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PREFACE

This manual provides a systematic way to train light cavalry weapon system proficiency; it may also be used by combat support and combat service support units. It describes light cavalry gunnery principles, methods, and techniques and includes an application of combined gunnery skills in basic and intermediate gunnery tables and advanced gunnery tables. The tasks, conditions, and standards outlined in the tables should be used to evaluate individual, crew, and section gunnery proficiency. These tables present a more complete way to train light cavalry crews and sections in gunnery.

The gunnery features in this manual are unique to light cavalry units. Included is a description of system features, engagement techniques, preliminary gunnery training, gunnery skills tests, gunnery tables, and qualification standards. Because technical manuals have priority updates, when the procedures in this manual conflict with technical manual procedures, the technical manuals should be followed.

This manual is intended to be a guide; units may modify the gunnery program to meet local training constraints. Although the gunnery tables are prepared for live fire, the multiple integrated laser engagement system (MILES) and other training devices may be used (except on qualification tables). Units must evaluate training to ensure it follows the building-block principle and adheres to sound training policy.

Light cavalry scouts must be trained to defeat a specific threat. Light cavalry gunnery is based on an analysis of the threat, the required crew tasks, and the capabilities of the individual weapon systems.

This manual provides up-to-date training information. It should be used by vehicle commanders, platoon sergeants and unit staff to develop gunnery programs to attain and sustain combat readiness. It is a ready reference for unit commanders, vehicle commanders, and gunners.

You are encouraged to recommend improvements to this publication. Additional techniques that have proven successful in the field are solicited for inclusion in this manual. Key your comments to a specific page, paragraph, and line of text; provide reasons for each comment so we can understand and evaluate your recommendations.

The proponent of this publication is HQ TRADOC. Send comments and recommendations on DA Form 2028 to Commandant, United States Army Armor School, ATTIN: ATSB-SBE-E, Fort Knox, Kentucky 40121-5212.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

CHAPTER 1

Introduction

Future battles will be mobile and violent, with emphasis on rapid fire capability, increased speed, and maneuverability. Light cavalry crews must be prepared to take maximum advantage of these capabilities. To defeat the threat and survive on the battlefield, light cavalry crews must be well trained.

The threat is a worthy opponent—well trained with excellent equipment. His order of battle includes the use of massive indirect-fire barrages combined with accurate and lethal direct-fire weapons. These direct-fire weapons consist primarily of large bore, high velocity tank cannons and long-range antitank guided missiles. The threat will try to neutralize allied air power with both long-range and short-range air defense weapons, deployed well forward in the battle area. A numerically larger force, the threat believes in using massed forces to overwhelm opponents.

To defeat the threat force, light cavalry crews must have a thorough knowledge of their functional capabilities, use of indirect fire, the techniques of acquiring targets, and the effective use of all crew-served weapons. In addition, light cavalry crews must develop and sustain tactical crew skills that will allow them to maneuver effectively and survive on the battlefield. This combination of crew gunnery and tactical skills is essential for total weapon system proficiency.

Purpose

This manual is designed to provide a systematic way to train light cavalry weapon system proficiency; it may also be used by combat support and combat service support units. It describes light cavalry gunnery principles, methods, and techniques and includes an application of combined gunnery skills in basic, intermediate, and advanced gunnery tables. These tables present a more complete way to train light cavalry crews and sections in gunnery. The tasks, conditions, and standards outlined in the tables should be used to evaluate individual, crew, and section gunnery proficiency.

Scope

This manual outlines light cavalry gunnery tables designed to attain and sustain crew through section gunnery proficiency.

The first nine chapters provide combat training principles, techniques, and exercises for light cavalry crews. Light cavalry gunnery skills and tactical skills are discussed in detail to promote uniformity and to maintain high standards of proficiency y. Proper application of these techniques will ensure the most effective use of the weapon system in training or in combat. Descriptions include how to—

- Detect, acquire, identify, and classify targets.
- Select the correct round of ammunition to match the target.

- Use direct-fire techniques.
- Operate machine guns and an explaination of their functions and role during direct-fire engagements.
- Develop a light cavalry gunnery training program.
- Establish new training sites for light cavalry combat training.

The relationship between gunnery and tactics is shown in the following table. The tactical tasks outlined in Appendix B are used with the scout section tables (advanced gunnery tables) in Chapter 10. Integration of the tactical and gunnery tasks maximizes the training effectiveness of the tables.

Table 1-1. Light Cavalry Combat Tables.

	GUNNERY TABLES		TACTICAL TASKS
Provide:	Manipulation training	**Provide:**	Realistic targets
	Crew duties		Tough acquisition problems
	Standard fire adjustment		Real target signatures
	Day/night firing		Shoot-back targets
	Ammunition selection		Evasive targets (OPFOR)
	Fire commands		Tactical maneuvering
	Real target signatures		Potential to vary vulnerability
			Full 360° range

CHAPTER 2

Weapon Systems and Ammunition Capabilities

Through its lethal weapons and maneuverability, the high mobility multipurpose wheeled vehicle, (HMMWV) provides the cavalry crew the means to survive as an effective reconnaissance element. This chapter discusses the weapon systems on the HMMWV and the capabilities of ammunition used by those weapon systems.

M249 Squad Automatic Weapon

DESCRIPTION

The squad automatic weapon (SAW) is an air-cooled, belt-fed, gas-operated automatic weapon that fires from the open-bolt position. It has a regulator for selecting either normal (750 rounds per minute [rpm]) or maximum (1,000 rpm) rate of fire. The maximum rate of fire is authorized only if the weapon's firing rate slows under adverse conditions. Ammunition is fed into the weapon from a 200-round ammunition box holding a disintegrating metallic split-link belt. The SAW also has an alternating feeding method using 20- and 30-round M16 rifle magazines. The weapon has a quick-change barrel; however, barrels *must not be interchanged* with those from other SAWS unless their headspace has been set for that weapon by direct support personnel. The M249 SAW is used to engage dismounted infantry, crew-served weapons, antitank guided missile (ATGM) teams, and thin-skinned vehicles. (See Table 2-1, *Weapon Churacteristics,* on page 2-5.)

AMMUNITION

The preferred combat ammunition mix for the M249 is a four-ball (M855) and one-tracer (M856) mix. There are other variations of 5.56-mm ammunition available; however, the four-and-one mix allows the gunner to use the tracer-on-target (TOT) method of adjusting fire to achieve target kill.

Type	Use
M855 Ball	Against light materiel targets and personnel.
M193 Ball	Range training.
M856 Tracer	Observation of fire, incendiary effects, and signaling.
Ml96 Tracer	Training.
M199 Dummy	During mechanical training.
M200 Blank	During training when simulated live fire is desired. (A blank firing attachment must be used to fire this ammunition.)

