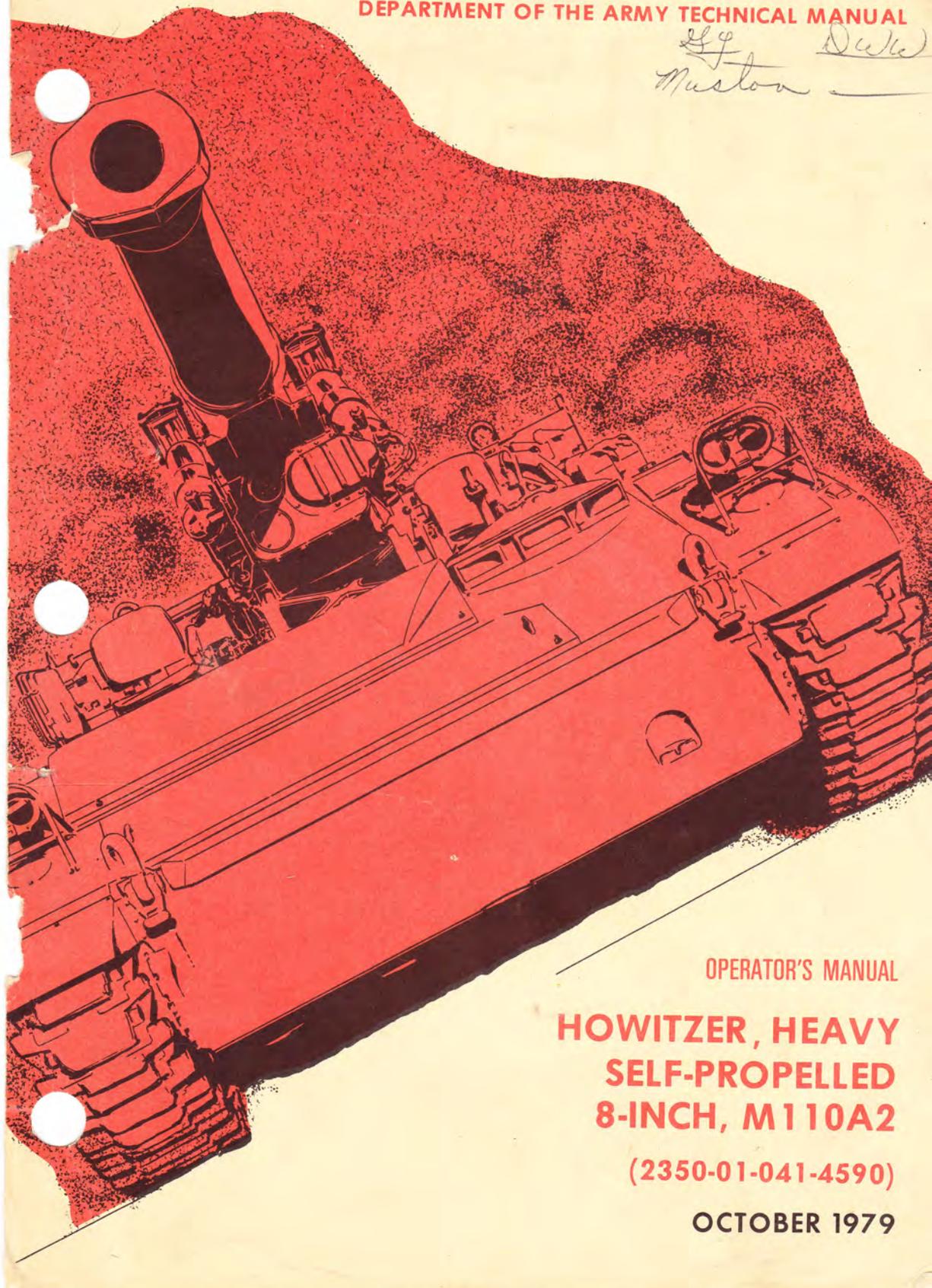


LAPOOK

TM9-2350-304-10

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

H. J. D. W. L.
Muston



OPERATOR'S MANUAL

**HOWITZER, HEAVY
SELF-PROPELLED
8-INCH, M110A2**

(2350-01-041-4590)

