8} \)-inch hole through the center of each aiming diagram and cover each hole with a piece of heavy cloth. A flashlight is held against the material to provide an aiming point for blackout conditions.
c. Tools. Section equipment includes all necessary tools for boresighting and testing.

Caution: Use the proper tools to prevent damage to fire control equipment.

d. Plumbline. The plumbline is used to level the trunnions for testing and to boresight the howitzer if time is not a factor. The plumbline is prepared as follows:
(1) Suspend the line from any convenient location so that the muzzle of the howitzer can be placed at a distance of approximately 5 feet from the line. For a more complete test insure that the line is long enough to allow for the highest possible tube elevation.

(2) Attach a weight to the end of the line for tautness and, to prevent the line from swinging, place the weight in a liquid filled container.

Section II. TESTING TARGET METHOD

36. General

The testing target method consists of aligning the line of sight of the tube, panoramic telescope, and the elbow telescope with the aiming diagrams on the testing target.

37. Preparations for Boresighting

Preparations for boresighting are as follows:

a. Place the howitzer on level ground.

b. Place the tube in the center of traverse.

c. Install the front and rear boresights (par. 35a).

d. Level the trunnions by using a plumbline, a gunner's quadrant, or matching the scribed lines on the telescope mount. The plumbline method is preferable, and the procedure is as follows:

  (1) Install a plumbline (par. 34d).

  (2) Traverse the tube until the plumbline is aligned with the front and rear boresights.
(3) Elevate and depress the tube throughout its limits. The vertical hairline of the front boresight should remain in coincidence with the plumbline.

(4) If coincidence is not maintained, raise one of the trails until the vertical hairline on the muzzle does track the plumbline.

(5) Perform steps in (3) and (4) above until coincidence is maintained throughout the elevation limits. Block the raised trail to make it solid. The trunnions are now solid.

e. The gunner's quadrant will normally be used to level the trunnions under field conditions when time is critical. The procedure is as follows:

(1) Use gunner's quadrant that has been checked by the end-for-end test.

(2) Set the index arm and the micrometer scale on the quadrant at zero.

(3) Place the quadrant in the breech recess parallel to the trunnions.

(4) Raise one trail until the bubble on the gunner's quadrant is centered.

f. If a plumbline or a gunner's quadrant is not available, match the white scribed lines on the telescope mount and raise one trail until the telescope mount cross-level bubble is centered. The scribe lines are scribed after a basic periodic test.

g. Set the tube at zero elevation by using a gunner's quadrant and applying corrections, as determined from the end-for-end test.
h. Center the longitudinal- and cross-level bubbles of the panoramic telescope mount.

38. Boresighting Procedures With Testing Target

With the weapon prepared as in paragraph 37, boresight as follows:

a. Testing Target Location. Locate testing target at least 50 meters in front of the howitzer.

b. Testing Target Alinement. Without moving the tube, aline the center aiming diagram of the testing target with the line of sight through the tube. The testing target must be placed perpendicular to the axis of the bore. The testing target must then be made secure.

c. Panoramic Telescope and Mount Alinement.

(1) Check the tangent screws for a firm sliding fit.

(2) Set the azimuth scale on the panoramic telescope to zero by turning the micrometer knob.

(3) Set the azimuth micrometer scale to zero (loosen the micrometer locking nut and slip the scale to zero, if necessary). The left index must also coincide. Tighten the micrometer locking nut.

(4) Loosen the tangent screw lock screws and with the tangent screws bring the vertical hair into alinement with the aiming diagram of the test target. Tighten the tangent screw lock screws. Recheck the scales and the fit of the telescope in the mount.
(5) Turn the elevation micrometer knob so that the horizontal crosshairs of the reticle of the telescope are on the appropriate aiming diagram of the testing target. The elevation micrometer scale should read zero. If it does not, loosen the screws on the knob, hold the knob, and slip the scale to zero. Tighten the screws. Only ordnance is authorized to adjust the coarse (azimuth) indexes.

(6) Match the elevation indexes on the sight mount by loosening the screws on the movable elevation index and the nut on the longitudinal-leveling knob (elevation knob). Tighten the screws and recheck.

d. Range Quadrant Adjustment.

(1) Set the elevation scale at zero by turning the elevation knob.

(2) The elevation micrometer scale should read zero. If the elevation micrometer does not read zero, loosen the three screws in the knob and, without moving the knob, slip the zero of the micrometer scale into coincidence with the index. Tighten the screws and recheck.

(3) Level the cross-level bubble.

(4) With the angle of site knob, level the longitudinal-level bubble.

(5) Check the angle of site scale. It should read 3 (300). If the angle of sight scale does not read 3 (300), loosen the two screws on the scale and move the digit
3 into coincidence with the index. Tighten the screws and recheck.

(6) Check the angle of site micrometer scale. It should read zero. If the angle of site micrometer scale does not read zero, loosen the screw in the micrometer knob and, holding the knob so as to keep the bubble centered, move the zero into coincidence with the index. Tighten the screw and recheck.

(7) Recheck both bubbles, all scales, and indexes.

(8) When the adjustment is complete, both bubbles are centered and all scales are at zero except the angle of site scale which should read 3 (300).

e. Adjustment of the Elbow Telescope.

(1) Level the reticle to the field of view with the bracket rotating knob.

(2) The N reticle line should be on its aiming diagram on the testing target.

(3) If the N reticle line is not set correctly—
   (a) Loosen the worm clamping bolt.
   (b) Move the elevation adjustment worm to bring the N line to coincidence with the aiming diagram on the testing target.
   (c) Tighten the worm clamping nut and recheck.

   Note. No adjustment can be made for deflection.
Section III. DISTANT AIMING POINT METHOD OF BORESIGHTING

39. General

The distant aiming point method consists of aligning the line of sight of the tube, the panoramic telescope and the direct fire telescope on an aiming point at a distance of at least 2,000 meters. This distance is used to insure that the mechanical axis of the tube and the optical axis of the telescopes intersect to form an angle not greater than one-fourth mil and are thereby approximately parallel.

40. Preparations for Boresighting

Preparations for boresighting are as follows:

a. The weapon should be near its center of traverse and pointed in the general direction of the distant aiming point.

b. Accurate cross-leveling of the trunnions is unnecessary for boresighting on a distant aiming point; however, they should be as level as possible.

c. The breech and muzzle boresights must be in their proper positions.

d. All instruments and mounts must be positioned securely without free play.

e. Set the tube at zero elevation by performing the end-for-end test on the gunner's quadrant.

f. Level the telescope mount by centering the cross- and longitudinal-level bubbles or by matching scribe lines on mount. Lock the elevation movement by tightening the wingnut. In this
position, the coarse and the fine set of elevation indexes must coincide. If they do not, make the following adjustment:

1. Loosen the two retaining screws on the adjustable coarse index and aline the two coarse indexes.

2. Loosen the retaining nut on the elevation knob and slip the index ring to aline the two fine indexes.

3. Tighten the two screws and the nut and verify the adjustment.

Note. The coarse and fine sets of elevation indexes must be in coincidence at all times during the boresighting operation.

g. Adjust the range quadrant as follows:

1. Cross-level the range quadrant and set the elevation and micrometer scales to zero.

2. Set the angle of site scale to 3 (300) and the angle of site micrometer scale to zero. In this position, the longitudinal-level bubble must center. If it does not, center the bubble by means of the angle of site micrometer knob.

3. Loosen the two retaining screws on the angle of site scale and slip the scale to aline the “3” with the angle of site scale index.

4. Loosen the screw in the angle of site micrometer knob and slip the angle of site micrometer scale to aline the zero with the micrometer scale index.
(5) Check to insure that the longitudinal bubble is still centered.

(6) Tighten the screw in the angle of site micrometer knob and the two retaining screws on the angle of site scale and verify the adjustment.

41. Boresighting Procedures, Distant Aiming Point

a. While looking through the breech boresight, elevate and traverse the tube until the intersection of the crosshairs of the muzzle boresight is aligned on the distant aiming point.

b. Adjust the panoramic telescope as follows:

(1) Check to insure that the azimuth and micrometer scales are set at zero.

(2) Adjust the vertical line in the reticle of the telescope on the distant aiming point by means of the tangent screws.

(3) The boresight picture observed in the telescope must be the same as the sight picture observed through the tube.

(4) Adjust the horizontal line on the distant aiming point by means of the elevating knob on the telescope. If the fine indexes do not coincide, loosen the three screws on top of the elevating knob and slip the scale. Tighten the three screws and verify the adjustment. Adjustment of the coarse index by battery personnel is not authorized.

(5) The panoramic telescope should be removed from the sight mount and then replaced to determine if there is any
looseness in the seating or if the tangent screws have been adjusted too tightly. This operation may reveal that the tangent screws must be readjusted to bring the line of sight on the distant aiming point.

c. Adjust the elbow telescope as follows:

(1) If the reticle pattern appears tilted in relation to the terrain, turn the rotating knob on the telescope mount until the range lines are parallel to the horizon.

(2) If the N range line on the elbow telescope is not aligned with the distant aiming point, loosen the elevation worm clamping bolt on the telescope mount and turn the elevation worm to bring the N range line of the elbow telescope in coincidence with the aiming point; tighten the clamping bolt and verify the adjustment.

(3) This mount does not provide for any lateral adjustment.

Section IV. STANDARD ANGLE METHOD OF BORESIGHTING

42. General

When positions are occupied in combat, the necessity for speed in opening fire or the necessity for observing camouflage discipline may make the boresighting methods previously described impracticable. Under such circumstances, the alinement of the optical axis of the panoramic telescope
parallel to the axis of the bore may be tested and adjusted by referring to a selected point on the muzzle. The deflection and elevation angles necessary to refer the line of sight of the telescope to the selected point of the muzzle will be referred to as the standard angles. During the basic periodic test, when the panoramic telescope has been found to be in correct alinement, is an ideal time to establish standard angles for later use. Once they have been determined, they may be used for a quick test of the alinement of the panoramic telescope when more precise methods cannot be used. Misalinement discovered and corrected as a result of this test should be verified by a more accurate method at the earliest opportunity. When using the standard angle method of boresighting, be sure that the position of the recoiling parts with respect to the nonrecoiling parts is the same as when the standard angles were determined. Because of this, the recoil system must be checked to see that it contains the proper amount of recoil oil before determining the standard angle.

43. Preliminary Operations

The procedure for establishing standard angles is as follows:

a. With the tube in battery, scribe lines in the paint to mark the position of parts which move in recoil with respect to parts which do not move in recoil.

b. Carefully level the trunnions.

c. Boresight the gun using a testing target.
d. With adhesive tape, fasten a bright common pin in the left horizontal witness mark. Allow the pin to project to the left of the muzzle.

e. Fasten a telescope parallax shield in place over the eyepiece.

f. Verify that the elevation index and the micrometer on the telescope are at zero.

g. Elevate the tube until it is approximately level with the top of the panoramic telescope.

h. Center the bubbles of the telescope mount and refer the telescope to the junction of the pin with the muzzle. Adjust the tube elevation and turn the azimuth micrometer knob until, with the bubbles centered, the horizontal and vertical hairs of the telescope are exactly on the junction of the pin with the muzzle.

i. Read the angle from the panoramic telescope to the nearest one-fourth mil. Since the graduations are to the nearest mil it is necessary to interpolate to the nearest one-fourth mil. This is the standard azimuth (horizontal) angle for the gun tested.

j. With either the range quadrant or gunner's quadrant, measure the elevation of the tube to the nearest one-fourth mil. This is the standard elevation (vertical) angle for the gun tested.

k. With a knife blade or other sharp metal point, scribe lines in the paint on the following parts:

(1) Straight across the junction of the cross-leveling segment and the cross-leveling worm knob (3, fig. 15).
(2) Straight across the junction of the cross-leveling worm housing and the cross-leveling worm knob shaft (2, fig. 15).

(3) Straight across the junction of the rocker and the actuating arm (1, fig. 15 and 2, fig. 16).

(4) Straight across the junction of the elevation knob shaft and the bracket (1, fig. 16).

