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Training Command
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AT1508
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STUDENT OUTLINE

M220E4 TOW2 WEAPON SYSTEM TARGET ENGAGEMENT

LEARNING OBJECTIVES

a. Terminal Learning Objective

(1) Given an M220E4 TOW2 weapon system, simulated encased missile, fire commands, and a precision gunnery training system, while wearing a fighting load, perform M220E4 TOW2 weapon system gunnery qualification by achieving a hit on 9 of 12 simulated vehicles presented and a minimum score of 900 points. (52TR.01.05)

b. Enabling Learning Objectives

(1) Given a list of choices, identify firing limitations for a M220E4 TOW2 weapon system in accordance with FM 23-34. (52TR.01.05a)

(2) Given an M220E4 TOW2 weapon system, simulated encased missile, and a precision gunnery training system, while wearing a fighting load, perform sight manipulation and sight selection in accordance with FM 23-34. (52TR.01.05b)

(3) Given an M220E4 TOW2 weapon system, simulated encased missile, and a precision gunnery training system, while wearing a fighting load, execute fire procedures in accordance with FM 23-34. (52TR.01.05c)

(4) Given an M220E4 TOW2 weapon system, simulated encased missile, and a precision gunnery training system, while wearing a fighting load, acquire a target in accordance with FM 23-34. (52TR.01.05d)

(5) Given an M220E4 TOW2 weapon system, simulated encased missile, and a precision gunnery training system, while wearing a fighting load, clear a back blast area in accordance with FM 23-34. (52TR.01.05e)

(6) Given an M220E4 TOW2 weapon system, simulated encased missile, and a precision gunnery training system, while wearing a fighting load, arm a M220E4 TOW2 weapon system in accordance with FM 23-34. (52TR.01.05f)

(7) Given an M220E4 TOW2 weapon system, simulated encased missile, and a precision gunnery training system, while wearing a fighting load, fire a M220E4 TOW2 weapon system in accordance with FM 23-34. (52TR.01.05g)

(8) Given an M220E4 TOW2 weapon system, simulated encased missile, and a precision gunnery training system, while wearing a fighting

load, track a target using a M220E4 TOW2 weapon system until impact in accordance with FM 23-34. (52TR.01.05h)

1. Firing Limitations for the M220E4 TOW2 Weapon System. There are various conditions that may limit the effectiveness of the TOW missile. These conditions are called firing limitations. The following conditions or limitations, should be considered before you implement your anti-armor plan:

a. Firing Over Water. Firing across bodies of water wider than 1,100 meters can reduce the range of the TOW. Signals being sent through the command-link wires may short out when a large amount of wire is submerged in water. If the range is less than 1,100 meters, there is no effect on the missile's range. A TOW position should be as high above, and as far back from the water as the tactical situation will allow. The squad or section leader should analyze his sector as soon as the position is occupied to determine if water will affect the employment of TOW. Every foot that you raise the firing platform will allow the missile to travel an extra 100 meters without being effected by the water.

b. Firing Over Electrical Wires. If the command-link wires contact a live high-voltage power line, personnel can be injured or killed, and positive control of the missile will be forfeited.

c. Firing in Windy Conditions. Gusty, flanking, or quartering winds can cause the launch tube to vibrate and spoil your tracking performance. Strong winds can move the missile around during flight, but as long as the cross hairs are kept center-mass on the target, the weapon system itself will compensate for the wind up to and including 30 mph crosswinds.

d. Firing Through Smoke and Area Fires. Smoke can obscure your line of sight and hide the target when trying to acquire, using the optical sight always use the thermal night sight in this situation. An extremely hot or dense fire can burn through the command-link wire, causing loss of control of the missile. Avoid firing through fire and over fires if at all possible.

e. Firing from Bunkers and Buildings. The TOW2 weapon system can be fired from enclosures if the room is no smaller than 17 x 24 feet and is equipped with a 7-foot ceiling. There must be an opening of at least 20 square feet for ventilation, preferably to the rear of the launcher. Open or destroy all windows and doors, and clear the room of all loose objects that may be affected by back blast. The room should be of sturdy construction, and all Marines present must be forward of the rear end of the launcher and the crew should wear earplugs.

f. Clearance Requirements. There must be at least 9 inches of clearance from the end of the launch tube, to the closest surface. This will ensure that the wings and control surfaces will not be damaged when they extend immediately after the missile clears the launch tube.