M60 7.62-mm Machine Gun

DESCRIPTION

The M60 machine gun is used to engage dismounted infantry, crew-served weapons, ATGM teams, thin-skinned vehicles, and aircraft. This fully automatic machine gun fires from the open bolt and is belt fed, gas operated, and air cooled. (See Table 2-1, *Weapon Characteristics*, on page 2-5 .)

AMMUNITION

The preferred combat ammunition mix for the M60 is a four-ball (M80) and one-tracer (M62) mix. Again, the four-and-one mix allows the gunner to use the TOT method of adjusting fire to achieve target kill.

Type	Use
M61 Armor-piercing	Against lightly armored targets.
M62 Tracer	For observation of fire, incendiary effects, signaling, and training.
M80 Ball	Against light materiel targets and personnel, and for range training.
M63 Dummy	During mechanical training.
M82 Blank	During training when simulated live fire is desired. (A blank firing attachment must be used to fire this ammunition.)

M2 HB Caliber .50 Machine Gun

DESCRIPTION

The M2 heavy barrel (HB) machine gun is used to engage dismounted infantry, crew-served weapons, ATGM teams, lightly armored vehicles, and aircraft. The M2 fires from the closed bolt and is belt fed, recoil operated, air cooled, and crew operated. The gun is capable of single shot and automatic fire. (See Table 2-1, *Weapon Characteristics*, on page 2-5.)

AMMUNITION

The preferred combat ammunition mix for the M2 is a four (API-M8) and one (API-T-M20) mix.

Note. Maximum effective range is 1,830 meters.

Cartridge	Use
M2 Ball	In marksmanship training, against personnel, and light materiel targets.
M1 Tracer	To aid in observing fire—secondary purposes are for incendiary effect and for signaling.
M2 Armor-piercing	Against armored aircraft and lightly armored vehicles, concrete shelters, and other bullet-resisting targets.
Ml Incendiary	Incendiary effect-especially against aircraft.
M8 Armor-piercing	Combined armor-piercing and incendiary effect.
M20 Armor-piercing	Combined armor-piercing and incendiary effect, with the additional tracer feature.
Ml Blank	For simulated fire (contains no bullet).
M2 Dummy	For training (completely inert).

MK 19 40-mm Grenade Machine Gun

DESCRIPTION

The Mark (MK) 19 is used against slow moving, hovering, or low-flying hostile rotary wing aircraft; dismounted infantry; and lightly armored vehicles. The MK 19 automatic fires from the open bolt and is air cooled, blow-back operated, and belt-fed. (See Table 2-1, *Weapon Characterises,* on page 2-5.)

AMMUNITION

The MK 19 fires six types of cartridges: M430/M430Al high-explosive dual-purpose grenades, M383 high-explosive grenade,M385M4918 training practice, and M9221M922Al dummy rounds.

M430/M430Al High Explosive Dual Purpose Grenades

These rounds are designed to penetrate armor and inflict personnel casualties.

- Identification-Olive drab with yellow-olive and yellow markings.
- Fuze—Point initiating, base detonating (PIBD) M549.
- Filler—Composition B.
- Arming distance—l8 to 30 meters.
- Kill radius—Approximately 5 meters.
- Maximum range—2,200 meters.
- Wound radius—Approximately 15 meters.
- Maximum effective range—1 ,500 meters.

M383 High-Explosive Grenade

The M383 is designed to inflict personnel casualties. It is packed in linked, 48-round belts.

- Fuze—Primer detonating (PD) M533.
- Filler—composition A5.
- Arming distance—18 to 36 meters.
- Blast radius—15 meters.
- Maximum range—2,200 meters.

M385/M918 Training Practice

The M385 is an inert round with a propellant charge. The M918 is a flash-bang round with a propellant charge.

- Propellant-M2.
- Maximum range-2,200 meters.
- Maximum effective range-1,500 meters.

M922/M922Al Dummy Rounds

These rounds are totally inert and are used to check gun functioning and to train gun crews. They are issued only to armorers.

Tube-Launched, Optically Tracked, Wire-Guided Missile System

DESCRIPTION

The tube-launched, optically tracked, wire-guided (TOW) weapon system consists of a launcher, with tracking and control capabilities, and a missile encased in a launch container. The launcher is equipped with self-contained replaceable units. (See Table 2-1, *Weapon Characteristics*, on page 2-5.)

CAPABILITIES

The TOW weapon system can be employed in all weather conditions, if the gunner can see his target through the optical sight or nightsight. The TOW is primarily an antitank weapon used to provide long-range engagement of all known armored targets. The TOW also provides a long-range assault capability against heavily fortified bunkers, pillboxes, and gun emplacements.

AMMUNITION

There are six missiles available for the TOW:

- BGM-71A Basic TOW.
- BGM-71A-1 Basic TOW extended range.
- BGM-71C Improved TOW.
- BGM-71D TOW 2.
- BGM-7lE TOW2A.
- BGM-71F TOW2B.

Note. All missiles have a minimum arming range of 65 meters.

Table 2-1. Weapon Characteristics.

Weapon	M249	M60	M2 HB	MK 19	TOW
Weight (pounds)	17	23	84	76	93 (with overpack)
Length (inches)	40.75	43.5	65.13	43	57.3 (with overpack)
Maximum Range (meters)	3,600	3,725	6,767	2,212	3,750
Arming Range (meters)	NA	NA	NA	18 to 30	65
Minimum Safe Range (meters)	NA	NA	NA	310	NA
Rate of Fire					
Cyclic (rpm)	800	550* (approximate)	500	375	NA
Rapid (rpm)	200*	200* (2 to 3 sec between bursts)	40* (6 to 9 rds per burst at 5 to 10 sec intervals)	60	NA
Sustained (rpm)	85	100* (4 to 5 sec between bursts)	40*	40	NA
Slow (rpm)	NA	NA	<40* (6 to 9 rds per burst at 10 to 15 sec intervals)	NA	NA
Single Shot	NA	NA	(round every 2 to 3 sec, as dictated by target)	NA	NA
Effective Range					
Area (meters)	1,000	1,100	1,829	2,212	NA
Point (meters)	600	900+	1,200	1,500	3,750
Moving (meters)	NA	NA	NA	NA	3,750
Ammunition					
Example Load (rounds)	600	600	NA	NA	NA

***With Barrel change.**

CHAPTER 3

Prepare to Fire

Prefire checks of the HMMWV weapon systems are important crew tasks. A prefire check must be made on the HMMWV weapon systems to eliminate all deficiencies associated with cleaning, maintenance, and functioning and to ensure that the weapon is safe to operate. A postfire check must be made after firing the weapon systems to detect any maintenance problems.

