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AT1504
06 AUG 04

STUDENT OUTLINE

M220E4 TOW2 SYSTEM CHECKOUT PROCEDURE

1. TERMINAL LEARNING OBJECTIVE

a. Given an SL-3 complete, M220E4 TOW2 weapon system, while wearing a fighting load, conduct a M220E4 TOW2 weapon system checkout procedure in accordance with TM 9-1425-450-12. (52TR.01.02)

2. ENABLING LEARNING OBJECTIVES

a. Given an SL-3 complete, M220E4 TOW2 weapon system, while wearing a fighting load, inspect a M220E4 TOW2 weapon system in accordance with TM 9-1425-450-12. (52TR.01.02a)

b. Given an SL-3 complete, M220E4 TOW2 weapon system, while wearing a fighting load, perform a system self-test for a M220E4 TOW2 weapon system in accordance with TM 9-1425-450-12. (52TR.01.02b)

c. Given an SL-3 complete, M220E4 TOW2 weapon system, while wearing a fighting load, boresight a M220E4 TOW2 weapon system in accordance with TM 9-1425-450-12. (52TR.01.02c)

d. Given an SL-3 complete, M220E4 TOW2 weapon system, while wearing a fighting load, perform a balance and steering check for a M220E4 TOW2 weapon system in accordance with TM 9-1425-450-12. (52TR.01.02d)

e. Given an SL-3 complete, M220E4 TOW2 weapon system, while wearing a fighting load, collimate a M220E4 TOW2 weapon system in accordance with TM 9-1425-450-12. (52TR.01.02e)

1. SYSTEM CHECKOUT PROCEDURE. Done to ensure that the system will work properly in a firing situation, a Systems Checkout procedure must be completed prior to firing. The checkout procedure is used to find faulty components on the system. The system checkout procedure should be done as quickly as possible. If too much time is taken to do the checkout procedures, the battery assembly may not have enough power to fire the missile.

a. Checkout. To conduct the checkout procedures use the acronym CCAN (Completely assembled, Closed cycle cooler on, Arming lever, and Narrow field of view on the thermal sight).

(1) Completely Assembled TOW2 weapon system. Ensure that the M220E4 TOW2 weapon system has been assembled correctly, check all cables locking mechanisms, and guide pins and rails. The M220E4 TOW2 weapon system should be locked down in both azimuth and elevation.

(2) Thermal sight. The following things must be done prior to starting the self-test portion of a system check out procedures:

(a) Turn the closed cycle cooler on the thermal sight to the "on" position and ensure that the thermal sight is running, this will give the thermal sight time to cool down for collimation.

(b) Set the field of view selector switch to narrow field of view by rotating the field of view selector switch from the WFOV position to the NFOV position (towards the rear of the system). Ensure that the switch moves freely.

(c) Set the thermal sight diopter focus ring to +0 by rotating focus ring until + 0 is in front of the white tick mark on the thermal sight. Ensuring that the ring moves freely.

(3) Optical sight. The following things must be done prior to starting the self-test portion of a system check out procedures:

(a) Check the reticle light switch by turning the switch to the "on" positions and then looking through the eyepiece of the optical sight to ensure that the crosshairs are illuminated red.

(b) Set the optical sight diopter focus ring to +3 by turning the focus ring until +3 is in front of the white tick mark on the optical sight, Ensure that the focus ring turns freely.

(4) Trigger. The following things must be done prior to starting the self-test portion of a system check out procedures:

(a) Check the cover by lifting the trigger protective cover and ensuring that the cover stands up on its own.

(b) Check trigger operation by Pressing the trigger and listening for a metallic click.

(c) Release the trigger and ensure that the trigger springs back to the original position.

(d) Close the trigger protective cover.

(5) Launch Tube. The following things must be done prior to starting the self-test portion of a system checkout procedure: (S.S.D)

(a) Check the Launch tube for serviceability by both visually and physically inspecting the exterior and interior of the launch tube and trunnion for splits, cracks, gouges, tears, pits, or visible raised areas.

(b) Check the launch tube to ensure it is attached securely to the trunnion by shaking the launch tube.

(c) Check the launch tube and trunnion for debris by both visually and physically inspecting the interior of the launch tube for wires or foreign material that could hinder firing of the missile.

(6) Bridge Clamp. The following things must be done prior to starting the self-test portion of a system check out procedures:

(a) Check to ensure that the system will arm by raising the arming lever. Ensuring that the arming lever stands 90 degrees on its own and that the electrical connections on the bridge clamp drops down approximately 1 inch when the arming lever is raised.