(1) The TOW2 missile requires 30 inches of clearance between the line of sight and a target 300 to 500 meters away. This is to allow for wire sag.

2. M220E4 TOW2 Weapon System Sight Manipulation. After a system checkout procedure has been performed the gunner should ensure that both the optical and the thermal night sights are adjusted to his eye, this will greatly

increase the gunner's accuracy as well as assist with target identification. Sight manipulation should be continuous throughout any operation.

a. Optical Sight. To adjust the optical sight, the gunner looks over the objective area for an object that is at least 300 meters away. Then he unlocks the azimuth lock, the elevation lock and brake on the traversing unit. Placing his eye into the optical sight eyepiece, he manipulates the traversing unit using the control knobs, onto the predetermined object. When the crosshairs of the optical sight are centered on the object, the gunner moves the elevation brake to lock the traversing unit down in elevation on the object. With one hand holding the traversing unit to prevent movement, he adjusts the diopter focus ring on the optical sight until the crosshairs are sharp and clear. (When scanning an area with the optical sight, the diopter focus ring will help you focus on different ranges. However before firing, ensure that the crosshairs are sharp and clear).

b. Thermal Night Sight. The gunner ensures that the thermal night sight "ON/OFF/Stby" switch is in the on position. Places his eye into the thermal night sight eyepiece, ensuring to apply forward pressure to open the security shutter. With one hand still on the control knobs the gunner does the following to adjust the thermal night sight picture:

(1) Ensures that the "battery monitor light", and the "not ready light" are not lit.

(2) The gunner adjusts the thermal night sight diopter focus ring until the crosshairs are sharp and clear.

(3) The gunner adjusts the brightness and contrast knobs until a blurry image appears.

(a) The brightness and contrast knobs should be adjusted for gunner preference. The hotter the objects the brighter the object will appear. The colder objects will appear darker.

(4) The gunner adjusts the range focus knob until the image appears sharp and clear. For the best image the gunner may have to re-adjust the brightness and contrast knobs.

(5) The gunner unlocks the elevation brake, and using the control knobs moves the traversing unit back to the locked down position.

(6) The gunner then applies the azimuth lock, and elevation lock and brake. Ensuring that the system is locked down in the -8 degree position.

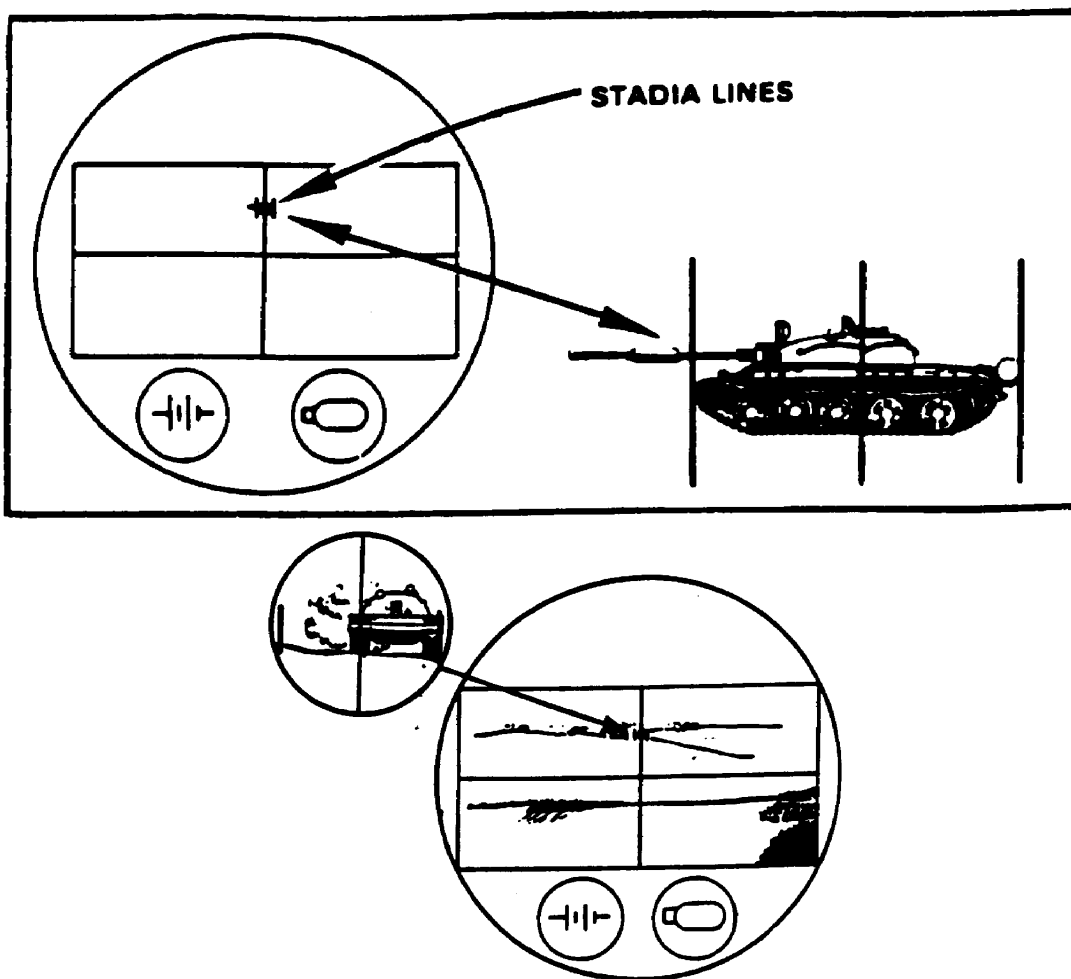
c. Sight Selection. The gunner should be aware of battlefield conditions when making sight selection