1. Fill the scribed lines with red paint and wipe off the excess.

Figure 15. Scribe lines for positioning mounts both laterally and longitudinally.
44. Procedure for Checking in the Field

Once the standard angles have been determined, steps in performing the standard angle method of boresighting are as follows:

a. Verify that the parts that move in recoil are in the same position with respect to the nonrecoiling parts as they were when the standard angles were determined.

b. Verify that the trunnions are canted not more than 10 mils; if convenient, level the trunnions.

c. Using the range quadrant or gunner's quadrant, elevate the tube to the standard elevation angle.
d. Place the parallax shield on the eyepiece of the telescope.

e. Make sure that the red scribe lines are in coincidence and set off the standard azimuth angle on the panoramic telescope.

f. Place pin in left witness mark.

g. If the vertical reticle is not exactly on the junction of the pin and the muzzle, adjust the tangent screws until the vertical reticle is properly aligned.

h. If the horizontal reticle is not exactly on the junction of the pin and the muzzle, turn the elevating knob of the panoramic telescope until it is properly aligned. Adjust the zero of the elevation knob scale so that it is in alinement with the index.
CHAPTER 6
BASIC PERIODIC TESTS

Section I. GENERAL

45. Purpose

Basic periodic tests are performed—

a. To determine whether the on-carriage sighting equipment, the gunner's quadrant, and the fuze setter are in correct adjustment.

b. By the section and the artillery mechanic under the supervision of the battery executive.

c. At the discretion of the unit commander. Suggested times are—

(1) Once each year if howitzer is used for nonfiring training.
(2) Every 3 months if the howitzer is fired.
(3) As soon as possible after intensive use, accidents, or travel in extremely rough terrain.

46. Conditions for Correct On-Carriage Fire Control Adjustment

The following conditions must be met for correct adjustment of on-carriage fire control instruments:

a. The line of sight of the panoramic telescope and of the elbow telescope must be parallel to the axis of the bore.
b. All indexes and scales, except the angle of sight scale, must read zero. The angle of sight scale must read 3 (300).

c. All bubbles must be in adjustment and level.

47. Preparations for Basic Periodic Tests

The following conditions must be established prior to conducting the tests:

a. Place the howitzer on a site that is as near level as possible.

b. Suspend a plumbline (par. 35d).

c. Level the trunnions by using the plumbline.

d. Boresight the howitzer by using the testing target.

Section II. TESTS OF GUNNER'S QUADRANT

48. General

The gunner's quadrant must be in proper adjustment to conduct the tests and adjustments on other sighting and fire control equipment.

49. End-For-End Test

The end-for-end test is conducted as follows:

a. Inspect the shoes on the gunner's quadrant for dirt, nicks, and burrs.

b. Inspect the quadrant seats on the breech for dirt, nicks, and burrs.

c. Zero the scales on the gunner's quadrant.

d. Place the quadrant on the quadrant seats. Depress and elevate the tube until the bubble in the gunner's quadrant is centered.
e. Reverse the quadrant on the seats and check the bubble. If the bubble recenters, the quadrant is in adjustment, and the test is complete.

f. If the bubble does not center, turn micrometer knob and try to center the bubble.

   (1) If the bubble centers, read the black figures on the micrometer scale and divide by 2. *This is the correction for the gunner's quadrant.*

   (2) Place this correction on the micrometer scale, and level the tube.

   (3) Reverse the quadrant. The bubble should center.

g. If the bubble does not center as in f above, move the gunner's quadrant arm down one graduation (10 mils).

   (1) Turn the micrometer knob until the bubble centers.

   (2) Take the reading on micrometer scale, add 10 to it and divide the sum by 2. Place the result on the micrometer scale.

   (3) With the quadrant arm set at minus 10 and the above result on the micrometer scale, place the quadrant on the quadrant seats and level the tube.

   (4) Reverse the quadrant. The bubble should center.

   (5) Subtract the reading on the micrometer scale from 10 to obtain the error.

   *Note.* If an error is determined during the end-for-end test, it will be used only during the sighting tests and adjustments and will not be carried in fire missions. If the error exceeds 0.4 mil the quadrant must be sent to ordnance.
50. Micrometer Test

The micrometer test is performed as follows:

a. Set the radial arm to read 10 mils on the elevation scale, and set the micrometer at zero.

b. Place the quadrant on the leveling plates with the line-of-fire arrow pointing toward the muzzle, and center the quadrant bubble by elevating the tube.

c. Set the radial arm at zero, and set the micrometer at 10 mils.

d. Reverse the quadrant; the bubbles should center.

Note. Do not disturb the lay of the tube.

e. If the bubble does not center, the micrometer is in error and must be adjusted by ordnance personnel.

51. Comparison Test

The comparison test is conducted in the following manner:

a. Compare the readings as follows:

(1) Take readings at low, medium, and high elevations.

(2) Use each gunner’s quadrant in the battery.

(3) Use the leveling plates of a single piece.

b. Compute the average reading at each elevation.

c. Compare each quadrant reading with the average.

d. Any quadrant differing more than 0.4 mil from the average must be adjusted by ordnance personnel.
Section III. TESTS OF ON-CARRIAGE FIRE CONTROL EQUIPMENT

52. Test of Range Quadrant


(1) The howitzer and carriage being level (axis of bore and axis of trunnions), center the cross-level bubble.

(2) Turn the elevation knob throughout its limits of motion.

(3) The cross-level bubble should remain centered to within one-half vial graduation; if it does not, the level is incorrectly aligned and the weapon should be sent to an ordnance unit for adjustment.

b. Pivot Azimuth Alinement Test.

(1) Place the breech and muzzle boresights in their proper positions in the tube.

(2) Center the previously tested cross-level bubble.

(3) Elevate and depress the tube, checking to see that the boresights track a plumb line placed in front of the tube; at the same time, watch the cross-level bubble.

(4) The bubble should remain centered to within one-half vial graduation.

(5) If the bubble moves off center in excess of this amount, the pivot is not aligned in azimuth with the tube; send the weapon to an ordnance unit for adjustment.
c. *Pivot Vertical Alinement Test.*

1. Level the tube using the previously tested gunner's quadrant.
2. Center the longitudinal bubble by turning the angle of site micrometer knob.
3. Operate the cross leveling knob throughout the limits of the motion; the longitudinal-level bubble should remain centered.
4. If the bubble moves off center in excess of one-half vial graduation, either the pivot is not aligned vertically with the tube or the level vial is not correctly aligned; send the weapon to an ordnance unit for adjustment.

d. *Comparison Test.*

1. Compare the readings indicated by the gunner's quadrant with those on the elevation quadrant at low, medium, and high elevations of the tube.
2. If the two instruments do not agree at all elevations, send the weapon to an ordnance unit for adjustment.

e. *Angle of Site Scale Test.* Level the tube with the gunner's quadrant, cross-level the range quadrant, and set the scales at zero. Center the longitudinal-level bubble by turning the angle of site micrometer knob. The angle of site scale should read 3 (300) and the angle of site micrometer should read zero; if they do not, adjust the scales.

53. Test of Azimuth Compensating Mechanism

*Panoramic Telescope Mount*

*a. General.* The purpose of this test is to
determine whether the azimuth compensating mechanism of the telescope mount actually keeps the tube in the correct vertical plane at all elevations. One of the tests listed below, in order of preference, should be performed.

b. *Test Wherein Trunnions Need Not Be Level (Plumbline Required).* By using a plumbline as a vertical reference plane, this test reveals the total amount of error that exists between the center of the reticle pattern and the direction in which the tube points. Steps are as follows:

1. With boresights in place and tube near zero elevation, traverse so that the line of sight through the tube is on the plumbline.

2. With the sight mount leveled, move only the sight to refer to a distant sharply defined aiming point (in any direction). Use the elevation knob of the sight to bring the horizontal reticle to the aiming point.

3. Elevate the tube to maximum elevation or to the top of the plumbline. Traverse, if necessary, to bring line of sight through tube back to plumbline.

4. Level the panoramic telescope mount both laterally and longitudinally.

5. Sight through the telescope to determine whether or not it is still on the aiming point.

6. If the sight is off the aiming point in excess of 1 mil in deflection and/or one-half vial graduation in elevation, send
the weapon to an ordnance unit for adjustment.

c. **Test With Trunnions Level.** Using the leveled trunnions and tube for control this test determines whether errors exist in the actuating arm pivot and/or level vials. Leveling may be accomplished by a plumpline check or by cross-leveling with the gunner’s quadrant on the breech ring. If cross-leveling is accomplished with the gunner’s quadrant on the breech ring, results of the test are accurate only to the extent of the parallel relationship of the trunnions to the top surface of the breech ring. Steps are as follows:

1. **Cross-level test of telescope mount.** The telescope mount cross-level bubble must be in proper adjustment before conducting the remainder of this test of the azimuth compensating mechanism.

   a. Center the cross-level bubble and place the line of sight of the panoramic telescope on a sharply defined aiming point.

   b. Elevate the tube to maximum elevation while keeping the telescope mount level longitudinally.

   Note. Do not readjust the cross-level bubble after the initial setting.

   c. The line of sight must not deviate from the target by more than 1 mil at any elevation checked nor the cross-level bubble travel more than one-half vial graduation. If deviation in excess of the tolerance occurs, the level vial
or pivot is incorrectly aligned; send the weapon to an ordnance unit for adjustment.

(2) **Vertical alignment test of telescope mount**

(a) Level the tube longitudinally with the gunner’s quadrant.

(b) Center the longitudinal-level bubbles.

(c) Operate the cross-leveling knob throughout the limits of motion; the longitudinal-level bubble should remain centered within one-half vial graduation. If the bubble moves in excess of the tolerance, either the level vial or the actuating arm pivot is not aligned correctly and the weapon should be sent to an ordnance unit for adjustment.

d. **Test With Gunner's Quadrant on Socket.** Using the top surface of the socket for control this test determines the relationship of the level bubbles to the top surface of socket. If the socket is bent or if the top surface is unlevel, results of the test will be inaccurate. With the tube and trunnions approximately level, place a steel or glass plate having parallel sides on top of the telescope mount. Level the telescope mount both crosswise and longitudinally by turning the cross-leveling and elevation knobs, using the tested gunner's quadrant as a level. If the elevation indexes on the rocker and the actuating arm and those on the elevation knob and the shaft do not match, adjust them by moving the adjustable in-
dex on the rocker or by adjusting the elevation knob index as needed. If the cross- and longitudinal-level bubbles are not centered within one-half vial graduation, adjustment must be made by ordnance personnel.

Section IV. TEST OF FUZE SETTERS

54. General

Examine the fuze setters as follows:

a. Check for burred or dented edges—
   (1) The stop that fits into the slot of the movable time ring.
   (2) The adjusting pawl which engages the notch in the fixed fuze ring.

b. Depress the adjustable pawl against its spring to determine that the movement of the pawl is free.

c. Test the fuze setter with the fuze for which it was designed; the time scale on the fuze setter must have the same graduation as the time ring on the fuze.

55. Time Scale Test

The time scale test is performed to verify that the time set on the fuze agrees, within prescribed tolerances, with the time setting on the fuze setter. This test may be conducted during firing or as a separate test.

Warning: Never use a fuze from a dud.

a. The time set on the fuze should agree with the time setting on the fuze setter within one-
fourth of the smallest graduation on the fuze time ring. The tolerances are—

1. 0.05 second for fuzes having 0.2 second graduation.

2. 0.125 second for fuzes having 0.5 second graduations.

b. If a fuze setting doesn’t agree with the time set on the fuze setter proceed as follows:

1. Repeat the test as a check with a different setting.

2. If the fuzes and the fuze setter still don’t agree, refer the instrument to ordnance.

c. Do not set any one live fuze more than twice.

d. When tests are complete, reset all fuzes to SAFE and replace the safety wire or cotter pin.
CHAPTER 7
MAINTENANCE AND INSPECTIONS

56. General

Systematic maintenance and inspection are essential to insure that—

a. The howitzer section is prepared to carry out its mission immediately.

b. Unexpected breakdowns are not experienced at a critical time when maximum performance is essential.

c. Expensive and time-consuming repairs are reduced to a minimum.

57. Disassembly, Assembly, and Adjustment

Authorized adjustments and disassemblies to be performed by battery personnel are prescribed in TM 9–325, and appropriate Department of the Army supply manuals. Deviation from these procedures is not authorized, except as permitted by the responsible ordnance officer.

58. Records

The principal records pertaining to the weapon are the equipment log book, DA Form 2404 (Equipment Inspection and Maintenance Worksheet) and DA Form 2407 (Maintenance Request). For detailed information on the use of these forms, see TM 38–750.
59. Maintenance

Detailed instructions for maintaining the howitzer are contained in TM 9–325 and LO 9–325. Maintenance instructions for the prime mover are contained in the appropriate technical manuals and lubrication orders.

60. Inspection

a. The chief of section should inspect his equipment daily and take immediate action to correct any deficiencies found.

b. The executive, accompanied by the artillery mechanic, should make a daily informal command inspection on different parts of the weapon and carriage.

c. The executive should make a thorough mechanical inspection at least once a month of the weapons, auxiliary equipment, tools, and spare parts.

61. Operational Services

A daily service is performed by the crew each day the vehicle or weapon is operated. This service is divided into three parts.

a. Before-operation service is a brief service to determine if the vehicle and howitzer is ready for operation. At this time the chief of section verifies that sufficient ammunition, rations, tools, and equipment are available and secured. A detailed list of duties is contained in table VI.