The following checklists are used along with the appropriate operator's manuals: M249 (TM 9-1005-201- 10), M60 (TM 9- 1005-224-10), M2 HB caliber .50 (TM 9- 1005-213-10), MK 19 40-mm grenade launcher (TM 9-1010-230-10), and TOW (FM 23-34).

Ammunition Checks

- Check all ammunition against TB 9-1300-385.
- Check link alignment.
- Check for long or short rounds.
- Check for cleanliness. (Report and turn in any rounds that have corrosion or damage.)

M249 Checks

- Ensure the M249 is cleaned and lubricated in accordance with TM 9-1005-201-10.
- Visually check for missing or damaged equipment.
- Ensure the bore is wiped dry.
- Inspect the M249 as outlined in the individual drill.
- Ensure that the M249 is properly lubricated.

M60 Checks

- Ensure the M60 is cleaned and lubricated in accordance with TM 9-1005-224-10.
- Ensure the M60 is installed and secured to the mount.
- Ensure the M60 is clear.
- Ensure the bore is wiped dry.
- Conduct a function check of the M60.

M2 HB Caliber .50 Checks

- Ensure the M2 is cleaned and lubricated in accordance with TM 9-1005-213-10.
- Ensure the M2 is secured to the mount.
- Ensure the headspace and timing are set.
- Ensure the bore is wiped dry.
- Conduct a function check of the M2.

MK 19 Checks

- Ensure the MK 19 is cleaned in accordance with TM 9-1010-23010.
- Ensure the MK 19 is secured to the mount.
- Ensure the bore is wiped dry.
- Conduct a function check of the MK 19.

TOW Checks

MISSLE

- Check the outside for soil, dirt, and grease.
- Check the outside for dents, gouges, punctures, and cracks.
- Check the humidity indicator (it should be blue).
- Ensure that the electrical connector dust cover is present.
- Ensure that the forward handling ring and quick-release clamp are present and secured.
- Ensure that the indexing lugs are not damaged.

LAUNCHER

- Inspect the assembled TOW launcher for obvious damage.
- Conduct a system self-test (to include collimation) to determine if the launcher will function properly; correct or report any malfunctions. (Refer to FM 23-34 for boresighting and collimation procedures.)
- Check DA Form 2408-4 (Weapon Record Data) to ensure the number of rounds fired is recorded.

CHAPTER 4

Target Acquisition and Range Determination

On future battlefields, the tempo will be such that a light cavalry crew must be prepared to move and, when necessary, engage targets rapidly. Platoons will be operating within irregular battle lines. Depending on the tactical situation and the area of operations, threat targets will be intermixed with friendly and neutral (civilian) vehicles. The speed and mobility of the light cavalry force, coupled with battle doctrine, also increase the likelihood of opposing and allied forces becoming intermingled during combat operations. Survival depends on the crew's ability to search for, detect, locate, identify, classify, confirm, and engage threat targets effectively and rapidly. Light cavalry crews must take advantage of the tactical situation and fire first when necessary. The speed and accuracy of an engagement are dependent on crew proficiency in target acquisition, range determination, and gunnery procedures.

Section I. TARGET ACQUISITION

This section describes the target acquisition process, methods for acquiring and classifying targets, and acquisition reports, and relates target acquisition confirmation to the conduct of fire.

Target acquisition is the timely detection, location, and identification of targets in enough detail to attack accurately by either direct fire or supporting weapons. The target acquisition process is a series of progressive and interdependent actions by which the crew acquires targets. These actions are crew search, detection, location, identification, classification, and confirmation. All crew members observe continuously. Effective target acquisition for a light cavalry crew requires the combined effort of all crew members.

Crew Search

Crew search (observation) is the act of watching the area of operations carefully. Crew members use the unaided eye as well as optics to search or scan the predetermined sector to acquire targets.

SECTORS OF OBSERVATION

Sectors of observation are areas assigned to each crew member for target acquisition. To ensure all-around coverage of the battlefield is maintained, each crew member is assigned a specific sector of observation by the vehicle commander. The gunner has a 360-degree responsibility. When operating as a section, fields of observation for each vehicle will overlap with other vehicles in the section to ensure all-around coverage.

NBC OPERATIONS

Wearing the protective mask hampers acquisition; therefore, in an NBC environment, the vehicle commander's and gunner's abilities to acquire targets are significantly reduced. Their acquisition responsibilities must be adjusted to compensate for this reduction.

DISMOUNTED OBSERVER

When the vehicle is in a hide position, an observer, equipped with binoculars and communications equipment, should dismount and locate forward of the vehicle position and observe the area of operations. Depending on the area(s) of responsibility, more than one observer position may be required.

GROUND SEARCH TECHNIQUES

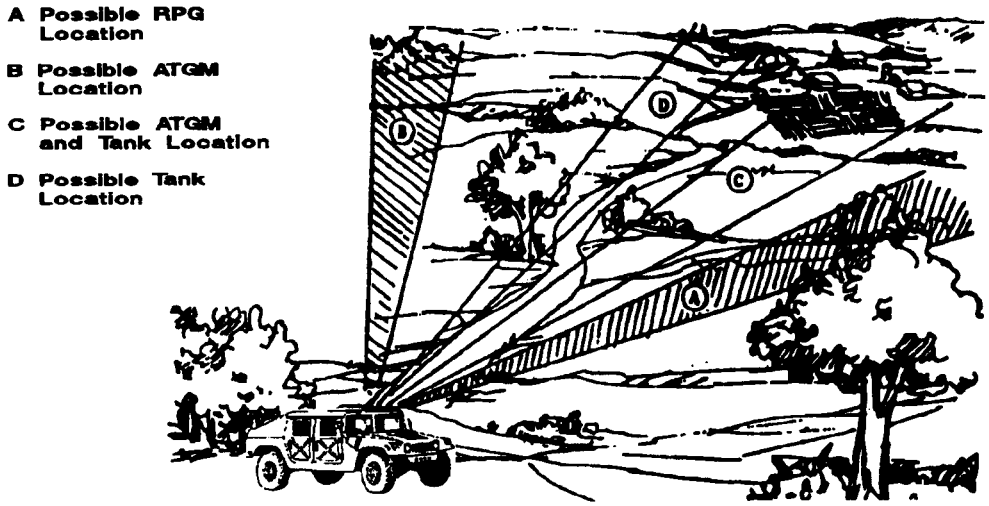
Crew members scan their areas of observation at all times to detect targets or possible target locations. There are three ground search techniques: rapid scan, slow (50-meter) scan, and detailed search. All three techniques may be used by all crew members (using the unaided eye, binoculars, or other optics) during good and limited visibility conditions. These techniques are modified at night by using the off-center vision method.