(1) The gunner determines which sight provides the best visibility of the target and uses that sight for engagement. The thermal night sight should always be the prefer sight for firing due to the ability to see through smoke.

3. Determining the Range to Target. Before you can apply your tracking skills as a TOW gunner, you must first ensure that your target is indeed close enough to kill. There is nothing more counterproductive for a TOW gunner than to commit himself to firing a missile, executing flawless

tracking procedures, and then having the missile impact 200 meters short of your intended target. Not only is this a waste of money, in combat it is tantamount to suicide. The target now has the advantage. The primary method to determine if a target is within range is as follows:

a. Thermal Night Sight Method. The stadia lines above the cross hairs in the thermal night sight are a ready-made range indicator. Center these stadia lines on the target and note which direction the vehicle is facing in relation to you. If the target is exposing his flanks to you, place the vertical stadia lines on top of the target. If the target's forward and rear edges touch or extend past the two end lines, the target is in range. Ensure you are using the actual front of the target and not the end of the main gun. If the target is facing you head on or at an oblique place the vertical line of the thermal night sight cross hairs and one of the end vertical stadia lines over the target. If the outside edges of the target touch or extend past those lines, the target is in range.



b. Additional Methods. If for some reason the thermal night sight is unavailable, there are additional ways to estimate range.

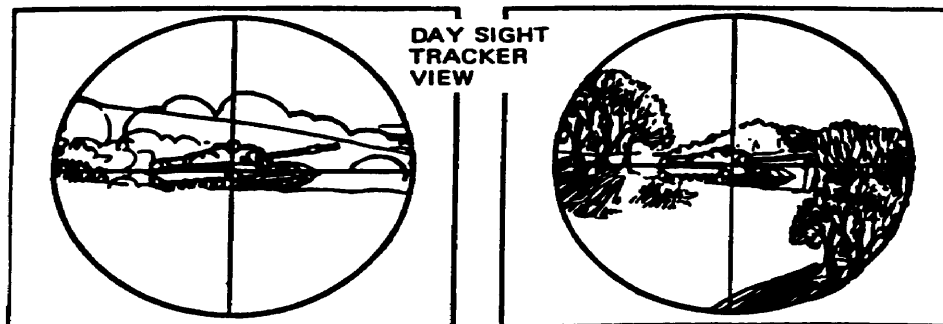
(1) Flash To Bang Method. Sound travels through the air at approximately 350 meters per second. If you see a flash in your engagement area simply count the seconds it takes before you hear the sound. Use the

"One One Thousand, Two One Thousand" method of counting. Multiply the number of seconds you counted by 350 to get the range from the blast to your position.