Table VI. Before-operation Service
(Located in back of manual)
Table VII. During-operation Service  
(Located in back of manual)

b. During-operation service consists of detecting any unsatisfactory performance of the vehicle or howitzer. A detailed list of duties is contained in table VII.

c. After-operation service prepares the vehicle to operate again on a moment's notice. This is the basic daily service for the vehicle, and howitzer and it is particularly important to detect deficiencies that developed during operation. All defects that the driver and crew cannot remedy must be reported at this time. The chief of section will resupply, as required, ammunition and rations and verify that all equipment is present. A detailed list of duties is contained in table VIII.

Table VIII. After-operation Service  
(Located in back of manual)
62. General

   a. Equipment that has been contaminated with the following agents constitutes a hazard to personnel and must be removed or neutralized:
      (1) Chemical.
      (2) Biological.
      (3) Radiological.

   b. Decontamination is the process of covering, removing, destroying, or changing the contaminating agent or agents into harmless substances.

   c. Decontamination must be started as soon as possible in order to reduce hazards and allow safe operation of equipment.

63. Decontamination of Toxic Chemical Agents

   Table IX prescribes the methods for decontaminating toxic chemical agents.
<table>
<thead>
<tr>
<th>Contaminated object</th>
<th>Preferred decontamination methods</th>
<th>Alternate decontamination methods</th>
<th>Field expedient methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canvas</td>
<td>Boil in soapy water for 1 hour.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use 5 percent solution of</td>
<td>Immerse in boiling water</td>
<td>Aerate (except for V-agents).</td>
</tr>
<tr>
<td></td>
<td>household bleach for V-agents.</td>
<td>for 1 hour.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use 5 percent solution</td>
<td>Launder by standard methods. Use DANC¹ solution or DS2.¹ Use slurry.²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>washing soda for G-agents.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothing</td>
<td>Immerse in boiling water for 1 hour, stir, add 1 pound of soap to each 10 gallons of water.</td>
<td>Launder by standard methods. Dryclean. Use DS2 for cotton items only.</td>
<td>Rub M5 ointment on small contaminated areas. Aerate (except for V-agents).</td>
</tr>
<tr>
<td></td>
<td>Use 5 percent solution of bleach for V-agents.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use 5 percent solution of</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>washing soda for G-agents.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unpainted metals</td>
<td>Use DS2 or DANC, then rinse or wipe with organic solvent,³ and dry.</td>
<td>Wash with cool soapy water³ and rinse.</td>
<td>Aerate.</td>
</tr>
<tr>
<td>Painted metals</td>
<td>Spray with DS2 or DANC solution.</td>
<td>Wash with hot soapy water and rinse. (Slurry may be used if it is removed within 1 hour and the surface is oiled.)</td>
<td>Aerate.</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Instruments</td>
<td>Clean with alcohol (or gasoline) and apply a thin coat of oil.</td>
<td>Wipe with rag dampened with DANC or DS2, dry with clean rag, and oil.</td>
<td>Weather.</td>
</tr>
</tbody>
</table>

1 These decontaminants are injurious to plastic and hard rubber and should not be used in the bore.

2 Equal weights of water and chloride of lime.

3 Organic solvents (petroleum products) and water do not neutralize contaminants. Precautions must be taken to dispose of these solvents as contaminated materiel.
64. Decontamination of Biological Agents

Decontaminants and decontamination procedures for toxic chemical agents are usually effective against biological agents.

65. Decontamination of Radiological Agents

a. *Radioactive contaminants* cannot be made safe by chemical action. They must be removed or shielded if it is impracticable to wait for natural decay.

b. *Decontamination* is the process of *reducing* the hazard by removing the contaminant or shielding against radiation. Methods are given in table X.
**Table X. Decontamination for Radiological Agents**

<table>
<thead>
<tr>
<th>Method</th>
<th>Contaminated object</th>
<th>Technique</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash and scrub with water.</td>
<td>All nonporous surfaces (metal, paint, plastics).</td>
<td>Work from top to bottom and up wind.</td>
<td>Drainage must be controlled —water is contaminated.</td>
</tr>
<tr>
<td>Detergent (soap) solution.</td>
<td>All nonporous surfaces.</td>
<td>Heat water if possible. Rub surface and wipe dry. (Moist application is all that is desired, do not let drip.)</td>
<td>Rags and runoff require disposal.</td>
</tr>
<tr>
<td>Organic solvents. (Petroleum products.)</td>
<td>All nonporous surfaces.</td>
<td>Immerse or wash with solvent, then wash in hot soapy water and rinse with clear water.</td>
<td>Vapors are toxic. Fire precautions are required.</td>
</tr>
<tr>
<td>Brushing</td>
<td>Porous and nonporous surfaces.</td>
<td>Brush, sweep, dust from equipment or clothing.</td>
<td>Limited control of contaminated dust. Wear protective mask.</td>
</tr>
</tbody>
</table>

Hot spots may be reduced by sanding, filing, or grinding. These methods are not practicable for large areas—a protective mask and gloves must be worn.
### Table X. Decontamination for Radiological Agents—Continued

<table>
<thead>
<tr>
<th>Method</th>
<th>Contaminated object</th>
<th>Technique</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launder</td>
<td>Clothing</td>
<td>Use hot soapy water and rinse with clear water.</td>
<td>Water requires disposal.</td>
</tr>
<tr>
<td>Bathing and scrubbing.</td>
<td>Personnel</td>
<td>Use brushes, running water, and soap.</td>
<td>Continue scrubbing until contamination level is safe.</td>
</tr>
</tbody>
</table>
CHAPTER 9
DESTRUCTION OF EQUIPMENT

66. General

a. Tactical situations may arise in which it is necessary to abandon equipment in a combat zone. In such a situation all equipment must be destroyed to prevent its use by the enemy.

b. Equipment will be destroyed only on the authority delegated by a division or higher commander.

67. Plans

A plan will be prepared by each battery to expedite destruction of equipment. The principles are as follows:

a. The plan must be adequate, uniform, easily executed.

b. Destroy essential parts first.

c. Destruction must be as complete as possible.

d. Destroy the same essential parts throughout the battery.

e. Destroy spare parts and accessories with the same priority as those installed on equipment.

68. Methods

a. The most generally applicable methods of destruction are—
(1) *Mechanical*—Requires ax, pick, sledge or similar equipment.

(2) *Burning*—Requires gasoline, oil, or other flammables.

(3) *Demolition*—Requires ammunition or explosives.

(4) *Gunfire*—Requires artillery, rocket launchers, rifle grenades, or hand grenades.

b. In general, destruction of essential parts, followed by burning is sufficient to render the weapon useless.

69. Reference

Detailed information on destruction of the equipment is contained in TM 9-325.
70. General

Safety precautions to be observed in training are prescribed in AR 385–63. Additional information is given in FM 6–40, FM 6–140, TM 9–325, and TM 9–1900. The more important safety precautions are summarized in this chapter.

71. Ammunition

The following precautions must be observed when handling ammunition:

a. Store ammunition in the firing area so that it is protected against accidental explosions.

b. Keep fire and flammables out of the area.

c. Protect ammunition from direct rays of the sun.

d. Do not disassemble fuzes.

e. All ammunition prepared for firing and not fired must be checked to insure that—

(1) Powder increments are present and in proper order and in good condition, and of the proper lot number.

(2) Lot number of the ammunition corresponds to the lot number on the container.

(3) Time fuzes are reset to SAFE and the safety wires are replaced.
72. Failure To Fire

If the weapon fails to fire—

a. Keep the weapon trained on the target.

b. Clear unnecessary personnel from the vicinity of the howitzer.

c. Make two additional attempts to fire the weapon.

d. Wait 2 minutes after the last attempt to fire.

e. The executive commands UNLOAD.

f. The assistant gunner opens the breech and number 1 removes the cartridge case.

g. If the primer is dented, a faulty primer is indicated, and the cartridge case is replaced.

h. If the primer is not dented, a faulty firing mechanism is indicated.

i. For detailed procedures refer to TM 9–325.

73. Drill and Firing

a. Load the weapon only when firing is imminent.

b. Personnel move in rear of the piece when going from side to side.

c. Personnel stay clear of recoil path.

d. Crew members should use earplugs or cotton to protect ear drums.

e. A safety officer will be present during all firing in training exercises. Specific duties for the safety officer are listed in FM 6–40.
CHAPTER II
TRAINING

Section I. GENERAL

74. Purpose

The purpose of this chapter is to present the minimum requirements for training the howitzer section. It includes—

a. Information for conduct of training.
b. Minimum training schedule.
c. Gunner’s qualification tests.

75. Conduct of Training

Section training is conducted by the section chief. Battery officers are responsible for preparing the training plans and for supervising their execution. The chief of section—

a. Trains each member of his section to function smoothly and efficiently in all duties in the section.
b. Welds the section into an effective, coordinated team, capable of functioning efficiently in combat.
c. Emphasizes the application of prior instruction to current training.
d. Maintains a progress card on each man to show—

(1) Instruction attended.
(2) Tests taken.
(3) Remarks pertaining to progress.

e. References: AR 611–201, ATP 6–100, FM 21–5, and FM 6–125.

Section II. MINIMUM TRAINING SCHEDULE

76. Training Periods

a. The principles that should be followed in scheduling and preparing training periods are listed below:

   (1) Arrange periods in service of the piece drill along with other battery training to provide a balanced training program.

   (2) Section drill should not exceed 30 minutes and be conducted in a vigorous manner.

   (3) Precede and follow howitzer drill with logically related subjects. For example, precede the drill period with tests and adjustments and follow with inspection and maintenance.

b. Army Subject Schedule 6–3 provides uniform guidance for cannoneer training.

c. Operational and maintenance characteristics of the weapon are referenced in TM 9–325.

d. The training schedule outlined in paragraph 77 is a guide to meet minimum training requirements.
## 77. Schedule

<table>
<thead>
<tr>
<th>Method</th>
<th>Hours</th>
<th>Subject</th>
<th>Text reference</th>
<th>Training aids and equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>C, D,</td>
<td>1</td>
<td>Organization and composition of gun section; general duties of individuals; formation of gun section.</td>
<td>Par. 2, 3, 10, tables I, II, III, and IV.</td>
<td>Gun and prime mover.</td>
</tr>
<tr>
<td>PW.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C, D,</td>
<td>1</td>
<td>Posts and posting of cannoneers; changing posts; mounting and dismounting.</td>
<td>Par. 12-15—</td>
<td>Do.</td>
</tr>
<tr>
<td>PW.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C, D,</td>
<td>2 (1 hour periods)</td>
<td>Coupling and uncoupling; prepare for action, and march order; movement of gun by hand.</td>
<td>Tables I and IV.</td>
<td>Do.</td>
</tr>
<tr>
<td>PW.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C, D,</td>
<td>24 (½ hour periods)</td>
<td>Gun drill, duties in firing, indirect laying.</td>
<td>Par. 20 and table II.</td>
<td>TOE equipment.</td>
</tr>
<tr>
<td>PW.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C, D,</td>
<td>9 (½ hour periods)</td>
<td>Gun drill duties in firing, direct laying.</td>
<td>Par. 21, 22, and table III.</td>
<td>Do.</td>
</tr>
<tr>
<td>PW.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C, D,</td>
<td>6 (1 hour and ½ hour periods)</td>
<td>Testing and adjustment of sighting and fire control equipment.</td>
<td>Par. 33-55—</td>
<td>Do.</td>
</tr>
<tr>
<td>PW.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See footnote on page 79.
<table>
<thead>
<tr>
<th>Method*</th>
<th>Hours</th>
<th>Subject</th>
<th>Text reference</th>
<th>Training aids and equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>C, D, PW.</td>
<td>2 (½ hour periods)</td>
<td>Aiming post displacement correction</td>
<td>Par. 29</td>
<td>TOE equipment, blackboard, and chalk.</td>
</tr>
<tr>
<td>C, D, PW.</td>
<td>4 (½ hour periods)</td>
<td>Inspections and maintenance drills</td>
<td>Par. 56-61</td>
<td>TOE equipment.</td>
</tr>
<tr>
<td>C, D, PW.</td>
<td>1</td>
<td>Decontamination of materiel</td>
<td>Par. 62-65</td>
<td>Decontamination equipment; TOE equipment.</td>
</tr>
<tr>
<td>C, D, PW.</td>
<td>1</td>
<td>Destruction of materiel to prevent use by the enemy.</td>
<td>Par. 66-69</td>
<td>Demolition and TOE equipment.</td>
</tr>
<tr>
<td>C, D---</td>
<td>1</td>
<td>Safety precautions</td>
<td>Par. 70-73</td>
<td>TOE equipment.</td>
</tr>
<tr>
<td>PW---</td>
<td>16 (4 hour periods)</td>
<td>Service, practice, indirect laying</td>
<td>Par. 17-20, table II</td>
<td>TOE equipment.</td>
</tr>
<tr>
<td>PW---</td>
<td>4</td>
<td>Service, practice, direct laying</td>
<td>Par. 21-24, table III</td>
<td>Do.</td>
</tr>
<tr>
<td>C, PW</td>
<td>6 (1 hour periods)</td>
<td>Review and tests of subjects previously covered.</td>
<td>All previous references.</td>
<td>Do.</td>
</tr>
</tbody>
</table>

*C—Conference; D—Demonstration; PW—Practical Work (78 hr.).*
78. Purpose and Scope

This section prescribes the tests to be given in the qualification of gunners. The purpose of the test is twofold—

a. To provide a means of determining the relative proficiency of the individual artillery soldier in the performance of the duties of the gunner, 105-mm howitzer M101 and modifications. The tests will not be a basis for determining the relative proficiency of batteries or higher units.

b. To serve as an adjunct to training.