Rapid Scan

The rapid-scan method (see Figure 4-1) is used to detect obvious signs of enemy activity quickly. It is usually the first method used, whether stationary or moving. The vehicle commander may use optics or the unaided eye; the gunner may use TOW sights (day or thermal mode), if available, in low magnification, or the unaided eye.

- Start in the center of the sector and rapidly scan from the nearest to the farthest visible point.
- Then, orient left or right and conduct a rapid scan, near to far. (This sweep must overlap the center area of the previously scanned sector.)
- Once one side (from center) is completed, scan the remaining side in the same manner.

Figure 4-1. Rapid Scan.

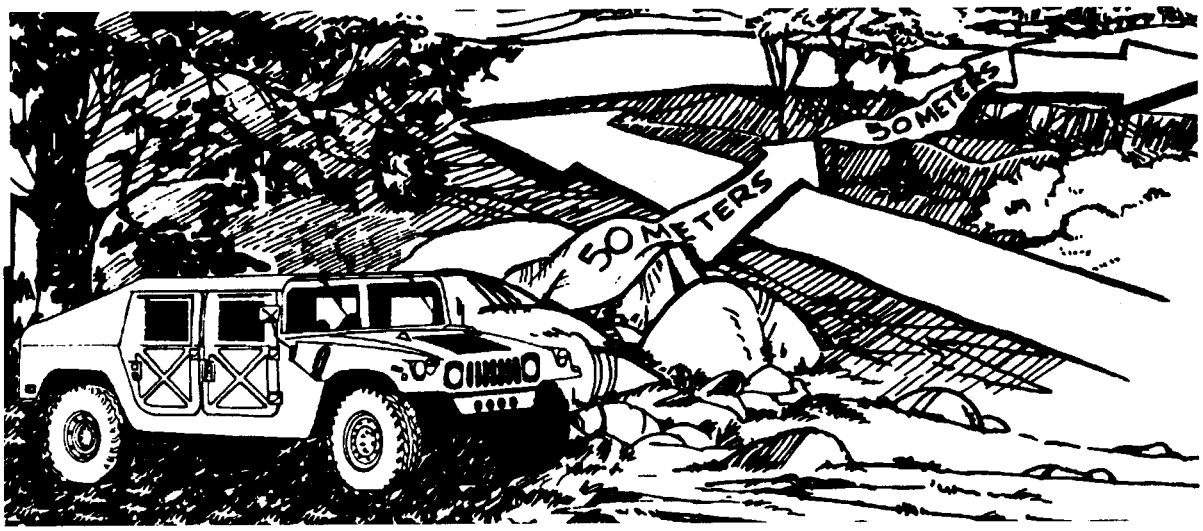


Slow (50-meter) Scan

If no obvious targets are identified in the rapid scan, crew members will conduct a more deliberate scan of the terrain by using the vehicle optics (day or thermal mode) or binoculars. The slow (50-meter) scan method (see Figure 4-2) is used for this task. The slow scan is best used by the vehicle commander or gunner when in a defensive position or from a short halt.

- Pausing at short intervals to give the eyes time to focus, search a strip of the target area 50 meters deep from right to left.
- Then, search a strip farther out from left to right overlapping the first area scanned.
- When a suspicious area or possible target signature is detected, stop and search the immediate area thoroughly, using the detailed search technique. If the AN/TAS 4(A) is being used, the gunner switches to high magnification (12X) for an intensive observation of potential targets.

Figure 4-2. Slow (50-meter) Scan.

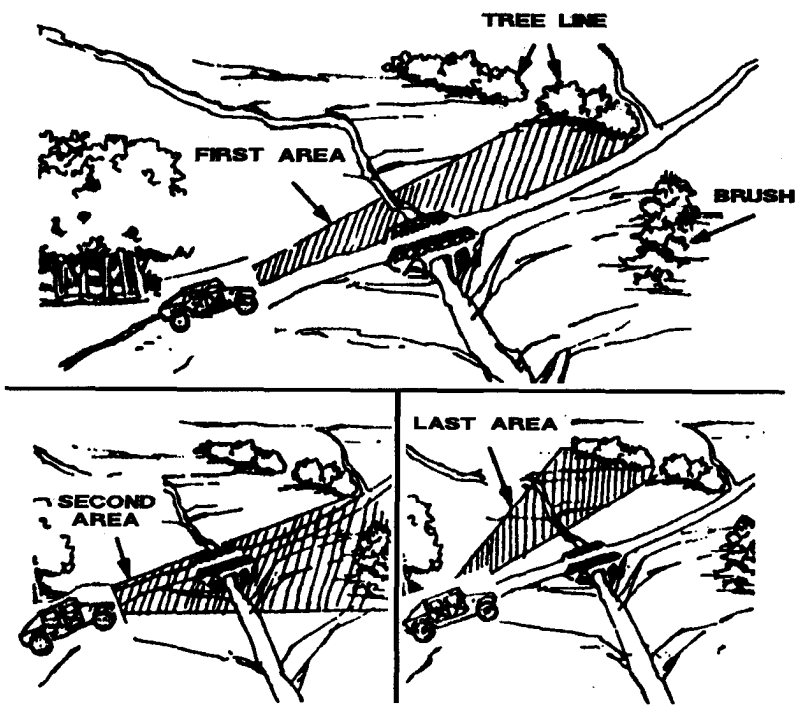


Detailed Search

If no targets are found using the rapid or slow scan techniques and time permits, crews should use the optics (day and night) to make a careful, deliberate search of specific areas in their assigned sector. This method (see Figure 4-3) is also used to search, in detail, small areas or locations with likely or suspected avenues of approach.

- Concentrate on one specific area or location and study that area intensely.
- Look for direct and indirect target signatures in a clockwise manner around the focal point (terrain feature) of the area. The following are examples of target signatures:
  - — Dust created by movement of vehicles.
  - — Tracks or tire marks.
  - — Reflections (flash) from glass or metal.
  - — Angular objects that do not conform to the surrounding area.
  - — Vegetation that appears out of place.
  - — Flash or smoke from a weapon or missile.
  - — Entrenchments or earthworks.

Figure 4-3. Detailed Search.