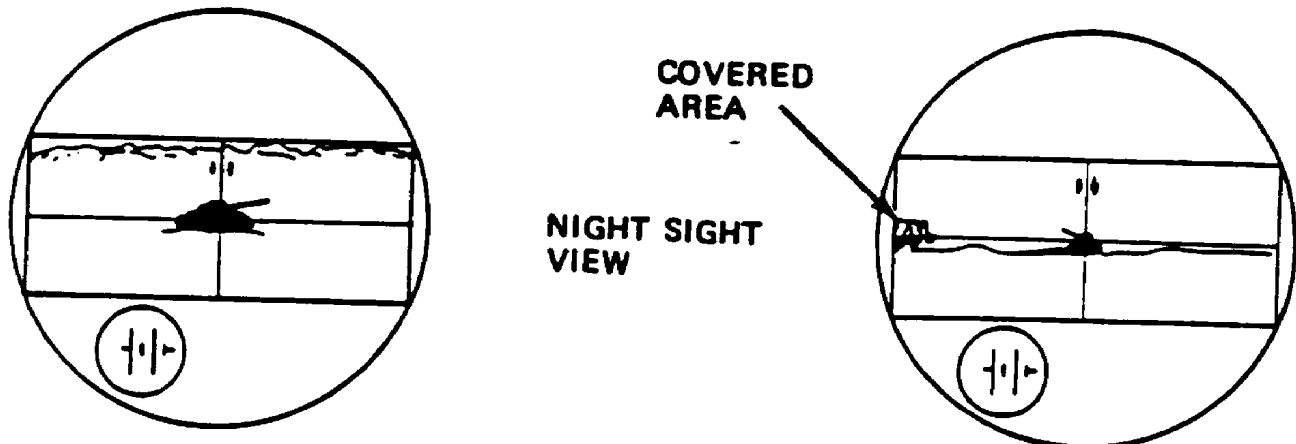
(2) Dog Tag Method. Remove the chain from your dog tag and hold the tag firmly from the bottom between your thumb and forefinger. Extend your arm so that it is parallel to the deck. Use the small hole that the chain ran through as a sighting aperture. Ensure you have an imaginary straight line from the target, through the hole, to your eye. If the target touches the edges of the circle, it is close enough to engage. Make sure you are using the actual front of the target and not the end of the main gun. Since armored vehicles come in many different sizes, this method should be used solely on tanks.

4. Determining Exposure Time. In order to kill your target, not only must you be able to track and estimate range correctly, you must also ensure that your target will not be able seek the safety of any available cover before you can kill him. Armored vehicles are very cautious when they move. They constantly look for positions to hide themselves should the need arise. Under the right circumstances, a lone tree or rock is enough to inhibit your missile from killing its target. You must now learn the two methods used to determine exposure time.

a. Optical Sight Method. Center the cross hairs on the visible mass of the vehicle. If the target is in range, and the area between the vertical cross hair and the edge of the field of view is clear, then the target is engageable. If obstructions do appear between the vertical cross hair and the edge of the field of view, then the exposure time may not be long enough.



b. Thermal night sight Method. The procedure to determine exposure time is the same for the thermal night sight as it is for the optical sight, except that the thermal night sight must be set in the Narrow Field of View.



5. Fire Commands. Fire commands are used to control the firing of all weapons. This is to ensure that no rounds are wasted, and that all vehicles are destroyed in a timely and efficient manner. Fire commands are clear and concise commands and contribute to the command and control necessary when engaging enemy armor formations. Fire commands will vary slightly depending on the tactical situation and the type of anti-armor weapon system. There are two types of fire commands used to initiate TOW fire.

a. The first type of fire command is the initial fire command. This is used to fire the first volley or individual shot. The unit leader usually gives it. It contains the following six items: (ADDRAC).

b. Alert. The unit leader will alert the unit by yelling unit. This let's them know they are about to receive a fire command.

c. Direction. The unit leader will tell the gunner(s) where to look for his target in his sectors of fire. The unit leader will use directions relevant to the gunners line of sight.

d. Description. The unit leader will then inform the gunner(s) which target he is to engage. This ensures that there is no question in the gunners' minds as to which target(s) the unit leader wants destroyed.

e. Range. The unit leader will then inform the gunner(s) at what range he estimates the target(s) to be at in relation to the gunners line of sight.

f. Assignment. This is the method of fire that the unit leader wishes to use to engage the targets. Each method has its advantages and disadvantages. The three assignment methods are listed below:

(1) Frontal Fire. A frontal fire pattern is best utilized when an enemy Armor formation is approaching perpendicular and spread out to your direction of fire and moving across your front.