(b) Raise the bridge clamp locking lever ensuring that the arming lever drops when the bridge clamp locking lever is raised. Raising the bridge clamp and ensure that the bridge clamp will stay open at a 90 degree angle on its own.

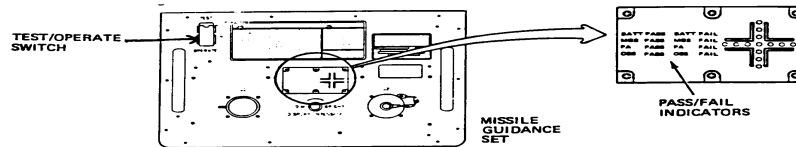
(c) Check the electrical connector on the bridge clamp for foreign materials and corrosion; with the bridge clamp open hold the arming lever up while you push up on the outer sleeve of the electrical connection to expose the connections, Visually inspecting for foreign materials and corrosion.

(d) Lower the bridge clamp, when bridge clamp is in the closed position on top of the trunnion move the bridge clamp locking lever into the locked position.

(e) Raise and lower the bridge clamp locking lever ensuring that you hear a scissor like sound.

2. SYSTEM SELF TEST. Tests whether or not the battery assembly has power, and confirms that the Optical sight, thermal sight and MGS are all responding to electrical impulses, and that they are compatible with each other. A system Self test should be performed when the system is moved over rough terrain, 10 degree F temperature changes occurs, Operating the system longer than 4 hours, After assembling the TOW2 system, or when changing a component of the system.

- a. Ensure that the optical sight diopter focus ring has been set to +3.
- b. Turn Display Intensity knob to the bright position.
- c. Raise the Test/Operate switch cover.



d. Press the Test/Operate switch on the MGS to the test position. The test/operate switch must be held in the test positions until the completion of steering and balance. If the test switch is released for any reason you must wait 3 seconds before retesting.

e. Make sure all pass/fail indicator on Display light up for 3 to 5 seconds.

f. Ensure Pass/Fail indicators illuminate with a green pass.

(1) Does the BATT pass illuminate, and not the BATT fail.

(2) Does the MGS pass illuminate, and not the MGS fail.

(3) Does the PA pass illuminate, and not the PA fail.

(4) Does the OSS pass illuminate, and not the OSS fail.

(5) Does the green center lamp in the azimuth/elevation cross light and glow steady? If it does not then you must before boresight procedures.

3. BORESIGHT. Is done to align the optical sight to the missile guidance set. A boresight should be performed when the system is moved over rough terrain, 10 degree F temperature changes occurs, operating the system longer than 4 hours, after assembling the TOW2 system, or when changing a component of the system.

a. Ensure that you have only two red dots in the azimuth and elevation cross on the missile guidance set. If there are four red dots you have what is called four corners, to correct four corners do the following:

(1) Release the test operate switch.

(2) Open the boresight adjustment knob covers.

(3) Adjust the boresight adjustment knobs to approximate center.

(4) Press test operate switch to test position and hold.

b. Open the boresight adjustment knob covers on the optical sight.

c. While still holding the test operate switch in the test position, turn the azimuth and elevation boresight adjustment knobs until the center green dot in the azimuth and elevation cross pad is illuminated and glowing steadily.

d. Close both the boresight adjustment knob covers, and ensure that the green dot glows steadily for 6 to 8 seconds.

4. STEERING AND BALANCE CHECK. Done to ensure that the tracking signal originating from the traversing unit is being read by the missile guidance set. Steering and balance should be performed when the system moved over rough terrain, 10 degree F temperature change occurs, operating the system longer than 4 hours, after assembling the TOW2 system, or when changing a component of the system.

(a) While still holding the test operate switch in the test position, unlock the azimuth and elevation lock and brake on the traversing unit.

(b) Using the control knobs on the traversing unit, elevate, depress and traverse the traversing unit. Ensuring that the green dot in the azimuth and elevation cross pad follows the movement of the traversing unit.

(c) Stop the movement of the traversing unit and ensure that the green dot in the azimuth and elevation cross pad returns to center and glows steadily.

(d) Lock the azimuth and elevation lock and brake. Elevate, depress and traverse the traversing unit until the traversing unit locks into position.

(e) Release the test operate switch, and close the protective cover.