79. General Instructions

a. Standards of Precision. The candidate will be required to perform the tests in accordance with the standards listed below:

(1) Scale settings must be exact and matching indexes must be brought into coincidence.

(2) Level bubbles must be exactly centered.

(3) The vertical reticle of the panoramic telescope must be aligned on the left edge of the aiming post or on exactly the same part of the aiming point each time the piece is laid.

(4) Final motions of azimuth and elevation setting knobs, as well as traversing and elevating handwheels, must be made in the appropriate direction. For elevating, the final motion of the handwheel should be in the direction of the more
difficult movement. Final motion for traversing is from left to right. Final movement of the vertical reticle of the telescope is from left to right.

b. Assistance. The candidate will receive no unauthorized assistance. Each candidate may select authorized assistants as indicated in the tests. In the event a candidate fails any test because of the fault of any assistant, the test will be disregarded, and the candidate will be given another test of the same nature.

c. Time. The time for any test will be the time from the last word of the command to the last word of the candidate's report. The candidate may begin any test after the first word of the first command.

d. Scoring. Scoring will be conducted in accordance with the subparagraphs Penalties and Credit under each subject. If a test is performed correctly, credit will be given in accordance with the subparagraph Credit under each subject. No credit will be allowed if conditions exist as specified in the subparagraphs headed Penalties.

e. Preparation for Tests. The howitzer will be prepared for action and the candidate posted at the proper position corresponding to the test being conducted or as indicated in the subparagraphs entitled "Special instructions." The examiner will insure that the candidate understands the requirements of each test and will require the candidate to report "I am ready" before each test.
f. **Qualification Scores.** Minimum scores required for qualification in the courses are as follows:

<table>
<thead>
<tr>
<th>Individual classification</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert gunner</td>
<td>90</td>
</tr>
<tr>
<td>First-class gunner</td>
<td>80</td>
</tr>
<tr>
<td>Second-class gunner</td>
<td>70</td>
</tr>
</tbody>
</table>

## 80. Outline of Tests

<table>
<thead>
<tr>
<th>Paragraph</th>
<th>Subject</th>
<th>Number of tests</th>
<th>Points each</th>
<th>Maximum credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>81</td>
<td>Direct laying, panoramic telescope</td>
<td>4</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>82</td>
<td>Direct laying, elbow telescope</td>
<td>4</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>83</td>
<td>Indirect laying, deflection only</td>
<td>18</td>
<td>2</td>
<td>36</td>
</tr>
<tr>
<td>84</td>
<td>Laying for quadrant with range quadrant</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>85</td>
<td>Laying for quadrant with gunner's quadrant</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>86</td>
<td>Displacement correction</td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Part I</td>
<td>(1)</td>
<td>3</td>
<td>(3)</td>
</tr>
<tr>
<td></td>
<td>Part II</td>
<td>(1)</td>
<td>1</td>
<td>(1)</td>
</tr>
<tr>
<td>87</td>
<td>Measuring site to the mask</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>88</td>
<td>Measuring quadrant</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>89</td>
<td>Measuring deflection</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>90</td>
<td>Tests and adjustment of sighting and fire control equipment</td>
<td>6</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tests 1, 3, 4, and 5</td>
<td>(4)</td>
<td>2</td>
<td>(8)</td>
</tr>
<tr>
<td></td>
<td>Tests 2 and 6</td>
<td>(2)</td>
<td>1</td>
<td>(2)</td>
</tr>
<tr>
<td>91</td>
<td>Materiel</td>
<td>3</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Tests 1 and 2</td>
<td>(2)</td>
<td>3</td>
<td>(6)</td>
</tr>
<tr>
<td></td>
<td>Test 3</td>
<td>(1)</td>
<td>4</td>
<td>(4)</td>
</tr>
</tbody>
</table>

**Total credit**                                      100

## 81. Direct Laying, Panoramic Telescope

a. **Scope of Tests.**

(1) Four tests (two groups of two tests
each) will be conducted in which the candidate will be required to execute commands similar to those given in (2) below.

(2) Tests 1 and 2 (and tests 3 and 4) will be executed as one series of commands.

(3) The candidate will be tested in the duties of the gunner, using the one-man, one-sight system.

b. Special Instructions.

(1) A stationary target will be placed approximately 600 meters from the howitzer.

(2) The fixed azimuth scale and micrometer scale will be set at zero, and indexes on telescope mount will be matched.

(3) The candidate will be posted as the gunner.

(4) The weapon will be pointed so that—

(a) A shift of approximately 100 mils will be required for tests 1 and 3.

(b) It will not be necessary to shift the trails for any of the four tests.

(5) Laying at the termination of tests 1 and 3 will not be disturbed prior to beginning tests 2 and 4.

(6) The examiner will announce the assumed direction of the movement of the target at the beginning of tests 1 and 3. The assumed direction of the movement of the target in test 3 will be opposite to that in test 1.
c. Outline of Tests.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Examiner commands (for example)</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 3.</td>
<td>TARGET, THAT TANK; LEAD 5, RANGE 5, RANGE 600.</td>
<td>Traverses piece until proper lead has been set. Places proper range line of reticle on the center of the visible mass of the target. Centers cross-level bubble. Gives the command FIRE when ready and steps clear. Same as test 1 above.</td>
</tr>
<tr>
<td>2 and 4.</td>
<td>RIGHT (LEFT) 10, ADD (DROP) 200.</td>
<td></td>
</tr>
</tbody>
</table>

**d. Penalties.** No credit will be allowed if, after each test—

1. The azimuth scale has been moved from zero.
2. The indexes on the azimuth micrometer have been moved from zero.
3. The indexes on the telescope mount are not in coincidence.
4. The lead in mils is not set properly.
5. The proper range line of the reticle is not on the center of the visible mass of the target.

**e. Credit.**

Time in seconds, exactly or less than _______ 4 4½ 5
Credit ___________________________ 2.0 1.5 1.0

82. Direct Laying, Elbow Telescope

a. Scope of Tests.

1. Four tests (two groups of two tests
each) will be conducted in which the candidate will be required to execute commands similar to those given in c below.

(2) Tests 1 and 2 (and tests 3 and 4) will be executed as one series of commands.

(3) The candidate will be tested in the duties of the assistant gunner, using the two-man, two-sight system.

b. Special Instructions.

(1) A stationary target will be placed approximately 600 meters from the piece.

(2) For tests 1 and 3, the field of view of the telescope will be placed on the target, with the correct range line more than 100 meters off the target.

(3) The laying of the piece will not be disturbed after tests 1 and 3.

c. Outline of Tests.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Examiner commands (for example)</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 3.</td>
<td>TARGET, THAT TANK: RANGE 500.</td>
<td>Places proper reticle line for announced range on the center of the visible mass of the target. Calls &quot;Set&quot; and steps clear. Same as test 1 above.</td>
</tr>
<tr>
<td>2 and 4.</td>
<td>ADD (DROP) 400 _____</td>
<td></td>
</tr>
</tbody>
</table>

d. Penalties. No credit will be allowed if, after each test—

(1) The correct range line is not on the center of the visible mass of the target.
(2) The range lines of the reticle are not approximately horizontal.

\[ e. \text{Credit.} \]

Time in seconds, exactly or less than____ 1½ 1¾ 2

Credit _____________________________ 2.0 1.5 1.0

83. Indirect Laying, Deflection Only

\[ a. \text{Scope of Tests.} \] Eighteen tests will be conducted in which the candidate will be required to execute commands similar to those given in \( c \) below. Tests 1 through 4 (and tests 5–9, 10–13, and 14–18) will be executed as one series of commands.

\[ b. \text{Special Instructions.} \]

(1) Commands will not necessitate shifting trails.

(2) The examiner will select a suitable aiming point and identify it to the candidate.

(3) Commands for special corrections will be given only in the tests indicated in the examples in \( c \) below.

(4) The command for new deflections for each test will be within the following prescribed limits.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Maximum change (mils)</th>
<th>Minimum change (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 and 11</td>
<td>180</td>
<td>140</td>
</tr>
<tr>
<td>3 and 12</td>
<td>90</td>
<td>70</td>
</tr>
<tr>
<td>4 and 13</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>7 and 16</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>8 and 17</td>
<td>50</td>
<td>30</td>
</tr>
<tr>
<td>9 and 18</td>
<td>20</td>
<td>10</td>
</tr>
</tbody>
</table>
(5) The piece will be laid with correct settings at the conclusion of each test before proceeding with the next test.

(6) Aiming posts will be set out at prescribed deflection and distances for these tests.

(7) Special corrections for deflection may be omitted from the test if the unit SOP requires that deflection corrections be applied at the fire direction center.

(8) The examiner will designate the section number of the weapon to be used. The examiner will announce special corrections in deflection to be applied by the candidate.

c. Outline of Tests.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Examiner commands (for example)</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 10</td>
<td>SPECIAL CORRECTIONS, DEFLECTION 2890, NUMBER 1 LEFT 7.</td>
<td>Sets deflection and applies special correction. Centers cross- and longitudinal - level bubbles. Traverses piece until vertical hair is on left edge of aiming posts. Checks centering of bubbles. Re-lays if necessary. Calls “Ready” and steps clear.</td>
</tr>
<tr>
<td>2 and 11</td>
<td>DEFLECTION 2760_-----</td>
<td>Sets deflection change. Leaves correction on gunner's aid.</td>
</tr>
<tr>
<td>Test No.</td>
<td>Examiner commands (for example)</td>
<td>Action of candidate</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>3 and 12.</td>
<td>DEFLECTION 2835</td>
<td>Lays on aiming posts. Checks centering of bubbles. Re-lays if necessary. Calls “Ready” and steps clear. Same as test 2 above.</td>
</tr>
<tr>
<td>4 and 13.</td>
<td>NUMBER 1, RIGHT 4</td>
<td>Same as test 2 above, but changes gunner’s aid to right 4 and resets deflection 2835 opposite index. Gunner moves gunner’s aid to zero.</td>
</tr>
<tr>
<td>5 and 14.</td>
<td>AIMING POINT, CHURCH STEEPLE, REFER.</td>
<td>Refers telescope to church steeple. Reads deflection and calls “Number 1, deflection (so much).”</td>
</tr>
<tr>
<td>6 and 15.</td>
<td>DEFLECTION 2800, REFER.</td>
<td>Slips the slipping azimuth micrometer scale to 2800. Verifies that vertical reticle is on church steeple. Calls “Number 1, deflection 2800.” Steps clear. Same as test 1 above.</td>
</tr>
<tr>
<td>7 and 16.</td>
<td>SPECIAL CORRECTIONS DEFLECTION 2920 NUMBER 1 LEFT 7.</td>
<td>Same as test 1 above.</td>
</tr>
</tbody>
</table>
### d. Penalties.

(1) No credit will be allowed if, after each test—
   
   (a) The deflection is set incorrectly.
   
   (b) The cross-level or longitudinal-level bubble is not centered.
   
   (c) The vertical hair of the telescope is not on the aiming point or left edge of aiming posts, as the case may be.

(2) No credit will be allowed if the last motion of the traverse was not made to the right.

### e. Credit.

Time in seconds, exactly or less than—

- Tests 1, 10, 6, and 15 each: 12 13 14
- Other tests, each: 8 9 10
- Credit: 2.0 1.5 1.0

---

### 84. Laying for Quadrant With Range Quadrant

**a. Scope of Tests.** Three tests will be conducted in which the candidate will be required to execute commands similar to those given in **c** below.

**b. Special Instruction.**

(1) Each test will require a change of settings and the accompanying laying of
the tube in elevation within the following limits: Quadrant elevation, 35 to 65 mils.

(2) Command for quadrant for tests 2 and 3 will not be made in multiples of 5 mils.

(3) Special corrections will be applied by the candidate if required by unit SOP. Otherwise they may be omitted.