(2) Depth Fire. This type of fire is best used when targets are approaching in depth. The unit engages the targets from front to rear simultaneously. The fire is worked toward the center of the formation. Keep

in mind, that the element assigned to destroy the rear targets may not be actually destroying the last vehicle in the formation. They are destroying the last vehicle seen when the command to fire was given. This method is ideal for destroying vehicles in a narrow area, such as a ravine or valley.

(3) Cross Fire. The crossfire pattern is best used to achieve a flank engagement and deceive the enemy. However, since there is a good chance that one or more sets of wires may cross, it is best to use this method only as a last resort. Crossfire is an outstanding method when utilized with machine guns because you can conduct grazing fire. TOW fire cannot be grazing fire.

g. Command and Control. This portion of the fire command allows the unit leader to initiate the ATGM fire. There may be several parts to the command and control procedure.

(1) The type of command given during this portion of the ADDRAC will depend on the tactical situation, the unit leader's experience and the experience of the gunners.

(2) The unit leader may allow the gunners to continue to fire on their own, until ordered to stop

(3) The unit leader may want to fire his guns in volleys, at his command.

(4) The unit leader may have all his guns fire at the same time, on his command.

(5) On the command "FIRE" all guns so identified in the alert portion of the ADDRAC launch their missiles at their assigned targets. Until you become thoroughly familiar with the procedure, and the unit leader has confidence in your abilities as a gunner, all fire is to be initiated by the unit leader.

(6) After all missiles have impacted downrange, the unit leader will either give another ADDRAC or he will give one of the following commands "cease tracking" or "cease tracking, out of action". These commands each have a distinct and separate purpose. "Cease tracking" tells the crew that the unit leader intends to stay in position and may decide to engage another target. "Cease tracking, out of action" tells the crew that the unit leader intends to move to another position.

h. Subsequent Fire Commands. This includes any additional commands used to accomplish a variety of tasks. They normally include only those elements necessary to accomplish these actions:

(1) Adjust Fire. To issue an adjust command, the unit leader orders the gunner(s) concerned to make a small change in the current or next ADDRAC. The vehicle was destroyed in the first ADDRAC. Another BMD-1 suddenly appears at the same place. The Adjust Command for gun one to engage the new BMD-1 would be, "GUN ONE, BMD-1, FIRE."

(2) Shift Fire. To issue a shift command the unit leader orders the gunner(s) concerned to engage a new series of targets in a different direction or location than the last ADDRAC.

(3) Cease Fire. A cease-fire command is given to permanently stop all A.T.G.M. fire from the current position. A displacement usually occurs after this type of command.

(4) Suspend Fire. A suspend command is given to temporarily stop all A.T.G.M. fire from the current position. This may be used to give the unit leader time to assess the situation and report to higher headquarters.

6. Target Engagement Procedures

a. Acquiring A Target. The gunner will look to the left of the optical sight, visually select a target, and then unlock the azimuth and elevation locks. Using the control knobs, the gunner will look through his selected sight, then align his crosshairs on the target, and sound off "target acquired".

(1) To accomplish the above task the gunner must perform the following steps to ensure accuracy.

(a) Turn on the reticle light switch if necessary.

(b) Acquire the target with the optical sight, move eye up to the thermal night sight, place the thermal night sight in the wide field of view and adjust the range focus, brightness and contrast controls as necessary to acquire target.

(c) Check to ensure that the target is within range using the stadia lines, and that there is enough engagement time to engage the target.

(d) Place the thermal night sight to narrow field of view and again adjust controls as necessary.

(e) Select whichever sight provides the better target image. Be sure to take into account battlefield conditions (smoke, fog, fires, red phosphorous).

(f) Check to ensuring the crosshairs are on the center of the visible mass of the target.