OCTOBER 1979

FIRE CONTROL ALINEMENT TEST AND MEASUREMENTS

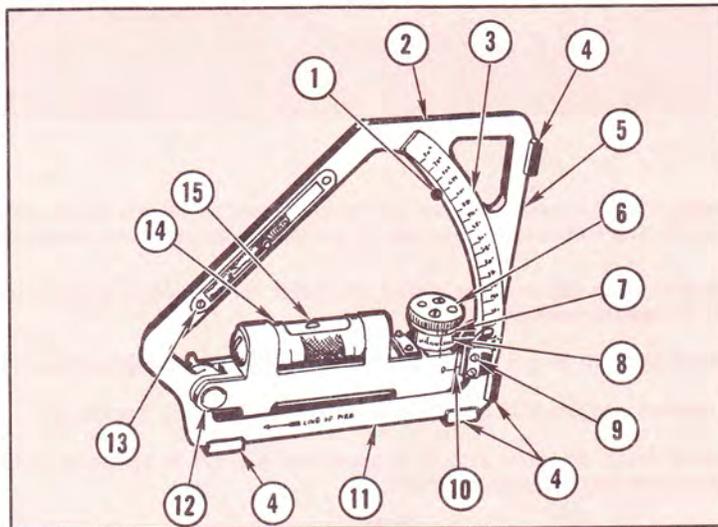
Fire control alinement tests (pages 2-70 thru 2-91) are performed by the section crew members under the supervision of the battery executive officer, chief of firing battery, and artillery mechanic. These tests are performed at the discretion of the unit commander. Suggested times for these tests are:

- Once each year if the piece is used for non-firing training.
- Once every 3 months if the piece is fired.
- As soon as possible after extensive use.
- Following accidents.
- Traversing extremely rough terrain.
- When fire control mounts have been replaced.
- Whenever the piece fires inaccurately for no apparent reason.

PREPARATION FOR FIRE CONTROL ALINEMENT TESTS

- 1 Move weapon to as firm and level ground as possible. Use hardstand, if available.
- 2 Check M15 fire control quadrant, M115 panoramic telescope, and M137 telescope mount for looseness or other obvious defects.
- 3 Inspect M1A1 gunner's quadrant shoes for dirt, nicks, or burrs. If necessary, clean shoes with oily rag.
- 4 Make sure that equilibrators are properly adjusted (page 2-96).
- 5 Make sure that suspension lockout system is engaged and tube is in battery.