(4) The candidate will be posted as number 1 cannoneer.

c. Outline of Tests.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Examiner commands (for example)</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>QUADRANT 275_------------------</td>
<td>Sets site 300 and announced quadrant elevation. Centers cross-level and longitudinal-level bubbles. Calls &quot;Set&quot; and steps clear.</td>
</tr>
<tr>
<td>2</td>
<td>QUADRANT 313_------------------</td>
<td>Same as test 1 above.</td>
</tr>
<tr>
<td>3</td>
<td>SPECIAL CORRECTIONS, NUMBER 1 UP 2, QUADRANT 333.</td>
<td>Same as test 1 above.</td>
</tr>
</tbody>
</table>

d. Penalties.

(1) No credit will be allowed if, after each test—
   (a) The quadrant is not set accurately.
   (b) The cross-level or longitudinal-level bubble is not centered.

(2) No credit will be allowed if the last movement of the tube was not in the
direction in which it is most difficult to turn the elevating handwheel.

e. Credit.

- Time in seconds, exactly or less than: 6% 7% 8%
  Credit: 2.0 1.5 1.0

85. Laying for Quadrant With Gunner's Quadrant

a. Scope of Tests. Three tests will be conducted in which the candidate will be required to execute commands similar to those given below.

b. Special Instructions.

(1) The gunner's quadrant will be set at zero for the first test.

(2) Each succeeding test will require a change of quadrant elevation setting within the limits of 30 to 60 mils.

(3) The candidate will be posted to the left of and facing the breech, with the gunner's quadrant in his hand.

(4) An assistant, selected by the candidate, will be posted to the right of the breech to operate the elevating handwheel.

c. Outline of Tests.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Examiner commands (for example)</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 QUADRANT 180----------</td>
<td>Sets quadrant elevation on gunner's quadrant. Seats quadrant. Has assistant elevate or depress the tube until the quadrant bubble is centered.</td>
<td></td>
</tr>
<tr>
<td>Test No.</td>
<td>Examiner commands (for example)</td>
<td>Action of candidate</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>2</td>
<td>QUADRANT 240</td>
<td>Calls &quot;Ready&quot; and waits for examiner to verify laying.</td>
</tr>
<tr>
<td>3</td>
<td>QUADRANT 205</td>
<td>Same as test 1 above.</td>
</tr>
</tbody>
</table>

d. Penalties.
(1) No credit will be allowed if, after each test—
   (a) The quadrant elevation is set incorrectly.
   (b) The quadrant is not properly seated.
   (c) The quadrant bubble is not properly centered.
(2) No credit will be allowed if the last movement of the tube was not in the direction in which it is most difficult to turn the elevating handwheel.

e. Credit.
Time in seconds, exactly or less than

| Credit | 6 | 6½ | 7 |

86. Displacement Correction

a. Scope of Test. One test, consisting of two parts, will be conducted in which the candidate will be required to execute the commands given in c below.

b. Special Instructions.
(1) Aiming posts will be set out at the prescribed distances.
(2) An assistant, selected by the candidate, will be stationed close to the far aiming post.
(3) The examiner will require the candidate to lay the piece on an announced deflection and report "I am ready."

(4) The far post or the weapon will then be moved so that a displacement of 5 to 10 mils occurs.

(5) The laying of the weapon at the termination of part I will not be disturbed for part II.

c. Outline of Test.

(1) Part I.

<table>
<thead>
<tr>
<th>Examiner commands</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORRECT FOR DISPLACEMENT.</td>
<td>Lays the piece so that the far post appears midway between the near post and the vertical reticle of the telescope. Checks centering of bubble. Re-lays if necessary. Calls &quot;Ready&quot; and steps clear.</td>
</tr>
</tbody>
</table>

(2) Part II.

<table>
<thead>
<tr>
<th>Examiner commands</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALINE AIMING POST.</td>
<td>Records deflection on shield and announces &quot;Deflection (so much) recorded.&quot; Directs assistant in alining aiming posts. Calls &quot;Ready&quot; and steps clear.</td>
</tr>
</tbody>
</table>

d. Penalties. No credit will be allowed if—

(1) Part I.

(a) The far aiming post does not appear
midway between the near post and the vertical reticle of the telescope.

(b) The cross-level or longitudinal-level bubble is not centered.

(c) The last motion of traverse was not made to the right.

(2) Part II.

(a) The deflection is other than the announced deflection.

(b) The aiming posts are not properly aligned.

(c) The vertical reticle of the telescope is not on the aiming posts.

e. Credit.

Part I, time in seconds exactly or less than

<table>
<thead>
<tr>
<th>Credit</th>
<th>3</th>
<th>3½</th>
<th>3¾</th>
<th>4</th>
</tr>
</thead>
</table>

Part II, no time limit.

| Credit | 1.0 |   |   |   |

87. Measuring Site to Mask

a. Scope of Test. One test will be conducted in which the candidate will be required to execute the command given in c below.

b. Special Instructions.

(1) The piece prepared for action will be placed 200 to 400 meters from a mask of reasonable height.

(2) The tube will be pointed so that it is 100 to 150 mils above the crest and 100 to 150 mils right or left of the highest point of the crest.
(3) The candidate will take post at the right rear of the breech.

c. Outline of Test.

<table>
<thead>
<tr>
<th>Examiner commands</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEASURE SITE TO MASK.</td>
<td>Sights along lowest element of bore and operates elevating and traversing mechanism until line of sight just clears crest. Sets angle of site scale at 300, centers longitudinal-level bubble by turning elevating knob, and centers cross-level bubble. Reads elevation from elevation scale and micrometer. Reports “Number (so-and-so), site to mask (so much).”</td>
</tr>
</tbody>
</table>

d. Penalties. No credit will be allowed if—

1. The line of sight along the lowest element of the bore does not just clear credit.

2. The cross-level or longitudinal-level bubble is not properly centered.

3. The angle of site scale does not read 300.

4. The site is announced incorrectly.

5. The last movement of the tube was not in the direction in which it is most difficult to turn the elevation handwheel.

e. Credit.

<table>
<thead>
<tr>
<th>Time in seconds, exactly or less</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>than 11</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>1.5</td>
</tr>
</tbody>
</table>

AGO 7829C 95
88. Measuring Quadrant

a. Scope of Test. One test will be conducted in which the candidate will be required to measure the quadrant by means of the gunner's quadrant.

b. Special Instructions. Prior to the test the examiner will lay the tube at a selected quadrant, measure the quadrant, and then set the gunner's quadrant at zero.

c. Outline of Test.

<table>
<thead>
<tr>
<th>Examiner commands</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEASURE THE QUADRANT.</td>
<td>Places gunner's quadrant on quadrant seats of the breech rings.</td>
</tr>
<tr>
<td></td>
<td>Levels bubble by raising or lowering the index arm and turning the micrometer knob.</td>
</tr>
<tr>
<td></td>
<td>Announces &quot;Number ( ) Quadrant ( ),&quot; hands quadrant to examiner.</td>
</tr>
</tbody>
</table>

d. Penalties. No credit will be allowed if—

(1) The quadrant bubble is not centered when the quadrant is seated properly.

(2) The quadrant is announced incorrectly.

e. Credit.

Time in seconds, exactly or less than __________________________ 8 9%, 10%

Credit __________________________ 4.0 3.0 2.0

89. Measuring Deflection

a. Scope of Test. One test will be conducted in which the candidate will be required to measure
and report a deflection in accordance with the command given below.

b. *Special Instructions.*

1. The piece will be laid on aiming posts to the left front.
2. An aiming point within 200 mils to the left or right of the aiming posts will be designated by the examiner and identified by the candidate.

c. *Outline of Test.*

<table>
<thead>
<tr>
<th>Examiner commands</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER ( ), AIMING POINT, THAT ( ), REFER.</td>
<td>Centers cross-level and longitudinal-level bubble. Refers to aiming point. Checks centering of bubbles and re-lays telescope if necessary. Reads deflection and reports, “Number ( ), deflection ( )” and steps clear.</td>
</tr>
</tbody>
</table>

d. *Penalties.* No credit will be allowed if—

1. The cross-level or longitudinal-level bubble is not centered properly.
2. The vertical reticle of the telescope is not on the aiming point.
3. The deflection is announced incorrectly.
4. The traversing handwheel is turned.

e. *Credit.*

Time in seconds, exactly or less than

<table>
<thead>
<tr>
<th>Than</th>
<th>4.0</th>
<th>3.0</th>
<th>2.0</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit</td>
<td>5</td>
<td>5½</td>
<td>6</td>
<td>6½</td>
</tr>
</tbody>
</table>
90. Test and Adjustment of Sighting and Fire Control Equipment

a. Scope of Tests. Six tests will be conducted in which the candidate will be required to demonstrate the methods employed in making the prescribed tests and authorized adjustments, or describe the action taken (e.g., send to the ordnance maintenance company) if adjustment is not authorized to be made by using personnel.

b. Special Instructions.

(1) The piece will be prepared for the tests as indicated in paragraph 47 of this manual.

(2) The equipment which will be needed for the tests is listed in paragraph 35 of this manual.

(3) The candidate will select an assistant to operate the elevating handwheel at the direction of the candidate during tests 1 and 2 and adjust and aline the testing target at the direction of the candidate prior to test 5.

(4) The tests will be conducted in the chronological sequence indicated in c below. After completion of test 2, the gunner's quadrant used in tests 1 and 2 will be used for test 3, with the proper correction as determined in test 1 carried on the quadrant, provided the correction does not exceed 0.4 mil.

(5) Adjustments which the candidate may be required to accomplish will fall within the following limits:
(a) Elevation and angle of site scales, not to exceed one 100-mil graduation.

(b) Elevation and angle of site micrometer scales, not to exceed ten 1-mil graduations.

(c) Rotating head and telescope mount elevation indexes, none.

(d) Rotating head and telescope mount elevation micrometer indexes, not to exceed one-fourth turn.

(e) Panoramic telescope azimuth scale, not to exceed one 100-mil graduation.

(f) Panoramic telescope slipping azimuth micrometer scale, not to exceed ten 1-mil graduations.

(6) The tube will be leveled at the conclusion of test 2 and will not be disturbed thereafter.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Examiner commands</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PERFORM END-FOR-END TEST ON GUNNER’S QUADRANT.</td>
<td>Performs test as prescribed in paragraph 49 of this manual. Calls “Error (so many) mils, quadrant serviceable (unserviceable)” and hands quadrant to examiner for verification.</td>
</tr>
<tr>
<td>2</td>
<td>PERFORM MICROMETER TEST ON GUNNER’S QUADRANT.</td>
<td>Performs test as prescribed in paragraph 50 of this manual.</td>
</tr>
<tr>
<td>Test No.</td>
<td>Examiner commands</td>
<td>Action of candidate</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>3</td>
<td>TEST TELESCOPE MOUNT.</td>
<td>Calls “Quadrant micrometer is (is not) in error.” Performs tests and makes adjustments, if necessary, as prescribed in paragraphs 38 and 53 of this manual. Calls “Cross- (longitudinal-) level bubble(s) within (without) allowable limit.</td>
</tr>
<tr>
<td></td>
<td><strong>Caution</strong>: Do not turn cross-leveling or elevation knobs of the telescope mount after this test</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>TEST RANGE QUADRANT</td>
<td>Performs tests and makes adjustments, if necessary, as prescribed in paragraphs 38 and 52 of this manual. Calls “Ready” and steps clear.</td>
</tr>
</tbody>
</table>

*Note.* Prior to test 3, the cross- and longitudinal-leveling of the tube and the panoramic telescope mount will be verified by the examiner, and the testing target will be aligned by the candidate with the help of his selected assistant as described in paragraph 54 of this manual.

| 5 | TEST ADJUSTMENT OF PANORAMIC TELESCOPE. | Performs tests and makes adjustments, as prescribed in |
### Test No. | Examiner commands | Action of candidate
--- | --- | ---
6   | TEST ADJUSTMENT OF ELBOW TELESCOPE. | performs tests and makes adjustments, as prescribed in paragraph 38 of this manual. Calls “Ready” and steps clear.

**c. Penalties.**

(1) **General.** The tests are not essentially speed tests. The purpose of the prescribed time limits is to insure that the candidate can perform the operation without wasted effort.

(2) **Test 1.** No credit will be allowed if—

(a) The bubble of the gunner’s quadrant does not center when verified by the examiner.

(b) The error (one-half of the amount of the angle which was indicated when the quadrant was first reversed and the bubble centered by moving the index arm and micrometer) is announced incorrectly by the candidate.

(c) The candidate fails to declare the quadrant unserviceable if the error (necessary correction) exceeds 0.4 mil, or fails to declare the quadrant.
serviceable if the error (necessary correction) is 0.4 mil or less.

(d) The time to complete the test exceeds 2 minutes.

(3) Test 2. No credit will be allowed if—

(a) The procedure is not followed correctly.

(b) The time to complete the test exceeds 1 minute.

(4) Test 3. No credit will be allowed if—

(a) The bubble of the gunner's quadrant is not centered in either direction.

(b) The candidate does not announce correctly the status of either the cross-level or the longitudinal-level bubble.