(g) Check for obstructions to the missile. Ensure the speed of the target is less than 35 kph. A target traveling more than 35 kph has a greater chance of reaching cover before missile reaches the target. Remember that if the thermal night sight is not in the narrow field of view, you will lose the missile and not hit the target.

b. Arming The System. At this time the a-gunner will ensure that the back blast area is free of troops and equipment. He will then sound off "Back blast area all secure", raise the arming lever, and gently tap the gunner on the shoulder (to ensure he is aware the weapon is armed), and then sound off "Gun up".

(1) Keep in mind when you firing from ground mount you will have an A-gunner and when firing from vehicle mount the a-gunner/driver will normally remain inside the vehicle.

c. Target Engagement. The gunner will raise the trigger protective cover and press the trigger, being careful not to disturb his line of sight,

and launch the missile. He will continue to track his target using the control knobs with a smooth push pull pressure, until he sees the missile impact, at which time he sounds off "Impact".

(1) Upon impact, the a-gunner, without disarming the system, will grab the bridge clamp locking lever and pull to the unlocked position. The gunner will lower the trigger protective cover and lock the traversing unit in both the azimuth and elevation.

7. Introduction to the Indoor and Outdoor Precision Gunnery Training System.

The Precision Gunnery Training System (PGTS) allows you the opportunity to identify and engage targets without actually firing a live missile. It allows you to develop the basic and advanced tracking skills that will enable you to become a proficient 0352.

a. Indoor Precision Gunnery Training System. The indoor system can be programmed with a variety of tactical scenarios ranging from short distance, daytime, single vehicle encounters, to long range, nighttime, tank platoon encounters. Most of the indoor system scenarios can be shot utilizing either the simulated optical sight or simulated thermal night sight. Additionally, misfires can be simulated as well. The PGTS enables you practice novice gunnery skills, advanced skills progression, and to conduct sustainment training.

(1) With the indoor PGTS, the following skills will be reinforced and enhanced:

- (a) Utilization of correct gunner firing posture.
- (b) Identification of a target.
- (c) Determination of target range and whether or not the target is engageable.
- (d) Exposure and familiarization of long tracking times.
- (e) The ability to practice fire commands and immediate action.

(2) The TOW indoor PGTS simulates the sights, tracking controls, switches, and indicators of the TOW weapon system and the BGM-71C (I-TOW) Missile. Through the headphones you will hear battlefield sounds. These consist of enemy vehicle fire, small arms fire, and the simulated TOW blast and singing of the trailing wires. Additionally, you hear and see the results of your missile impact, and hear commands from the Instructor. The instructor also has the ability to save, replay and review student missions to critique gunner error and stop improper procedures from becoming a habit. The student can also be shown the azimuth and elevation deviations of each shot in a bar graph format.

(a) The only TOW components needed to operate the indoor PGTS are the tripod, traversing unit, and launch tube. Ensure all these components are SL-3 complete and serviceable. All other components are organic to the indoor system. When setting this system up, utilize a cool, dry, level area with adequate ventilation to prevent the system from overheating. The indoor PGTS system consists of the following components:

1 Student Station. This box-like device houses the simulated optical and thermal night sights. A working reticule light switch is found here as well. The student can adjust the optical sight cross hairs and the brightness/contrast and cross hairs of the thermal night sight to suit his needs. This unit mounts to the boresight plate of the traversing unit in the exact same manner as the optical sight. However, there is no locking latch. The device is secured by tightening a threaded T-pole on the station itself.

2 Instructor Station. This device houses the TV display, the laser disk for the six scenario disks, the input jack for the Headphones, and the Instructor's mouse. This unit allows the instructor to see everything that the gunner sees as he is tracking his target. From here the instructor can control the size of the target aiming area and the amount of obscuration.

3 Coil Cable Extension Cable. This cable attaches to the coil cable (J1) on the MGS, and allows tracking commands to be relayed to the instructor station. The same care must be shown when connecting these two cables, that you use when connecting the coil cable (J1) to the MGS so you do not bend or break any of the small pins on the Connector's face.

4 Power/Interface Cables. These cables power the system from a wall outlet and transfer power back and forth between system components.

5 Weighted MSR. This simulated encased missile is an expended missile modified with a weighted aft end device to simulate a live, balanced encased missile.

(3) System Preparation. To prepare the indoor PGTS for firing, you must first conduct sight alignment procedures. Follow the procedures below to align the sights in the student station:

(a) Lock the system down using the traversing unit's azimuth lock and elevation lock/brake.