Off-Center Vision Method

Day and night scan techniques (rapid, slow, and detailed) are similar, with one exception: At night when using daylight optics or the unaided eye, do not look directly at an object; look a few degrees off to the side of the target object. When scanning with off-center vision, move the eye in short, abrupt, irregular movements. At each likely target area, pause a few seconds to attempt to detect a target or any movement. If an object is detected as a possible target, use off-center vision to observe it. While observing the object, frequent eye movement is necessary to prevent object fade-out. Cupping the hands around the eye will also increase night vision.

AIR SEARCH TECHNIQUES

There are two air search techniques (see Figure 4-4) used to detect aerial targets quickly: flat terrain scan and hilly terrain scan. Both of these methods are based on slow (50-meter) scan techniques. While using a ground search technique, crew members should always search near to far for possible targets; when using an air search technique, crew members should always search far to near.

Flat Terrain Scan (Air Search)

In flat terrain, search the horizon by moving the eyes in short movements from object to object.

Hilly Terrain Scan (Air Search)

In hilly terrain, search the sky beginning just below the horizon and move upward. Use prominent terrain features as points of reference to ensure overlapping areas of search.

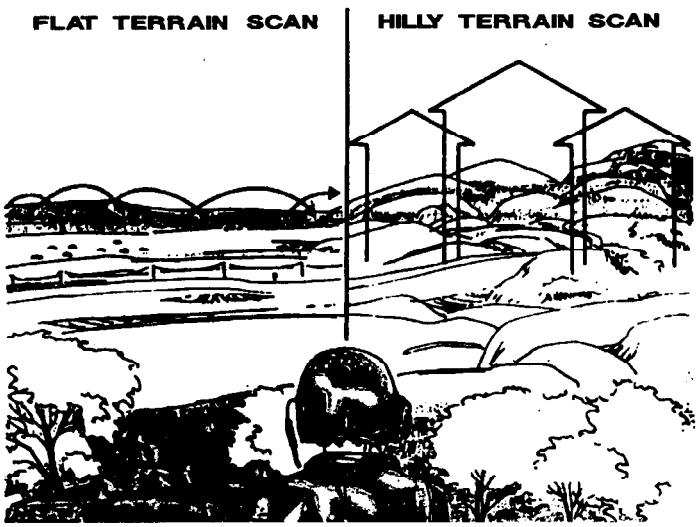
Notes. When using the air search technique, concentrate just below the tops of the trees or vegetation to detect helicopters in hide positions.

Ground and air search techniques may be combined. This allows crew members to scan for targets in the air and on the ground at the same time. Combinations used will depend on the area of operations and mission, enemy, terrain, troops, and time available (METT-T).

Air search at night is similar to searching for ground targets at night.

Threat aircraft operate in pairs. If aircraft are acquired, a second pair of aircraft should be expected, and possibly another pair. There may be one to four pairs of aircraft.

Figure 4-4. Air Search Techniques.



CREW SEARCH TIPS

All of the surveillance, target acquisition, and night observation (STANO) devices on the vehicle can be used to acquire targets. These devices include binoculars, night vision goggles, starlight scopes, AN/TAS-5, and the TOW sights in either the day or night mode.

- Initial scanning is always done without optics first, then with optics (such as binoculars or sights).
- Target search is continuous. Any target(s) missed on the first or second scan may be seen on the third or fourth scan.
- The entire crew must look for likely targets and target locations using proper scan techniques within their assigned sectors of observation.
- While on the move, the gunner should use the rapid scan technique, constantly scanning his sector limits from the right limit to the left limit.
- Targets on the edge of the peripheral field of view are harder to detect and locate.
- The field of view is greatly narrowed while the crew members are wearing protective masks; therefore, the crew's ability to acquire targets during NBC conditions is limited. The crew must scan continuously.
- Concentrate the search in areas where targets are more likely to appear (such as identified avenues of approach, woodlines, and reverse slope firing positions).

Target Detection

Target detection is the discovery of any target or object (such as personnel, vehicles, equipment) of potential military significance on the battlefield. Target detection occurs during crew search as a direct result of observation.

TARGET SIGNATURES

Target signatures are indicators or clues that aid an observer in the search to detect the presence of potential targets. Most weapons and vehicles have identifiable signatures. These signatures may be the result of the design of the equipment or the environment in which the equipment is operating. For example, firing a vehicle's main weapon system could produce blast, flash, noise, smoke, and dust. The movement of vehicles through a built-up area causes more noise than the movement of the same vehicle in an open field. Different types of aircraft have different signatures (the signature of a hovering helicopter is not the same as that of a fixed-wing aircraft). Other factors (such as visibility, temperature, and weather conditions) also affect target signatures.

Look for targets where they are most likely to be employed. Tracked vehicle signatures are most likely to be detected in open areas and rolling terrain. For threat antitank positions, visually cover primary avenues of approach where tanks and armored personnel carriers (APC) are likely to be used. Look for helicopters on the backside of woodlines, ridgelines, and significant folds in the terrain.

Crews must be familiar with these as well as other possibilities. Sight, hearing, and smell can all assist in detecting signatures that will lead to target location and identification. Target signatures include—

- Soldier signatures:
  - — Foxholes.
  - — Broken vegetation.
  - — Footprints.
  - — New and old fires.
  - — Noise.
  - — Trash.

- Tracked vehicle signatures:
  - — Vehicle tracks on the ground.
  - — Engine noise.
  - — Exhaust smoke.
  - — Dust clouds from movement.
  - — Weapon firing report and smoke.
  - — Bright white flash at night.

Note. Normally, when weather conditions permit, a tracked vehicle is more visible than the surrounding area and readily visible through passive and thermal sights.

- Antitank signatures:
  - — Missile launch “swish” sound.
  - — Long, thin wires from fired ATGMs.
  - — Sharp crack of the ATGM being fired.
  - — Destroyed armored vehicles.

- Artillery signatures:
  - — Loud, dull sound.
  - — Grayish-white smoke cloud.
  - — Bright, orange flash and black smoke from air bursts.
  - — Rushing noise several seconds before round impacts.

Notes. Towed artillery signatures vary according to the towing vehicle.

Self-propelled artillery has the same thermal infrared signature as tracked vehicles.

- Aircraft signatures:
  - — Glare of sun reflecting off aircraft canopies, wings, and fuselages of freed-wing aircraft and windows and rotor blades of helicopters.
  - — Aircraft noise.
  - — Vapor trails from engine exhaust and fired missiles.
  - — Dust and movement of foliage from hovering helicopters.
- Obstacles and mine signatures:
  - — Loose or disturbed dirt in a regular pattern.
  - — Destroyed or disabled vehicle that appears to have struck a mine.