(c) The matching indexes on the rocker and actuating arm or those on the elevation knob and shaft are not in coincidence when the adjustments are complete.

(d) The time to complete the test and adjustments exceeds 4 minutes.

(5) Test 4. No credit will be allowed if—

(a) The elevation micrometer does not read zero when the elevation scale reads zero.

(b) The angle of site does not read 300 when the cross-level and longitudinal-level bubbles are centered.

(c) The cross-level or longitudinal-level bubble is not properly centered.

(d) The time to complete the tests and adjustments exceeds 2 minutes.
(6) Test 5. No credit will be allowed if—
(a) The candidate fails to make adjustments when such adjustments are indicated.
(b) The rotating head elevation micrometer indexes are not in coincidence.
(c) The zero line of either the azimuth scale or azimuth scale micrometer is not in coincidence with its respective index.
(d) The centerline of the bore, as viewed through the boresights, or the line of sight of the telescope does not fall on the respective sighting points on the testing target when all scales are set at zero.
(e) The time to complete the tests and adjustments exceeds 4 minutes and 30 seconds.

(7) Test 6. No credit will be allowed if—
(a) The reticle is not horizontal.
(b) The “N” range line is not in coincidence with the proper sighting line of the testing target.
(c) The time to complete the test and adjustment exceeds 1 minute.

d. Credit.
(1) The candidate will be scored on the general merit of his work in addition to the specific requirements above.
(2) If the tests and adjustments are performed correctly within the prescribed
time limits, maximum credit will be
given as follows:

<table>
<thead>
<tr>
<th>Test</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>2</td>
</tr>
<tr>
<td>Test 2</td>
<td>1</td>
</tr>
<tr>
<td>Test 3</td>
<td>2</td>
</tr>
<tr>
<td>Test 4</td>
<td>2</td>
</tr>
<tr>
<td>Test 5</td>
<td>2</td>
</tr>
<tr>
<td>Test 6</td>
<td>1</td>
</tr>
</tbody>
</table>

Total 10

91. Materiel

a. Scope of Tests. The candidate will be re-
quired to perform three tests as outlined below.

b. Special Instructions.

(1) Tests 1 and 2. For tests 1 and 2, a
paulin will be placed on the ground for
the convenience of the candidate in lay-
ing out the disassembled parts. The can-
didate will be allowed to select the tools
and accessories necessary for the per-
formance of the tests prior to the start
of the tests.

(2) Test 3.

(a) A complete set of lubrication equip-
ment authorized for use of battery
personnel will be made conveniently
available on a paulin adjacent to the
howitzer.

(b) Every type of lubricant used on the
weapon will be placed conveniently on
the paulin, in plainly labeled contain-
ers.
### c. Outline of Tests.

<table>
<thead>
<tr>
<th>Test No.</th>
<th>Examiner commands</th>
<th>Action of candidate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>DISASSEMBLE BREECH MECHANISM AND FIRING LOCK.</strong></td>
<td>Performs the operation as prescribed in TM 9-325, laying the parts on the paulin. After disassembly, identifies all parts to examiner.</td>
</tr>
<tr>
<td>2</td>
<td><strong>ASSEMBLE BREECH MECHANISM AND FIRING LOCK.</strong></td>
<td>Performs the operation as prescribed in TM 9-325.</td>
</tr>
<tr>
<td>3</td>
<td><strong>LUBRICATION TEST</strong></td>
<td>Selects proper lubricating equipment and lubricant and shows how and with which lubricant each lubrication point is serviced. (Actual lubrication is not performed.)</td>
</tr>
</tbody>
</table>

### d. Penalties.

1. The tests are not essentially speed tests. The purpose of the maximum time limits is to insure that the candidate can perform the operations without wasted effort.

2. No credit will be given if the following time limits are exceeded:

   - Test 1: 1½ minutes
   - Test 2: 3 minutes
   - Test 3: 2 minutes

3. A penalty of one-half point will be assessed for each component part not correctly identified or omitted in test 1.
There is no time limit imposed on the identification of component parts. However, the examiner may reduce the grade if it becomes obvious that the candidate is not familiar with the nomenclature.

**e. Credit.**

(1) The candidate will be scored on the general merit of his work in addition to the specific requirements above.

(2) If each test is performed correctly within the prescribed time limit, maximum credit will be given as follows:

<table>
<thead>
<tr>
<th>Test</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>3</td>
</tr>
<tr>
<td>Test 2</td>
<td>3</td>
</tr>
<tr>
<td>Test 3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>
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<th>Reference</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>Dictionary of United States Army Terms.</td>
</tr>
<tr>
<td>AR 320-50</td>
<td>Authorized Abbreviations and Brevity Codes.</td>
</tr>
<tr>
<td>AR 385-63</td>
<td>Regulations for Firing Ammunition for Training Target Practice and Combat.</td>
</tr>
<tr>
<td>AR 672-5-1</td>
<td>Awards.</td>
</tr>
<tr>
<td>AR 750-5</td>
<td>Organization Policies and Responsibilities for Maintenance Operation.</td>
</tr>
<tr>
<td>DA Pam 108-1</td>
<td>Index of Army Motion Pictures, Film Strips, Slides and Phonographic Recordings.</td>
</tr>
<tr>
<td>DA Pam 310-series</td>
<td>Index of Military Publications.</td>
</tr>
<tr>
<td>FM 5-15</td>
<td>Field Fortifications.</td>
</tr>
<tr>
<td>FM 5-20</td>
<td>Camouflage, Basic Principles and Field Camouflage.</td>
</tr>
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<td>FM 5-25</td>
<td>Explosives and Demolitions.</td>
</tr>
<tr>
<td>FM 6-20-2</td>
<td>Field Artillery Techniques.</td>
</tr>
<tr>
<td>FM 6-40</td>
<td>Field Artillery Cannon Gunnery.</td>
</tr>
<tr>
<td>FM 6-125</td>
<td>Qualification Tests for Specialist Field Artillery.</td>
</tr>
<tr>
<td>FM 6-140</td>
<td>The Field Artillery Battery.</td>
</tr>
<tr>
<td>FM 17-50</td>
<td>Armor Logistics</td>
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</tr>
<tr>
<td>FM 21-30</td>
<td>Military Symbols.</td>
</tr>
<tr>
<td>FM 21-40</td>
<td>Small Unit Procedures in Nuclear, Biological, and Chemical Warfare.</td>
</tr>
</tbody>
</table>

**AGO 7829C**
Visual Signals.
Drills and Ceremonies.
Basic Cold Weather Manual.
Army Training Program for Field Artillery Units.
Training Test for Field Artillery Howitzer Battery, Light or Medium, Towed and Self-Propelled.
Firing Tables for Howitzer, 105-mm.
Chemical, Biological, and Radiological Decontamination.
Deep Water Fording of Ordnance Materiel.
105-mm Howitzer M2A1, Carriages M2A1 and M2A2, and Combat Vehicle Mounts M4 and M4A1.
Ordnance Corps Equipment Data Sheets.
Auxiliary Sighting and Fire Control Equipment.
Ordnance Maintenance: Gunner's Quadrants M1 and M1918 and Machine Gun Clinometer M1917.
Ammunition, General.
Panoramic Telescope, M1, M12, M12A2, M12A5 and M12A6.
Driver Selection, Training and Supervision; Tracked Vehicles.
The Army Equipment Records System and Procedures.
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<td>During operation service</td>
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<td>7</td>
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<td>Safety, general</td>
<td>70</td>
<td>73</td>
</tr>
<tr>
<td>Safety officer</td>
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<td>Section, composition of</td>
<td>2</td>
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</tbody>
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By Order of the Secretary of the Army:

EARLE G. WHEELER,
   General, United States Army,
   Chief of Staff.

Official:

J. C. LAMBERT,
   Major General, United States Army,
   The Adjutant General.
Distribution:

**Active Army:**
- DCSPER (2)
- ACSI (2)
- DCSLOG (2)
- DCSOPS (2)
- Ofc Res Comp (2)
- CRD (1)
- COA (1)
- CINFO (1)
- TIG (1)
- CNGB (2)
- USCONARC (5)
- ARADCOM (2)
- ARADCOM Rgn (1)
- USACDC (2)
- LOGCOMD (1)
- Armies (5)
- Corps (3)
- Div (2)
- Div Arty (1)
- Bde (1)
- Regt (1)
- FA Gp (1)
- Inf BG (1)
- Ft Carson (2)
- Ft Devens (2)

**NG:** State AG (3); TOE: 1–7 (1); 6–100 (3); 6–115 (3); 6–116, 6–117, 6–126, 6–127, 6–401, 6–501 (1); 17–1 (1).

**USAR:** Same as Active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320–50.
### Table V. Trajectory Characteristics, Shell HE, Charge 7; Shell HEP-T

<table>
<thead>
<tr>
<th>Range (meters)</th>
<th>Elevation</th>
<th>Trajectory characteristics</th>
<th>Firing data</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>2</td>
<td>Within these ranges, the trajectory is flat enough to prevent an 8-foot tank from passing under it.</td>
<td>Start firing using 400 meter range setting.</td>
</tr>
<tr>
<td>200</td>
<td>3</td>
<td>A range of 400 meters is ideal for opening fire, because fires can be conducted for the maximum time without misses if deflection is correct.</td>
<td></td>
</tr>
<tr>
<td>300</td>
<td>5</td>
<td>The trajectory is sufficiently flat to permit direct estimate of range without bracketing the target. If a hit is obtained at the bottom of an 8-foot tank, the addition of a 100-meter range change will result in a round that will just brush the top of the tank. Range changes will seldom be more than 100-meters, and 50-meter range changes will frequently be sufficient. These are the maximum ranges at which a tank should be fired on, unless tactical conditions require otherwise.</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>7</td>
<td>The trajectory is flat enough to prevent a 4-foot tank from passing under it.</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>9</td>
<td>The trajectory is flat enough to prevent a 4-foot tank from passing under it.</td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>11</td>
<td>The trajectory is flat enough to prevent a 4-foot tank from passing under it.</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>13</td>
<td>The trajectory is flat enough to prevent a 4-foot tank from passing under it.</td>
<td></td>
</tr>
<tr>
<td>800</td>
<td>15</td>
<td>The trajectory is flat enough to prevent a 4-foot tank from passing under it.</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>18</td>
<td>The trajectory is flat enough to prevent a 4-foot tank from passing under it.</td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td>20</td>
<td>The trajectory is flat enough to prevent a 4-foot tank from passing under it.</td>
<td></td>
</tr>
<tr>
<td>1100</td>
<td>22</td>
<td>The trajectory is flat enough to prevent a 4-foot tank from passing under it.</td>
<td></td>
</tr>
<tr>
<td>1200</td>
<td>25</td>
<td>Within these ranges, hits are only reasonably possible. Bracket adjustment of the target is normally required.</td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td>28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1500</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1700</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1800</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 1800</td>
<td></td>
<td>Direct laying at moving targets is not advisable. At these ranges the slope of fall of the projectile is such that a hit on a moving target is very difficult to obtain.</td>
<td></td>
</tr>
</tbody>
</table>

**Shell HE, charge 7**

<table>
<thead>
<tr>
<th>Range (meters)</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>200</td>
<td>5</td>
</tr>
<tr>
<td>300</td>
<td>7</td>
</tr>
<tr>
<td>400</td>
<td>10</td>
</tr>
<tr>
<td>500</td>
<td>12</td>
</tr>
<tr>
<td>600</td>
<td>15</td>
</tr>
<tr>
<td>700</td>
<td>17</td>
</tr>
<tr>
<td>800</td>
<td>20</td>
</tr>
<tr>
<td>900</td>
<td>23</td>
</tr>
</tbody>
</table>

**Firing data**

1. Start firing with the estimated range at the closest 100-meter range.
2. Make range changes with 50- or 100-meter increments.
3. Bracket adjustment of the target (overs and shorts) is not required.

1. Start firing with the estimated range at the closest 100-meter range.
2. Adjustment on the target by bracketing (overs and shorts) is required.
3. Surprise effect on the target must not be important.