(b) Place your right eye in the eyepiece of the optical sight on the student station, while the Instructor begins the alignment procedure on the instructor station.

(c) Once the alignment software is running, you will be presented with a white alignment cross in the optical sight.

(d) Use the control knobs to superimpose the optical sight's cross hairs on top of the white alignment cross and press the trigger once.

(e) To align the thermal night sight, place your shooting eye in the upper eyepiece and repeat steps two through four.

b. Outdoor Precision Gunnery Training System (AN/TWQ-T3). The outdoor PGTS uses an actual TOW system, with the exception of the missile guidance set (AN/TSQ-136), and the encased missile. This system utilizes power from the M-1045/46 or a special battery designed to look like an encased missile. The major difference between the indoor and outdoor systems is that the outdoor PGTS uses an actual vehicle as the target. The target vehicle is

fitted with a mirror like device called retro-reflector, which captures the low-level laser beam that the outdoor system emits. Unlike the indoor system, the instructor cannot replay or save a particular mission. The outdoor PGTS enables you to practice novice gunnery skills, advanced skills progression, and to conduct sustainment training.

(1) With the outdoor PGTS, the following skills will be reinforced and enhanced:

- (a) Utilization of correct gunner firing posture.
- (b) Determination of target range and whether or not the target is engageable.
- (c) Exposure and familiarization of long tracking times.
- (d) The ability to practice fire commands and immediate action.

(2) The outdoor system consists of the following components:

(a) Instructor Station. The station contains the outdoor PGTS "MGS" This device is called the computer control module. It has the same dimensions as an actual MGS, but it is not nearly as heavy. The face of this device is unique. The on/off power switch and fuse assembly is located here.

(b) Remote Control Unit. The RCU attaches to the control module, via a small cable. This allows the instructor to test the electrical compatibility of the system. This test is called a bit test. The system must pass a bit test before you can utilize it. The RCU also has the following features:

1 Obscuration Time Selection Switch. This switch allows the instructor to set the amount and length of missile obscuration for each shot.

2 Target Size Selection Switch. This switch allows the instructor to set the level of difficulty of each track by decreasing the size of the target aiming area that the system will recognize, thus reducing the effective kill area. Do not shoot at the reflector, but at the center of mass of the target. This is determined when you align the system.

3 Trajectory, Burst, and Obscuration Simulator Alignment Button Switch. This switch aids the instructor when conducting the bit test.

4 Hit Point Indicator Lamps. This switch allows the instructor to monitor the missile flight and impact. When the gunner has aligned the system, and utilizes his aiming point, these lamps are activated. If the missile track was is in the hit/hill zone, all four hit point lamps are illuminated. If the missile track fell within the hit/no kill zone, the lamps will illuminate accordingly. Erratic or sudden, drastic course corrections WILL cause the missile track to terminate and the miss/over lamps will illuminate.

(c) Student Station. This station consists of several components and allows the gunner to utilize the TOW system as if he were engaging a live target. It consists of the following components:

1 Simulator Missile Tube Assembly (SMTA). This device replaces the TOW encased missile. It houses the laser transceiver, the launch effects simulator and the interconnecting cable. The laser transceiver scans the target to measure the gunner's tracking/aiming error. The simulator contains a small breech housing, which accommodates an M-80 blast cartridge, to simulate the backblast noise, a binding switch, and an arm/safe switch.

2 Trajectory, Burst, Obscuration Simulator (TBOS). This device provides the student a visual simulation of the missile launch through both sight, and impact effects that would be experienced through the firing and tracking a TOW missile.

3 Optical Sight Interface. This device allows the gunner to utilize an actual optical sight with the outdoor PGTS.

4 Thermal night sight Interface. This device allows the gunner to utilize the an actual thermal night sight with the outdoor PGTS.

(d) Target Retro-Reflector. This long, thin device attaches to the top of the target vehicle. The small mirrors in the top of the device redirect the low-level laser beam back to the system. This allows the instructor to monitor the track via the RCU.