DETECTION CHALLENGES

Some targets are more difficult to detect than others. Increased crew sustainment training and greater concentration are needed to detect and locate targets. Some examples of these more difficult targets and challenges are—

- Peripheral targets (targets on the edge of the field of view).
- Targets that are camouflaged or in shadows.
- Targets that can be heard but not seen.
- Targets under less than ideal indirect fire illumination. (If the illumination is in front of the target, the resulting shadow will be darker than the target. If the illumination is behind the target [and not in position to "wash out" the crew's optics], the target should stand out distinctly from the background.). Always keep one eye closed during illumination search, and never look directly into the illumination source.
- Small, single targets such as lone, dismounted ATGM or rocket-propelled grenade (RPG) positions.
- Natural obstacles (weather and terrain).
- Man-made obstacles (smoke and battlefield clutter).

Note. Behavioral or physical deficiencies (fatigue, eye reaction to gun flashes) also make target detection more difficult.

REDUCED VISIBILITY CONDITIONS

In winter, about 12 hours are spent in the dark. The threat makes the most of these conditions by moving his forces in the dark. The threat also digs in or continues the attack during the night. Even during the day, the threat uses every means possible to cover his intentions. Camouflaged targets in woodlines or behind buildings are difficult to acquire with day optics. These targets can sometimes be detected more easily with thermal sights or other night vision equipment (see Table 4-1). For example, a vehicle in a woodline will be seen as an irregular shape compared to surrounding vegetation. A vehicle behind a building with its engine running may give off a heat plume from the exhaust, thus alerting the crew to the target. The gunner must be able to use thermal sights, if available, to acquire targets during limited visibility and during daylight. Thermal sights operate by sensing heat radiation or temperature changes. Any source of heat that is at least one degree above the surrounding temperature can be sensed by thermal sights. The following primary heat sources may be detected by thermal sights.

- Solar heat. Energy from the sun is absorbed by the exterior surface of an object. The heat radiated from that object is then sensed by the thermal sight. During daylight, targets are hotter and easier to detect. It is necessary, as the sun goes down and the temperature drops, to note how the object form changes.
- Fuel combustion. Heat is created through the operation of a vehicle engine. Most vehicles will show one or more image(s). Vehicles will show a plume of heat from the exhaust and another around the engine compartment.
- Friction. Moving parts of a vehicle will cause friction. These areas will then a pear as images in the sight: tracks, road wheels, drive sprockets, and support rollers. (Vehicles driving through mud or snow will not show as sharp an image.)
- Thermal reflections. Glossy, smooth surfaces (such as the windshield of a vehicle) may reflect radiated heat.
- Body heat. Body heat is also sensed by the thermal sight.

Table 4-1.Thermal Sights and Night Vision Equipment.

Equipment	Weight (pounds)	Range (meters) Starlight/Moonlight	Battery	Field of view (degrees)
PVS-7A/B Goggles	1.5	150/300	BA 5567 (1 ea) or AA (2 ea)	40
PVS-4 Individual Sight	3.5	400/600	BA 5567 (2 ea)	15
PAS-13 Thermal (Projected)	4.13 to 4.85	Equal to, or greater than, weapon	BA 6847 (2 ea)	15 15/9 9/3
TVS-5 Crew Sight	7.5	1,000/1,200	BA 5567 (2 ea)	9
GVS-5 Range Finder	5.0	200 to 9,900	BA 6515 or BB 516	7
PVS-6 Range Finder	3.5	50 to 10.000	BA 6515 or BB 516	7

Note. There are three versions of the PAS-13 which will replace the PVS-4 and TVS-5 beginning in FY 96:
- Light-4.13 pounds.
- Medium-4.33 pounds.
- Heavy-4.85 pounds.

Target Location

Target location is the determination of where a potential target is on the battlefield. A target is located as a result of observation and detection during crew search. Once a target is located by a crew member, the target location must be communicated to all other personnel. Target location methods used to announce a target depend on the individual's specific position, unit SOP, and time available. Descriptions of the four most common target location methods follow.

CLOCK METHOD

The clock method is commonly used to get the vehicle commander or gunner on target. Twelve o'clock is based on the direction of vehicle movement while traveling, and the front of the vehicle when stationary. The vehicle commander or gunner can use the vehicle front direction to assist in accurately announcing target location. (Example: BMP—NINE O'CLOCK.)

SECTOR METHOD

The sector method is similar to the clock method; it is quick and easy to use. It is best used to indicate a direction from the direction of movement (moving) or vehicle orientation (stationary) using the terms center, left, right, and rear. Center sector is always to the direct front. (Example: THREE TANKS-LEFT REAR.)

REFERENCE POINT METHOD

The reference point method is used in conjunction with optics. The vehicle commander uses optics to determine the mil value from a terrain feature or known position. He then announces the mil value to the gunner. The gunner uses the mil reticle relationship to traverse onto the target. The key to this location method is the vehicle commander's and gunner's knowledge of the mil sight relationship. (Example: ATGM—TRP ONE FOUR—RIGHT FIVE MILS.)

The quick reference point method is used by all personnel to hand over targets near a target reference point (TRP). (Example: TWO PCs—TRP ONE FOUR.)

The precise reference point method is used to locate targets accurately in relation to a known reference point.

GRID METHOD

The grid method is the least desired technique because of the length of time it takes to bring the gunner on target. The vehicle commander receives the location of a target by map grid (usually from an observation post). He then uses his map to orient the vehicle toward the target area for the gunner.

Target Identification

Target identification is the recognition of a potential military target as being a particular target (such as a specific vehicle by type).

As a minimum, identification must determine the target as friendly or threat (friend, foe, or neutral). Crews must know what to engage and what not to engage. The crew's only method of positive vehicle identification is visual. The crew's ability to visually identify targets greatly decreases as engagement ranges increase, camouflage techniques become more effective, and battlefield obscuration increases.

Target identification training is an essential part of any weapon system proficiency training program. Crews must be able to identify targets quickly to have the advantage of engaging first when necessary and destroying the threat at the weapon system's maximum engagement range; therefore, crews must be continuous y trained and evaluated on target identification. (See the unit S2 for more information on identifying specific or additional vehicles, aircraft, and equipment likely to appear on the battlefield.)

Note. Keep in mind that, in many parts of the world, our allies and the threat employ both allied- and threat-made vehicles.

Target Classification

Target classification is categorizing potential targets by the level of danger they represent. To defeat multiple targets on the battlefield, the *most dangerous* targets must be engaged first. This requires a quick determination of which target is the *most dangerous.* All crew members must know the engagement priorities of their unit and be able to classify priority targets; however, the vehicle commander is responsible for classifying targets and deciding what and when to shoot. Targets are classified by the level of danger based on the following criteria.