5. COLLIMATING PROCESS. Done using the boresight collimator to align the thermal sight to the optical sight. The collimating process should be performed when the system has been moved over rough terrain, 10 degree F temperature changes occurs, operating the system longer than 4 hours, after assembling the TOW2 system, or when changing a component of the system.

a. Remove your cover off your head, and cover the front of the optical sight. Turn the reticle light switch on and check to see if the crosshairs illuminate. Then turn off reticle light switch.

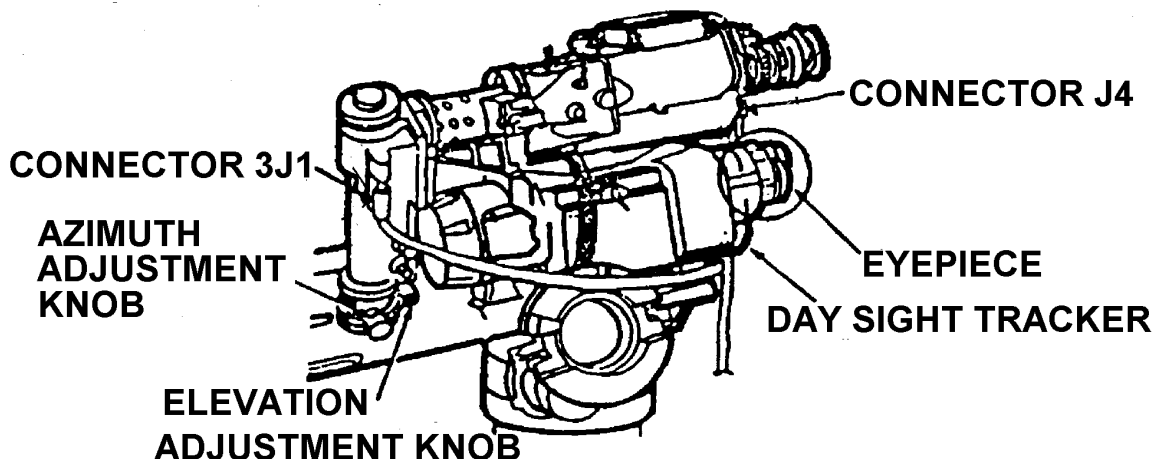
b. Remove the boresight collimator from the case.

c. Inspect the mating surfaces on the thermal sight and the boresight collimator to ensure proper mating

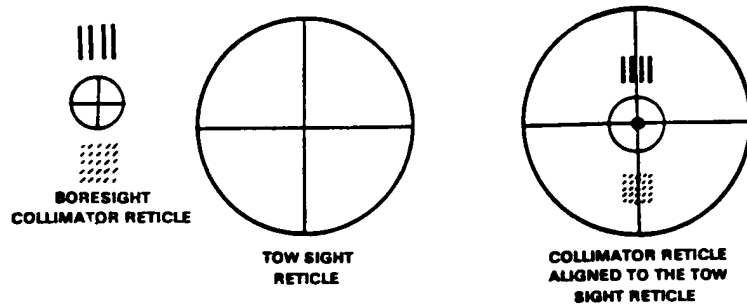
d. Ensure that the course azimuth knob on the thermal sight is in the 1 or 2 position and not in-between.

e. Attach the boresight collimator to the thermal sight by aligning the locator pins on the thermal sight with the pads on the boresight collimator. Push in and turn the securing latches on the boresight collimator to lock in place.

f. Remove the dust covers from the boresight power cable, boresight collimator, and the thermal sight. Attach the power cable to the 3J1 connection on the boresight collimator and the J4 connection on the thermal sight.



g. Look into the eyepiece on the optical sight, adjust diopter focus ring until there are sharp clear crosshairs. Ensure that the optical sight crosshairs and the boresight reticle pattern appear.