8. Preparing the Outdoor Precision Gunnery Training System for Firing.

Follow the procedures below to prepare the outdoor PGTS for firing:

a. Install the Optical Sight Interface. Position the optical sight interface so that the interface clamp will engage the TOW lens assembly. Ensure that the interface locking arm is in the vertical position. Press the interface forward until the interface mounting plate is flush against the TOW lens assembly housing. Turn the interface locking arm down, securing the interface to the optical sight.

b. Install the Thermal night sight Interface. Open the retaining bracket latch on the thermal night sight interface and slide the bracket out from the interface as far as possible. Carefully remove the thermal night sight eye shield assembly. Turn the diopter adjustment full clockwise. Position the interface onto the thermal night sight so the retaining bracket is fully engaged with the post amplifier. Slide the interface retaining bracket toward the closed position and secure the interface to the thermal night sight by closing the latch.

c. Install the CRT. Open the CRT clamp on the optical sight interface. Remove the CRT protective cover and with the CRT cable pointing down, slide the CRT assembly into the interface optics housing until the CRT lugs align and mate with the interface optics housing slots. Close the interface clamps and tighten the swing bolt. To install the CRT on the thermal night sight, perform the same procedure as was done on the optical sight interface. Adjust the thermal night sight interface diopter grip to minus -1 position or until resistance is felt.

d. Install the Computer Control Module. Utilize the CCM cables to connect it to the vehicle power supply. Ensure the fuse is serviceable and the on/off power switch is set to off.

e. Install the Power Converter. Ensure the switch on the power converter is set to the in the off position. Ensure you look for bent pins before attaching these cables.

9. Aligning the Outdoor Precision Gunnery Training System. Before you can utilize the outdoor PGTS, it must first be aligned. This procedure ensures that both sight interfaces and the missile track are all on the same sheet of music. Follow the procedure below to align the system:

a. Move the target vehicle with the attached retro-reflector out at least 100 meters, and have the vehicle stop until the procedure is complete.

b. Determine which sight interface you will be utilizing and insert and secure the CRT.

c. Verify that the arming lever is in the safe position.

d. Ensure the bit readout window on the RCU shows safe.

e. Turn on the power converter and the CCM.

f. Raise the arming lever.

g. Ensure the bit readout window shows alignment.

h. Center the optical sight cross hairs center mass on the target. Hold the aiming point steady.

i. Press the trans align button switch and observe that alignment is lit and bit readout window shows alignment. Press the align button on the RCU. If the alignment is successful the readout will flash alignment pass. Unsuccessful attempt will show alignment fail.

j. Observe the small, red dot superimposed upon the optical sight lens. Adjust the aiming point so the red dot is center mass in the cross hairs. Hold the aiming point steady.

k. Press the trans align button switch and observe that alignment is lit and bit readout window shows alignment.

l. Observe as the small, red dot moves back onto the intersection of the optical sight cross hairs, then disappears, in a few seconds.

m. If the alignment is successful the readout will flash ALIGNMENT PASS. Unsuccessful attempt will show ALIGNMENT FAIL.

10. Loading the M-80 Blast Simulator. Ensure the arm switch on the CCM is set to off. Uncoil the two electrical wires from the base of the M-80. Carefully unshunt these wires and using the pressure clips in the small breech housing in the rear of the simulator missile tube assembly, attach each free end of the wires to a different clip. Carefully push the blast simulator and the wire fully into the breech housing.

11. Firing the Indoor or Outdoor Precision Gunnery Training System. Both crewmen must be wearing helmets, flak jackets and hearing protection.

a. Arming Procedures. The outdoor PGTS arms in the exact same manner as an actual TOW system.

b. Fire Commands. The outdoor PGTS allows you to practice your fire commands. All the scenario information is present on the instructors screen prior to the beginning of each mission.

c. Target Engagement Procedures. The outdoor PGTS allows you to practice your range estimation and target exposure procedures by providing different scenarios for you to practice with, under the eyes of your instructors.

d. Target Tracking Procedures. The outdoor PGTS allows you to build upon you beginner tracking skills by constantly reinforcing the basics of a good, solid firing postures. Additionally, you will learn the necessity of smooth and steady course corrections by firing simulated missiles.

REFERENCES: TM 9-6920-450-10 Trainer Gunnery Anti-Tank AN/TWQ-T1 Pages 1-11 Through 3-20; TOW Gunner Trainer And Guided Missile AN/TWQ-10-3 Field Tactical Trainer, FM 23-34 TOW Weapon System 1-4 Through 1-8; TOW Weapon System 3-19 Through 3-22.