MOST DANGEROUS

When the crew observes a threat target with HMMWV-defeating capabilities that appears to be preparing to engage them, the target is classified as *most dangerous.* This type of target is the greatest threat and must be engaged immediately. When faced with multiple *most dangerous* targets, the vehicle commander must further classify the targets based on which one of the *most dangerous* targets is the greatest immediate threat.

Generally, helicopters, tanks, and BMPs within their effective ranges have a greater kill probability against HMMWVs than handheld high-explosive antitank (HEAT) weapons (for example, RPGs).

Stationary targets can fire more accurately (and are therefore more dangerous) than moving targets. If two or more targets are of equal threat, engage the closest one first. When engaging more than two *most dangerous* targets from a stationary (weapons-down) position, the crew should use an alternate firing position. Smoke (indirect fire or on-board) may also be used to keep the enemy from observing the vehicle. Minimizing the number of rounds fired from any one position (primary, alternate) aids in confusing the enemy and avoiding detection caused by a firing signature.

DANGEROUS

When the crew sees a target with HMMWV-defeating capabilities but the target is not preparing to engage them, the target is classified as dangerous. This type of target should be engaged after all *most dangerous* targets have been destroyed, unless otherwise specified by the priority of engagements. Multiple *dangerous* targets are engaged in the same manner as *most dangerous* targets—engage the target that presents the greatest threat; if the targets are of equal threat, engage the closest one first.

LEAST DANGEROUS

A target that does not have a weapon system capable of defeating a HMMWV is classified as a *least dangerous* target. Engage this type of target after all most *dangerous* and *dangerous* targets have been destroyed, unless it has a higher priority of engagement.

ENGAGEMENT PRIORITIES

Engagement priorities are also used to classify targets. Unit operation orders (OPORD) or SOPS will designate certain types of targets as priority targets for destruction, regardless of their threat to the light cavalry.

- Classify special targets. Targets are selected based on their impact on the total threat force (command and control vehicles, engineer vehicles, reconnaissance vehicles, and artillery). Destroying these targets breaks up the combined arms capability of the threat force.

- Establish a specific type target priority for specific friendly vehicles (friendly tanks and improved TOW vehicles [ITV] might classify tanks as *most dangerous,* while light cavalry classifies threat BRDMs and other infantry carriers as *most dangerous).*

- Establish a specific type target priority for specific elements in the unit (one light cavalry unit might prioritize enemy BRDMs while another prioritizes BMPs).

Information to assist light cavalry crews in classifying targets includes—

- The most likely threat vehicles to be engaged by light cavalry.

- Threat vehicle primary and secondary armament capability of penetrating HMMWVS.

- The armor penetration data, with no angle of slope at 1,000 meters (except where noted as 500 meters).

Target Confirmation

Target confirmation is the rapid verification of the initial identification and classification of the target. It is the final step in the target acquisition process and is completed during conduct of fire. Confirmation takes place after the vehicle commander has issued all elements, except the execution element, of the fire command and as the gunner is completing his lay. (Gunners also go through a confirmation step. As he makes his final lay, the gunner assures himself that the target is hostile.)

The vehicle commander completes his evaluation of the nature of the target based on the target's appearance and his knowledge of the tactical situation. If the vehicle commander determines that the target is hostile, he continues the engagement. If he determines the target is friendly or neutral, he commands "CEASE FIRE. " If he cannot confirm the nature of the target, he continues to observe until he can confirm the target.

If the gunner confirms the target is hostile, he completes his final lay and engages the target, on order. If the gunner determines the target is friendly or neutral, he announces his confirmation to the vehicle commander ("CONFIRMATION FRIENDLY" or "CONFIRMATION NEUTRAL"). If he cannot determine the nature of the target, he announces "CONFIRMATION DOUBTFUL." The vehicle commander then determines whether to continue or terminate the engagement. (Crew duties during conduct of fire are discussed in Chapter 5.)

It is vital that the vehicle commander is kept informed on the tactical situation so he can assist in target confirmation. For example, he must be aware of friendly element movement within or between battle positions, the forward passage of lines, status of the withdrawal of any covering force, or the movement of civilian vehicle traffic in the area of operations.