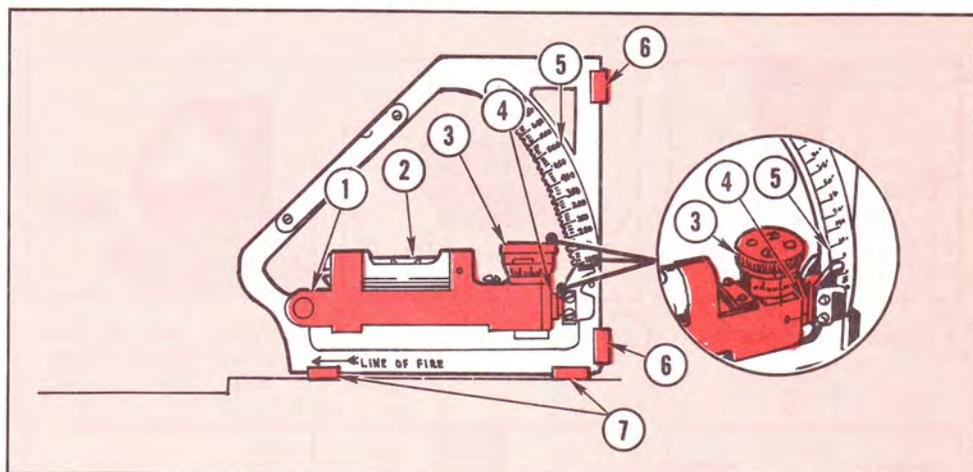
OPERATION OF GUNNER'S QUADRANT M1A1



- | | |
|--|------------------------------------|
| (1) ELEVATION SCALE 800-1600 MILS (RIGHT SIDE) (HIDDEN). | (8) MICROMETER SCALE. |
| (2) FRAME | (9) LEFT RADIAL ARM PLUNGER PLATE. |
| (3) ELEVATION SCALE 0-800 MILS (LEFT SIDE) | (10) RADIAL ARM PLUNGER |
| (4) FRAME SHOE | (11) REFERENCE SURFACE, 0-800 MILS |
| (5) REFERENCE SURFACE, 800-1600 MILS | (12) RADIAL ARM |
| (6) KNOB | (13) NAME PLATE |
| (7) MICROMETER MASK | (14) COVER |
| | (15) LEVEL VIAL. |

OPERATION OF GUNNER'S QUADRANT M1A1 – CONTINUED

The gunner operates the quadrant M1A1.



- 1 Inspect shoes (6) and (7) for dirt, nicks, or burrs.
- 2 Inspect quadrant seats on breech, mount M137, and elevation quadrant M15 for dirt, nicks, or burrs.

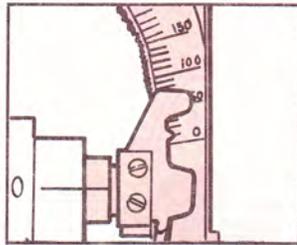
WARNING

Gunner's quadrant micrometer test and end-for-end test must be conducted prior to using gunner's quadrant for any fire control alignment test (page 2-72 and 2-73).

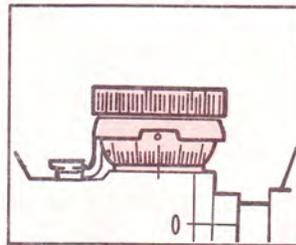
- 3 Place gunner's quadrant M1A1 on the cannon breech quadrant seat or on quadrant seat of mount M137 or elevation quadrant M15. Make sure that LINE OF FIRE arrow is pointing forward.
- 4 Push in on radial arm plunger (4) and move radial arm (1) up or down on elevation scale to center bubble in level vial (2) as closely as possible.
- 5 Turn micrometer knob (3) to accurately center bubble in level vial (2).
- 6 Read elevation (in 10 mil increments) on elevation scale (5) plus number of mils indicated on the micrometer scale (in 0.2 mil increments).
- 7 To level gun tube, mount M137 or elevation quadrant M15, proceed as above, except set radial arm to zero mils on elevation scale (5) and turn micrometer knob (3) to zero mils. Elevate or depress tube, mount or elevation quadrant until bubble is accurately centered in level vial (2). Be sure line of fire arrow points forward to muzzle end.
- 8 For elevation over 800 mils, place quadrant M1A1 on quadrant shoes (6) and read elevation on (800-1600 mils) elevation scale (5) located on right side of quadrant M1A1. Be sure line of fire arrow points forward to muzzle end.

GUNNER'S QUADRANT MICROMETER TEST

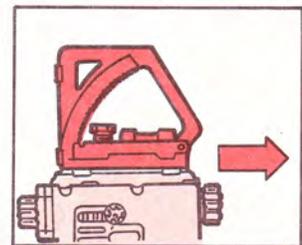
Gunner – Perform the gunner's quadrant micrometer test prior to using the quadrant for any fire control alinement tests.



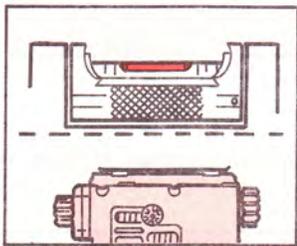
1 Set index at plus 10.



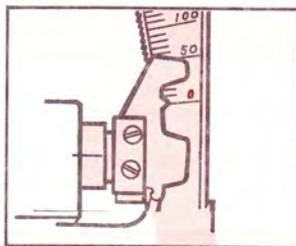
2 Zero micrometer.