**Table V**
Table VI. Before-operation Service

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Chief of section</th>
<th>Gunner</th>
<th>Assistant grunner</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
<th>No. 5</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reinspects inspections by members of the gun section in all sequences.</td>
<td>Inspects condition, completeness, corrects, and security of section chest.</td>
<td>Reports, &quot;Inspection ready.&quot;</td>
<td>Reports, &quot;Inspection ready.&quot;</td>
<td>Reports, &quot;Assistant gunner ready.&quot;</td>
<td>Reports, &quot;Number 1 ready.&quot;</td>
<td>Reports, &quot;Number 2 ready.&quot;</td>
<td>Reports, &quot;Number 3 ready.&quot;</td>
<td>Reports, &quot;Number 4 ready.&quot;</td>
</tr>
<tr>
<td>2</td>
<td>Verifies that hoist is properly coupled.</td>
<td>Releases left wheel hand brake.</td>
<td>Right wheel hand brake before coupling.</td>
<td>Inspects condition and security of rammer staff.</td>
<td>Reports, &quot;Ready for operating.&quot;</td>
<td>Reports, &quot;Assistant ready.&quot;</td>
<td>Reports, &quot;Number 1 ready.&quot;</td>
<td>Reports, &quot;Number 2 ready.&quot;</td>
<td>Reports, &quot;Number 3 ready.&quot;</td>
</tr>
<tr>
<td>5</td>
<td>Supervises the gunner in making tests and adjustment of sight.</td>
<td>Inspects condition and security of the rifle, except elevating telescopes.</td>
<td>Inspects elevating telescopes.</td>
<td>Inspects overall for wear, break, parts, damage, and for low oil pressure. Inspects wheels for loose or missing nuts, brake, screw, and valve caps.</td>
<td>Inspects cradle and sight for adjustment and fastening.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
</tr>
<tr>
<td>6</td>
<td>Inspects oil index to insures that proper reserve of oil is present in the recoil system (TM 9-325).</td>
<td>Inspects condition and security of the rifle, except elevating telescopes.</td>
<td>Inspects elevating telescopes.</td>
<td>Inspects overall for wear, break, parts, damage, and for low oil pressure. Inspects wheels for loose or missing nuts, brake, screw, and valve caps.</td>
<td>Inspects cradle and sight for adjustment and fastening.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
</tr>
<tr>
<td>7</td>
<td>Verifies presence of proper supply of cleaning and preserving material.</td>
<td>Inspects condition and security of the rifle, except elevating telescopes.</td>
<td>Inspects elevating telescopes.</td>
<td>Inspects overall for wear, break, parts, damage, and for low oil pressure. Inspects wheels for loose or missing nuts, brake, screw, and valve caps.</td>
<td>Inspects cradle and sight for adjustment and fastening.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
</tr>
<tr>
<td>9</td>
<td>New breech end of overall cover.</td>
<td>Inspects condition and security of the rifle, except elevating telescopes.</td>
<td>Inspects elevating telescopes.</td>
<td>Inspects overall for wear, break, parts, damage, and for low oil pressure. Inspects wheels for loose or missing nuts, brake, screw, and valve caps.</td>
<td>Inspects cradle and sight for adjustment and fastening.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
</tr>
<tr>
<td>10</td>
<td>Reinspects overall for proper functioning of the gun.</td>
<td>Inspects condition and security of the rifle, except elevating telescopes.</td>
<td>Inspects elevating telescopes.</td>
<td>Inspects overall for wear, break, parts, damage, and for low oil pressure. Inspects wheels for loose or missing nuts, brake, screw, and valve caps.</td>
<td>Inspects cradle and sight for adjustment and fastening.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
</tr>
<tr>
<td>11</td>
<td>Verifies presence of proper supply of cleaning and preserving material.</td>
<td>Inspects condition and security of the rifle, except elevating telescopes.</td>
<td>Inspects elevating telescopes.</td>
<td>Inspects overall for wear, break, parts, damage, and for low oil pressure. Inspects wheels for loose or missing nuts, brake, screw, and valve caps.</td>
<td>Inspects cradle and sight for adjustment and fastening.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
<td>Inspects condition and security of aiming posts on trails.</td>
</tr>
<tr>
<td>13</td>
<td>Reports to battery executive when section personnel are assembled in their vehicles. &quot;If, Number ( ) in order,&quot; reports defects which the section cannot remedy without delay or assistance.</td>
<td>Reports, &quot;Inspection ready.&quot;</td>
<td>Reports, &quot;Assistant gunner ready.&quot;</td>
<td>Reports, &quot;Number 1 ready.&quot;</td>
<td>Reports, &quot;Number 2 ready.&quot;</td>
<td>Reports, &quot;Number 3 ready.&quot;</td>
<td>Reports, &quot;Number 4 ready.&quot;</td>
<td>Reports, &quot;Number 5 ready.&quot;</td>
<td>Reports, &quot;Driver ready.&quot;</td>
</tr>
</tbody>
</table>
Table VII. During-operation Service.

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Chief of section</th>
<th>Gunner</th>
<th>Assistant gunner</th>
<th>No. 1</th>
<th>Hse. 2-8 inclusive</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supervises inspection and maintenance at halt.</td>
<td>Inspects for presence, condition, and security of sighting equipment, covers, staff sections, aiming posts, trail handspikes, and section chest.</td>
<td>Inspects coupling of howitzer to prime mover.</td>
<td>Inspects tires and wheels. (Inspects tires for wear, bruises, cuts, stones in treads, and for correct air pressure.) Inspects wheels for loose or missing nuts, hubcap screws, valve caps, and overheated wheel bearings.</td>
<td>Performs duties as prescribed by chief of section.</td>
<td>Performs service as prescribed for his vehicle.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Receives reports of personnel upon completion of their duties.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table VII
<table>
<thead>
<tr>
<th>Sequence</th>
<th>Chief of section</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
<th>No. 5</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supervises detailed inspection and maintenance of howitzer in all sequences.</td>
<td>Inspects for presence of all sighting and fire control equipment, cleans, secures, and replaces rammer staff and trail handspike.</td>
<td>Removes, cleans, and secures all muzzle covers.</td>
<td>Reports, &quot;Gunner ready.&quot;</td>
<td>Reports, &quot;Assistant gunner ready.&quot;</td>
<td>Reports, &quot;Number 1 ready.&quot;</td>
<td>Reports, &quot;Number 2 ready.&quot;</td>
</tr>
<tr>
<td>2</td>
<td>Inspects tools, ammunition, and equipment for completeness and condition.</td>
<td>Inspects and replaces rammer staff and trail handspike.</td>
<td>Inspects and cleans light optics equipment and stores it in section chest.</td>
<td>Reports, &quot;Gunner ready.&quot;</td>
<td>Reports, &quot;Assistant gunner ready.&quot;</td>
<td>Reports, &quot;Number 1 ready.&quot;</td>
<td>Reports, &quot;Number 2 ready.&quot;</td>
</tr>
<tr>
<td>3</td>
<td>Inspects ammunition for lot numbers, complete rounds, and general condition.</td>
<td>Remove breech portion of overall howitzer cover.</td>
<td>Replace muzzle portion of overall howitzer cover.</td>
<td>Reports, &quot;Gunner ready.&quot;</td>
<td>Reports, &quot;Assistant gunner ready.&quot;</td>
<td>Reports, &quot;Number 1 ready.&quot;</td>
<td>Reports, &quot;Number 2 ready.&quot;</td>
</tr>
<tr>
<td>4</td>
<td>Inspects recoil systems, the signs of leakage and rear portion filling to correct oil reserve when necessary (TM 9-325).</td>
<td>Inspects and cleans light optics equipment and stores it in section chest.</td>
<td>Replace breech portion of overall howitzer cover.</td>
<td>Reports, &quot;Gunner ready.&quot;</td>
<td>Reports, &quot;Assistant gunner ready.&quot;</td>
<td>Reports, &quot;Number 1 ready.&quot;</td>
<td>Reports, &quot;Number 2 ready.&quot;</td>
</tr>
<tr>
<td>5</td>
<td>Checks the contents of the ammunition chest, and inspects for condition of chest and contents.</td>
<td>Lubricates howitzer and carriage.</td>
<td>Cleans and lubricates the trail handspike.</td>
<td>Inspects carriage for loose or missing parts, bolts, nuts, rivets, and broken welds; looks for excess grease or oil under carriage.</td>
<td>Replace muzzle portion of overall howitzer cover.</td>
<td>Replaces safety coat.</td>
<td>Inspects carriage for loose or missing parts, bolts, nuts, rivets, and broken welds; looks for excess grease or oil under carriage.</td>
</tr>
<tr>
<td>7</td>
<td>Verifies that there is an ample supply of emergency supplies, oil, water, and gasoline.</td>
<td>Lubricates howitzer and carriage.</td>
<td>Lubricates howitzer and carriage.</td>
<td>Replaces safety coat.</td>
<td>Properly stores unused cleaning and preserving materials.</td>
<td>Properly stores unused cleaning and preserving materials.</td>
<td>Properly stores unused cleaning and preserving materials.</td>
</tr>
<tr>
<td>8</td>
<td>Replace breech portion of overall howitzer cover.</td>
<td>Checks, lubricates, and returns fuze setter to section chest.</td>
<td>Inspects carriage for loose or missing parts, bolts, nuts, rivets, and broken welds; looks for excess grease or oil under carriage.</td>
<td>Replace muzzle portion of overall howitzer cover.</td>
<td>Properly stores unused cleaning and preserving materials.</td>
<td>Properly stores unused cleaning and preserving materials.</td>
<td>Properly stores unused cleaning and preserving materials.</td>
</tr>
<tr>
<td>9</td>
<td>Receives reports from members of the section as they complete inspection and maintenance operations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Receives reports from members of the section as they complete inspection and maintenance operations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Reports to battery executive: &quot;Sir, a number () in section.&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table VIII After-operation Service.
**Table 1. Duties in Prepare for Action**

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Duties in Prepare for Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Commands PREPARE FOR ACTION. Repairs work of cannoneers during all activities. Commands SMOOTH.</td>
</tr>
<tr>
<td>2</td>
<td>Commands ACTION FRONT. THE staff of the command in ACTION FRONT (right) orders the staff of the command in ACTION FRONT (left) to prepare for action.</td>
</tr>
<tr>
<td>3</td>
<td>If the piece is to be moved by hand, commands: ACTION FRONT (BACK) TO EARTH.</td>
</tr>
<tr>
<td>4</td>
<td>Directs ordering of equipment and ammunition.</td>
</tr>
<tr>
<td>5</td>
<td>Assumes responsibility for the personnel of the vehicle to the motor park.</td>
</tr>
<tr>
<td>6</td>
<td>Unloads ammunition and equipment.</td>
</tr>
<tr>
<td>7</td>
<td>Unlocks the trail locking latch.</td>
</tr>
<tr>
<td>8</td>
<td>Unlocks the left axle locking latch.</td>
</tr>
<tr>
<td>9</td>
<td>Unlocks the right axle locking latch.</td>
</tr>
<tr>
<td>10</td>
<td>Unlocks the left axle lock.</td>
</tr>
<tr>
<td>11</td>
<td>Unlocks the right axle lock.</td>
</tr>
<tr>
<td>12</td>
<td>Unlocks the left axle lock.</td>
</tr>
<tr>
<td>13</td>
<td>Unlocks the right axle lock.</td>
</tr>
</tbody>
</table>

*Table 1: Duties in Prepare for Action*

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Duties in Prepare for Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Commands PREPARE FOR ACTION. Repairs work of cannoneers during all activities. Commands SMOOTH.</td>
</tr>
<tr>
<td>2</td>
<td>Commands ACTION FRONT. THE staff of the command in ACTION FRONT (right) orders the staff of the command in ACTION FRONT (left) to prepare for action.</td>
</tr>
<tr>
<td>3</td>
<td>If the piece is to be moved by hand, commands: ACTION FRONT (BACK) TO EARTH.</td>
</tr>
<tr>
<td>4</td>
<td>Directs ordering of equipment and ammunition.</td>
</tr>
<tr>
<td>5</td>
<td>Assumes responsibility for the personnel of the vehicle to the motor park.</td>
</tr>
<tr>
<td>6</td>
<td>Unloads ammunition and equipment.</td>
</tr>
<tr>
<td>7</td>
<td>Unlocks the trail locking latch.</td>
</tr>
<tr>
<td>8</td>
<td>Unlocks the left axle locking latch.</td>
</tr>
<tr>
<td>9</td>
<td>Unlocks the right axle locking latch.</td>
</tr>
<tr>
<td>10</td>
<td>Unlocks the left axle lock.</td>
</tr>
<tr>
<td>11</td>
<td>Unlocks the right axle lock.</td>
</tr>
<tr>
<td>12</td>
<td>Unlocks the left axle lock.</td>
</tr>
<tr>
<td>13</td>
<td>Unlocks the right axle lock.</td>
</tr>
</tbody>
</table>

*Table 1: Duties in Prepare for Action*
Table II. Duties in Firing, Indirect Laying