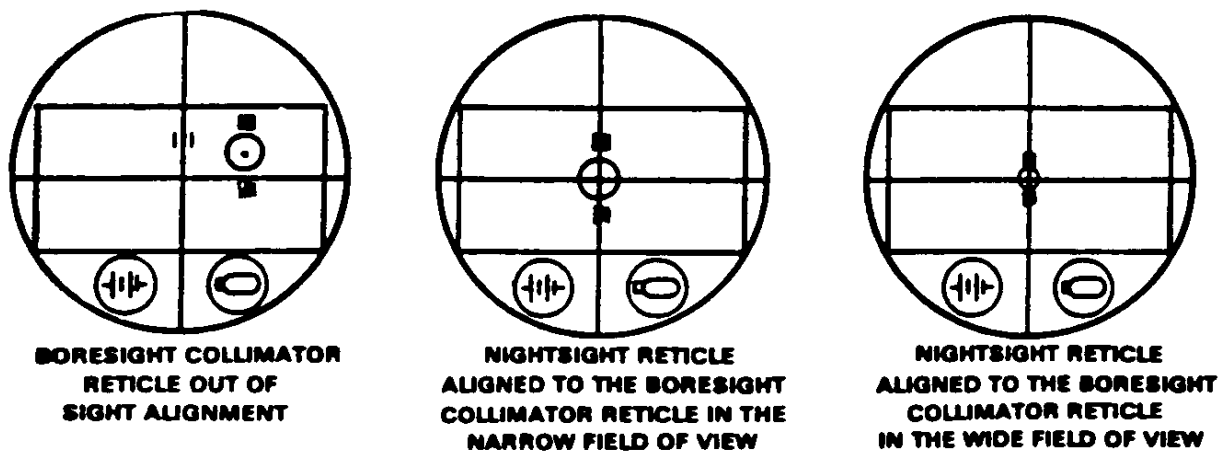
h. Adjust the boresight AZ and EL adjustment knobs to align the boresight reticle with the optical sight crosshairs. Ensure that the pattern is centered.

i. Ensure that the thermal sight is in NFOV. Look through the eyepiece to ensure that the reticle is lit and that the battery monitor light is off.

j. Adjust the brightness, contrast, and range focus knobs on the thermal sight for the best picture of the boresight collimator reticle pattern. Ensure that the reticle is clear.

k. Adjust the thermal sight diopter ring until the crosshairs are sharp and clear.

l. Unlock the azimuth and elevation locks on the thermal sight by turning the locks fully counter clockwise.



m. Adjust the AZ and EL on the adjustment knobs on the thermal sight until the reticle patterns are aligned. Ensure that the thermal sight cross hairs are centered on the reticle pattern.

n. Lock the azimuth and elevation locks on the thermal sight by turning the locks fully clockwise.

o. Ensure that the boresight reticle is still aligned.

p. Move the field of view selector switch to WFOV on the thermal sight and check to ensure that the center dot of the boresight collimator reticle is less than one diameter from the center of the thermal sight crosshairs.

q. Look into the optical sight eyepiece and re-check the alignment of the boresight collimator reticle.

r. Remove the boresight collimator power cable from the thermal sight J4 and replace dust the covers on both. Remove the boresight collimator power cable from the 3J1 connection on the boresight collimator and replace the dust covers. Place the power cable back into the boresight case.

s. Remove the boresight collimator by releasing the securing latches and sliding the boresight collimator off the thermal sight.

t. Replace the boresight collimator into the case, close the lid and secure it using the latches on the case.

u. Refocus the optical and thermal sight on a target to ensure that there is a clear picture.

v. Look through the thermal sight eyepiece to ensure that the battery light is off.

6. TROUBLESHOOTING. Troubleshooting is the process of correcting deficiencies that may occur during the checkout procedures. Before troubleshooting is conducted the gunner should release the test operate switch, wait 30 seconds, then re-test.

a. IF no pass/fail indicators on missile guidance set illuminate when the test operate switch is in test position.

(1) Remove and replace the battery assembly.

b. If all the pass/fail indicators do not illuminate for 3 seconds.

(1) Remove and replace the MGS

c. If the batt fail indicator light illuminates.

(1) Remove and replace the battery assembly.

d. If the MGS fail indicator light illuminates.

(1) Remove and replace the MGS

- e. If the MGS pass indicator light does not glow steadily.
 - (1) Set the field of view to NFOV.
 - (2) Set the On/Off/Stby switch to the on position.
 - (3) Remove and replace the thermal sight.
- f. If the PA fail indicator light illuminates.
 - (1) Replace the thermal sight.
 - (2) Check pins on the PA cable.
- g. If the OSS fail indicator light illuminates.
 - (1) Replace the optical sight.
 - (2) Remove and replace the MGS
- h. If the OSS pass indicator light is blinking.
 - (1) Perform the steps to correct four corners.

REFERENCES: TM 9-1425-450-12 Operator's and Organizational Maintenance Manual for the TOW2 Weapons System, pages 2-84 through 2-119.