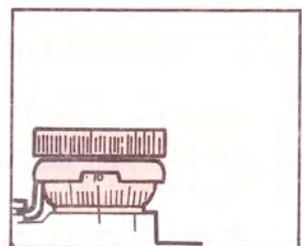
3 Point line of fire arrow toward muzzle end.



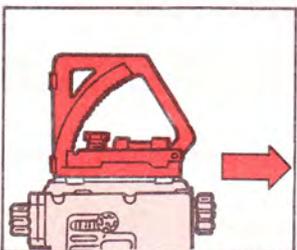
4 Depress/elevate tube to center bubble.



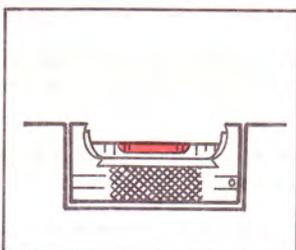
5 Set index at zero.



6 Set micrometer at 10.



7 Point line of fire arrow toward muzzle end.



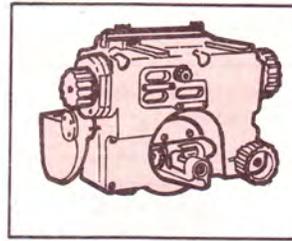
8 Bubble should center.

- 9 If bubble does not recenter, the micrometer is in error. The quadrant should be turned in to direct support maintenance for repair and no further test or adjustment made with the instrument.

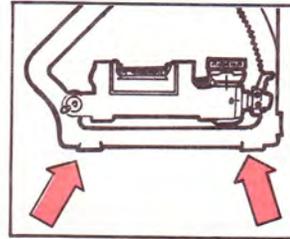
GUNNER'S QUADRANT END-FOR-END TEST

Gunner — Perform the gunner's quadrant end-for-end test prior to using the quadrant for any fire control alignment tests.

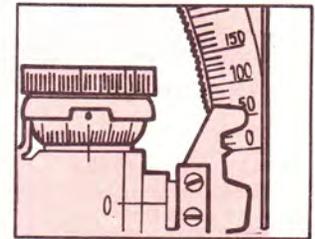
TOLERANCE +0.4 to -0.4, ANYTHING GREATER IS NOT ACCEPTABLE.



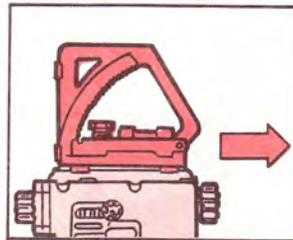
1 Inspect breech or elevation quadrant seats.



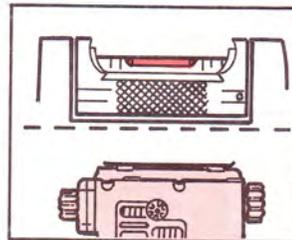
2 Inspect quadrant shoes.



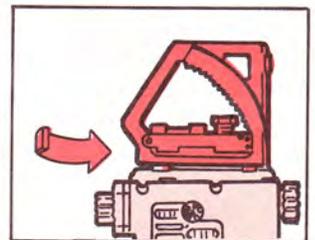
3 Zero the scales.



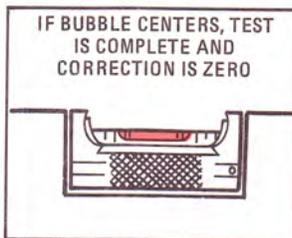
4 Point line of fire arrow to muzzle.



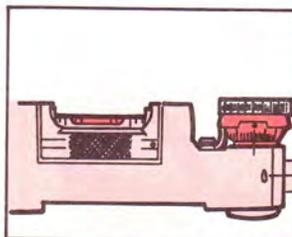
5 Depress/elevate tube to center bubble.



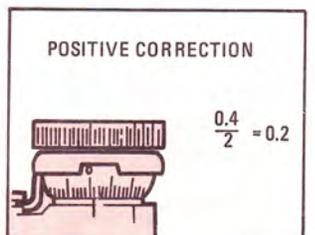
6 Reverse direction.