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Grade of service</th>
<th>Duties in Firing, Indirect Laying</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>For impact the command is FUZE M500 (or other fuze) is heard.</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>1. Seats stationary lug of setter into top recess of fuze.</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>2. Loosens wingnut on fuze setter, sets announced time.</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>3. Turns setter clockwise until setter stops or a click is heard.</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>4. Removes setter and verifies setting.</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>5. Screws in designated fuze, using authorized fuze wrench.</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Prepare propellant charge.</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>1. The command is FUSE ( ).</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>2. Verify the number of increments.</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>3. Reads the deflection and reports to the executive.</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>4. Removes or replaces supplementary charges as required.</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>5. Screws in designated fuse, using authorized fuze wrench.</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Corrects for aiming post displacement when the vertical reticle in the panoramic telescope is displaced from the line formed by the aiming posts. He says the bubble so that the firing post appears exactly midway between the rear aiming post and the vertical reticle.</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>For impact the command is FUZE M500 (or other fuze) is heard.</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>1. Seats upper lug of fuze setter in the upper recess of the fuze.</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>2. Informs the executive that Number 1 has set the fuze.</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>3. Turns setter clockwise until the set is aligned with the index on the setting ring.</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>4. Removes setter and verifies setting.</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>5. Screws in designated fuse, using authorized fuze wrench.</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Prepare propellant charge.</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>1. The command is FUSE ( ).</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td>2. Verify the number of increments.</td>
</tr>
<tr>
<td>23</td>
<td></td>
<td>3. Reads the deflection and reports to the executive.</td>
</tr>
<tr>
<td>24</td>
<td></td>
<td>4. Removes or replaces supplementary charges as required.</td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>5. Screws in designated fuse, using authorized fuze wrench.</td>
</tr>
</tbody>
</table>

**Notes:**
- Be sure that the fuse is set properly before firing.
- Follow fire commands and repeat commands to the section commander.
- Corrects for aiming post displacement when the vertical reticle in the panoramic telescope is displaced from the line formed by the aiming posts. He says the bubble so that the firing post appears exactly midway between the rear aiming post and the vertical reticle.
- For impact the command is FUZE M500 (or other fuze) is heard.
- 1. Seats stationary lug of setter into top recess of fuze.
- 2. Loosens wingnut on fuze setter, sets announced time. Valid to the executive that Number 1 has set the fuze.
- 3. Turns setter clockwise until the set is aligned with the index on the setting ring.
- 4. Removes setter and verifies setting. Valid to the executive that Number 1 has set the fuze.
- 1. The command is FUSE ( ).
- 2. Verify the number of increments. Valid to the executive that Number 1 has set the fuze.
- 3. Reads the deflection and reports to the executive. Valid to the executive that Number 1 has set the fuze.
- 4. Removes or replaces supplementary charges as required. Valid to the executive that Number 1 has set the fuze.
<table>
<thead>
<tr>
<th>Sequence</th>
<th>Chief of section</th>
<th>Gunner</th>
<th>Assistant gunner</th>
<th>No. 4</th>
<th>Nos. 1, 2, 3 and 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conducts fire of howitzer: 1. Takes control of his section and fires the howitzer when the executive commands TARGET, TANK, RIGHT (LEFT) FRONT, FIRE AT WILL or simply FIRE AT WILL. 2. Alerts section to prepare for direct fire.</td>
<td>Prepares panoramic telescopes for direct laying: 1. Centers cross-level bubble. 2. Verifies that the gunner’s aid index is set at zero. 3. Centers the non-slipping azimuth, the slipping azimuth, and the slipping micrometer scales.</td>
<td>Checks elbow telescope.</td>
<td>Perform same duties as in indirect laying.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Identifies or selects target: Identifies target designated by executive. 2. If target is a group of vehicles, selects the target that is the greatest threat to his position or the supported position based on this priority. a. Tanks at short range threatening to overrun the position. b. Hull down stationary tanks covering the advance of other tanks. c. Area containing personnel threatening to overrun the position. 3. Repeats target designation to the section “Lead Tank.” “Moving tank.” Takes post to the flank and slightly to the rear of the piece where his observation will not be obscured by muzzle blast and smoke. Estimates range to target: 1. A range card (fig. 11) with accurate measurements to key points provides the most accurate ranges. 2. Estimated ranges are used if accurate measurements are not available. Determines lead in mils: Lead is based on target speed, range, direction of travel, and ammunition used. Approximate initial leads are as follows:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table III. Duties in Direct Laying

<table>
<thead>
<tr>
<th>Source</th>
<th>Example</th>
<th>Speed (MPH)</th>
<th>Target traveling to line of fire</th>
<th>Target traveling to line of fire</th>
<th>Target traveling to line of fire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Medium</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Fast</td>
<td>20</td>
<td>20</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>30</td>
<td>20</td>
<td>20</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>20</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>20</td>
<td>20</td>
<td>15</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Sets initial lead on the gunner’s aid and across the micrometer scale. Traverse howitzer until the center vertical reticle is centered on the target and maintain this sight picture by continuous tracking of the target. Withdraws eye slightly and commands FIRE, after the assistant gunner calls “Set.” Elevates or depresses the piece until the target is centered on the appropriate range line in the reticle. Note. The reticle in the elbow telescope is patterned for use with shell HE, Charge 7, and shell HEAT. To use shell HEP-T with the elbow telescope, prepare a conversion table by comparing the elevations for shell HEP-T with the range for Charge 7, and use that range with the Charge 7 reticle for laying on the target. Maintains target on appropriate range line by continuous tracking. Calls “Set,” and withdraws eye slightly from the elbow telescope.

Opens and closes the breach. Tape the assistant gunner on the shoulder when the piece is loaded to indicate the piece is ready to fire. Fires when the gunner commands “FIRE.”

4. Commands FIRE, after the assistant gunner has called “Set.”

### Table III

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Duties in Direct Laying</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Performs same duties as in indirect laying.</td>
</tr>
<tr>
<td>2</td>
<td>Determines lead in mils: 1. A range card (fig. 11) with accurate measurements to key points provides the most accurate ranges. 2. Estimated ranges are used if accurate measurements are not available. Determines lead in mils: Lead is based on target speed, range, direction of travel, and ammunition used. Approximate initial leads are as follows:</td>
</tr>
<tr>
<td>3</td>
<td>Elevates or depresses the piece until the target is centered on the appropriate range line in the reticle. Note. The reticle in the elbow telescope is patterned for use with shell HE, Charge 7, and shell HEAT. To use shell HEP-T with the elbow telescope, prepare a conversion table by comparing the elevations for shell HEP-T with the range for Charge 7, and use that range with the Charge 7 reticle for laying on the target. Maintains target on appropriate range line by continuous tracking. Calls “Set,” and withdraws eye slightly from the elbow telescope.</td>
</tr>
<tr>
<td>4</td>
<td>Opens and closes the breach. Tape the assistant gunner on the shoulder when the piece is loaded to indicate the piece is ready to fire. Fires when the gunner commands “FIRE.”</td>
</tr>
</tbody>
</table>

### One-Man, One-Sight System

Fire commands are the same as above.

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Duties in Direct Laying</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Performs same duties as in indirect laying.</td>
</tr>
<tr>
<td>2</td>
<td>Determines lead in mils: 1. A range card (fig. 11) with accurate measurements to key points provides the most accurate ranges. 2. Estimated ranges are used if accurate measurements are not available. Determines lead in mils: Lead is based on target speed, range, direction of travel, and ammunition used. Approximate initial leads are as follows:</td>
</tr>
<tr>
<td>3</td>
<td>Elevates or depresses the piece until the target is centered on the appropriate range line in the reticle. Note. The reticle in the elbow telescope is patterned for use with shell HE, Charge 7, and shell HEAT. To use shell HEP-T with the elbow telescope, prepare a conversion table by comparing the elevations for shell HEP-T with the range for Charge 7, and use that range with the Charge 7 reticle for laying on the target. Maintains target on appropriate range line by continuous tracking. Calls “Set,” and withdraws eye slightly from the elbow telescope.</td>
</tr>
<tr>
<td>4</td>
<td>Opens and closes the breach. Tape the assistant gunner on the shoulder when the piece is loaded to indicate the piece is ready to fire. Fires when the gunner commands “FIRE.”</td>
</tr>
</tbody>
</table>
### Table IV. Duties in Preparation for Traveling

<table>
<thead>
<tr>
<th>Sequence</th>
<th>Chief of section</th>
<th>Gunner</th>
<th>Assistant gunner</th>
<th>No. 1</th>
<th>No. 2</th>
<th>No. 3</th>
<th>No. 4</th>
<th>No. 5</th>
<th>Driver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Commands March Order.</td>
<td>Assists number 3 in locking the cradle locking strut by placing the piece in the center of traverse. Withdraws the left trail locking pin from the forward hole (firing position) and inserts it in the rear hole (traveling position).</td>
<td>Inspects the chamber to see that the gun is unloaded; closes the breach after inspection by the chief of section. Closes cover on range quadrant vials. Assists number 3 in locking cradle locking strut by operating the elevation handwheel. Withdraws the right trail locking pin from the forward hole (firing position) and inserts it in the rear hole (traveling position). Picks up gun cover from the right of the gun and places it over the cradle. Moves to right trail.</td>
<td>Moves to his position at the left trail prepared to assist in closing it.</td>
<td>Moves to his position at the right trail prepared to assist in closing it.</td>
<td>Locks the cradle locking strut in traveling position assisted by the gunner operating the traversing handwheel and the assistant gunner operating the elevating handwheel. Releases the left handbrake.</td>
<td>Releases the right handbrake if removed, inserts the trail handspike in its socket in the rear of the left trail. Moves to his position at the left trail prepared to assist in closing it.</td>
<td>Drives the prime mover to the howitzer position as directed by the chief of section.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fit the overall cover over the breech end of the howitzer fitting the holes of the cover over the traveling lock shaft; leave the cover draped over the cradle. Assisted by number 2 closes right trail when number 3 calls “close.”</td>
<td>Using the handspike for leverage assisted by number 5 closes the left trail when number 3 calls “close.”</td>
<td>Using the drawbar for leverage assisted by the assistant gunner the right trail when number 3 calls “close.”</td>
<td>When he sees that gunner and the assistant gunner have finished fitting the holes of the gun cover over the traveling lock shaft, calls “close” to assistant gunner, numbers 1 and 2 indicating that the trails may be closed.</td>
<td>Picks up the muzzle cover, and after the tube has been inspected by the chief of section and found cleared, fastens the cover over the muzzle.</td>
<td>Using the handspike for leverage assists number 1 in closing the left trail when number 3 calls “close.”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sets the rotating head and deflection of the panoramic telescope at zero. Closes the covers on the telescope mount level vials. Removes telescope from its mount and places it in its case; locks the case.</td>
<td>Removes the elbow telescope, if mounted, and places it in its case.</td>
<td>Locks the trail locking latch after the trails are closed.</td>
<td>Disengages the drawbar locking shaft and rotates the drawbar 180° to the downward position, and engages the lock in the outer holes.</td>
<td>Locks left axle lock in traveling position.</td>
<td>Removes the handspike, fastens it in its carrying case, and other wires as directed.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Inspects for proper march order specifically the trail lock, cradle traveling locks, cradle locking strut, and handbrakes.</td>
<td>Fit and fasten the breech end of the overall cover.</td>
<td>Disassemble the rammer staff; removes the rammer (bore brush) and places it in the section chest; fastens the sections of the rammer staff in their brackets on the right trail when number 3 calls “close.”</td>
<td>Prepare ammunition and equipment for loading in the prime mover.</td>
<td>Raise and latch the bottom shield flap; secure the overall cover over the forward part of piece.</td>
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<tr>
<td>5</td>
<td>Assists the chief of section in supervising the march order.</td>
<td>Assists number 2 in preparing ammunition and equipment for loading in the prime mover.</td>
<td>Assists number 2 in preparing ammunition and equipment for loading in the prime mover.</td>
<td>Retrieves and disassembles the aiming posts, places them in their covers, and fastens them in their brackets on the right trail. Assists number 2.</td>
<td>Assists number 2 in preparing ammunition and equipment for loading in the prime mover.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>Directs maneuvering of prime mover until the pintle is almost over the lunette.</td>
<td>Grasps right trail handrail.</td>
<td>Grasps left trail handrail.</td>
<td>Grasps right trail handrail.</td>
<td>Releases left handbrake as directed.</td>
<td>Releases right handbrake as directed.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>Connects blackout system cables to the prime mover.</td>
<td>Raises the trails and places lunette in the pintle.</td>
<td>Assists the assistant gunner to raise the trails. Latches and locks the pintle.</td>
<td>Asists the assistant gunner to raise the trails.</td>
<td>Assist by placing weight on the tube as required.</td>
<td>Assists the assistant gunner to raise the trails.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Commands MOUNT (par. 3). Verifies that: 1. The handbrakes are released. 2. The blackout system is connected. 3. The pintle is latched and locked. 4. The equipment and personnel are aboard and secure. 5. The tailgate and safety strap are secure. Reports “Sir, number ( ) in order,” or any defects the section cannot remedy without delay.</td>
<td>Takes post. Mounts in prime mover.</td>
<td>Takes post. Mounts in prime mover.</td>
<td>Takes post. Mounts in prime mover.</td>
<td>Takes post. Mounts in prime mover.</td>
<td>Takes post. Mounts in prime mover.</td>
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<td></td>
</tr>
</tbody>
</table>

Table IV