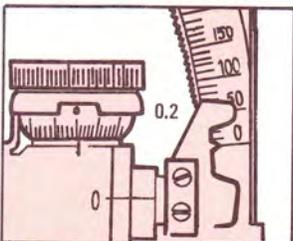
7 Bubble should center. If bubble does not center, go to step 8.



8 Center bubble with micrometer knob. If bubble centers, go to step 9. If it does not, go to step 16.



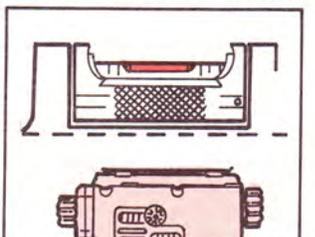
9 Divide micrometer reading by 2 to determine correction factor.



10 Put result on micrometer scale.

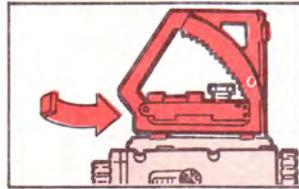


11 Point line of fire arrow toward muzzle end.

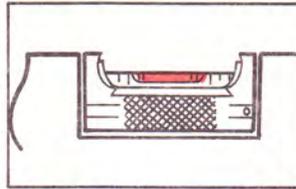


12 Depress/elevate tube to center bubble.

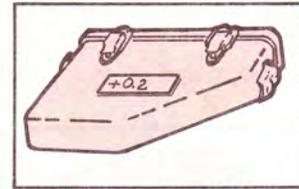
GUNNER'S QUADRANT END-FOR-END TEST – CONTINUED



13 Reverse direction.



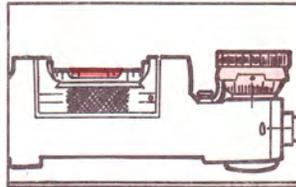
14 Bubble should center.



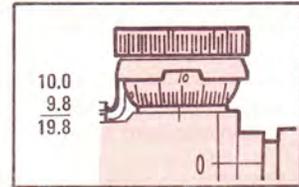
15 Record end-for-end correction.



16 Set index at minus 10 (1600 on 800 to 1600 scale).



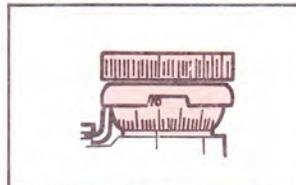
17 Center bubble with micrometer knob.



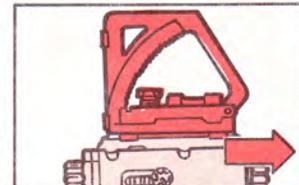
18 Add 10 to micrometer reading.

$$\frac{19.8}{2} = 9.9$$

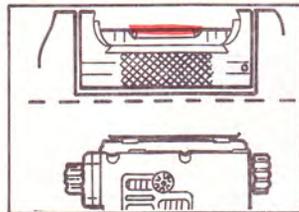
19 Divide answer by 2.



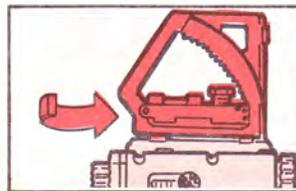
20 Place result on micrometer scale.



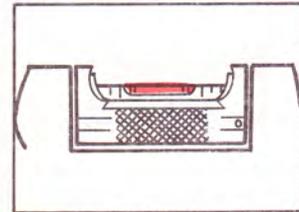
21 Point line of fire arrow toward muzzle end.



22 Depress/elevate tube to center bubble.



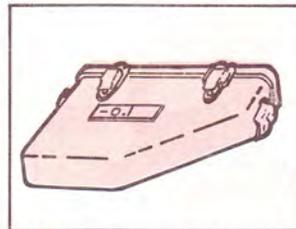
23 Reverse direction.



24 Bubble should center. If bubble does not center go back to step 16.

$$\begin{array}{r} 10.0 \\ - 9.9 \\ \hline - 0.1 \end{array}$$

25 Subtract micrometer reading from 10. Since this is a negative correction (step 16), a minus sign must be placed in front of the correction factor.



26 Record end-for-end correction.