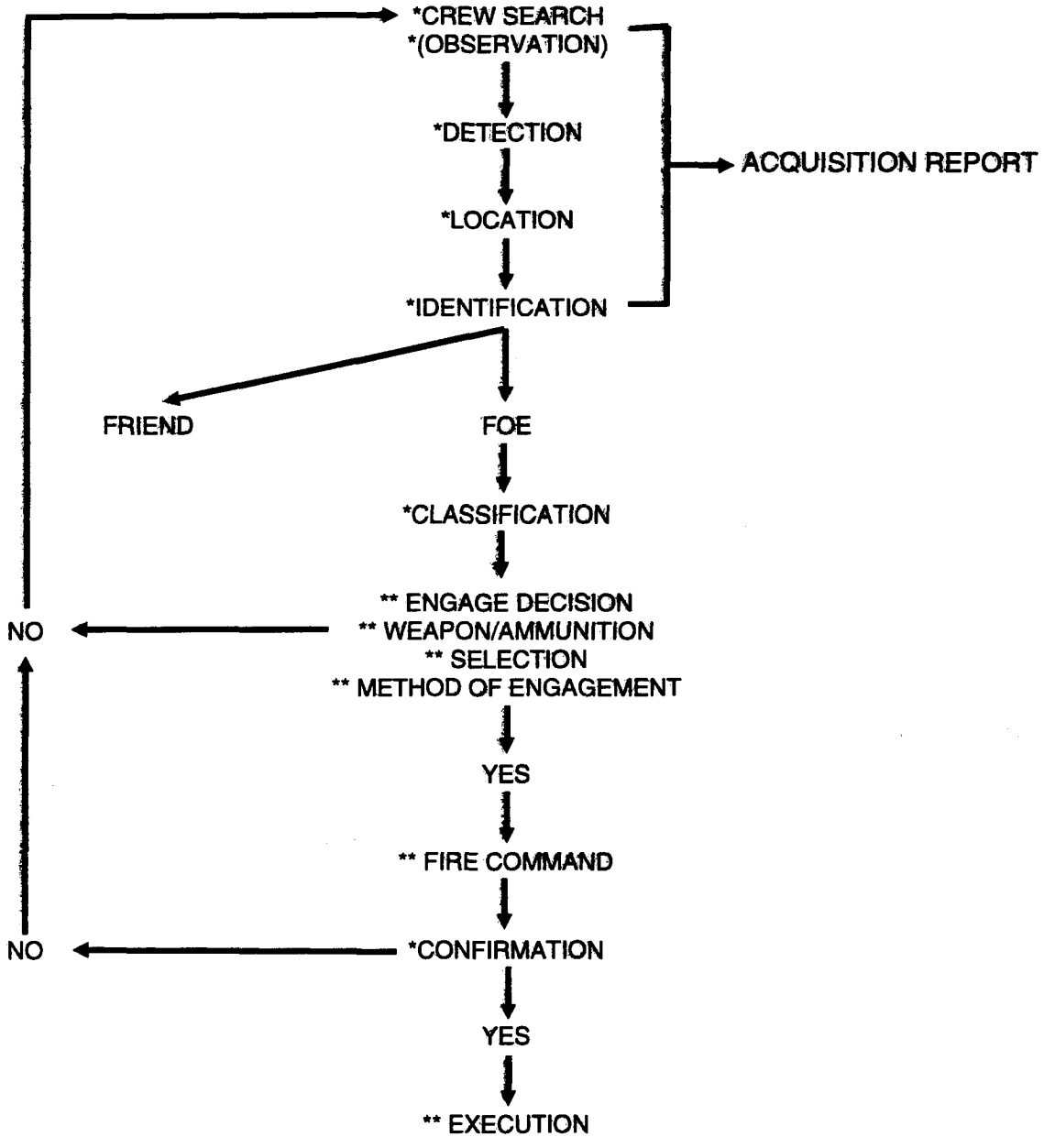
Acquisition Reports

Targets acquired by a crew member must be reported to the vehicle commander immediately by crew acquisition report. This target handover technique must take place before the classification step of the target acquisition process continues. An acquisition report consists of three elements: alert (optional), description, and location (for example, "DRIVER REPORT—TWO MOVING PCs—LEFT FLANK'). The acquisition report is given internally between the crew members who can identify each other by voice recognition. Therefore, the description element of the report usually serves as the alert element also (for example, "TWO MOVING PCs—ELEVEN O'CLOCK").

Target Acquisition and Conduct of Fire

Light cavalry crews must be proficient in the techniques and procedures of both target acquisition and conduct of fire to engage the enemy successfully in combat. (Figure 4-5 on page 4-14 shows the relationship between the steps in target acquisition and conduct of fire.)

Figure 4-5. Target Acquisition Process.



LEGEND: * TARGET ACQUISITION ELEMENT
** DIRECT FIRE ELEMENT

Section II. RANGE DETERMINATION

Range determination significantly affects target engagement accuracy. Errors in range determination will cause more first round misses than an error in deflection. Range errors causing the first round to go over the target are particularly serious because of the difficulty of observing and adjusting from a round that goes high.

When the vehicle commander chooses the precision engagement, he must rapidly and accurately determine the range to the target. The vehicle commander is primarily responsible for determining range. He has more options for determining range and a better knowledge of the terrain and tactical situation; therefore, in most cases, he can more easily and more quickly make a range determination. The gunner and driver have limited means of determining range.

This section details range determination methods available to each crew member.

Vehicle Commander

The vehicle commander is responsible for navigation, command, and control. He uses his knowledge of the terrain, the tactical situation, the friendly control measures on his map and on the ground, and his experience to determine range. He may determine range using the naked eye, the assisted method, a map, or one of the other methods of range determination; these methods can be used separately or in combination.

NAKED EYE

The vehicle commander, with practice, can estimate distances out to about 1,000 meters. This is particularly useful in close-in, immediate engagement situations where no time is available for using sights, binoculars, or maps. A technique for accomplishing this is the football field method. The vehicle commander counts 100-meter increments, estimating the number of football fields that could fit between him and the target.

The vehicle commander must be aware that light, weather, and terrain conditions can make a target look nearer or farther than it is. Conditions that make a target appear to be nearer are—

- Bright, clear day.
- Sun in front of the target.
- High elevations.
- Large targets.
- Bright colors (white, red, yellow).
- Contrast.
- Looking across ravines, hollows, rivers, depressions.

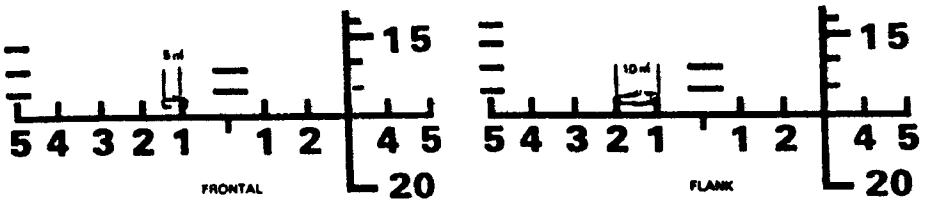
Conditions that make a target appear to be farther are—

- Fog, rain, haze, smoke, dusk, and dawn.
- sun behind the target
- Low elevations.
- Small targets.
- Dark target colors (brown, black, green).
- Camouflaged targets (paint, netting).

ASSISTED METHOD (Binoculars With Mil-Relation Formula)

The binoculars and mil relation are used in the assisted method of range determination. To use this method, the width or height of the target must be known. Using the known threat vehicle width or height with the binocular mil scale, substitute the mil relation and compute the range. When measuring the frontal width, measure only the vehicle front slope (from left front corner to right front corner). When measuring flank width, measure the entire vehicle. Accuracy of this method depends on the target dimensions and the vehicle commander's ability to make precise measurements with the binoculars (see Figure 4-6).

Figure 4-6. Target Measurement Using Binocular Reticle.



Note. The distance between tick marks on the horizontal scale is 10 mils.

The mil is a unit of angular measurement equal to 1/6400 of a circle. There are 18 mils in one degree. One mil equals the width (or height) of 1 meter at a range of 1,000 meters. This relation is constant as the angle increases from one mil to two roils, and the range increases from 1,000 meters to 2,000 meters. Because the mil relation is constant, other units of measurement (such as yards, feet, or inches) can be substituted to express width or range; however, both width and range must be expressed in the same unit of measurement. For example, if the sides of a one-roil angle are extended to 1,000 yards, the width between the ends of the sides is 1 yard.

Since the relationship of the target width in roils ($\frac{W}{R}$) to the target width (W) in meters is constant at varying distances, accurate range determination is possible. The mil relation holds true whether the W factor is length, width, or height; therefore, the range can be determined if the target dimensions are known.

To determine the range (R), the mil and W factors must be known.

The mil comes from reading the target width (height or length) on the mil scale in the binoculars. The W comes from Table 4-2 or other vehicle identification aid (GTA 17-2-13 or FM 23- 1), and is expressed in meters.

The known target width (W) is then divided by the mil (mil) width; this equals the range (R) factor. Multiply R by 1,000 to determine the target range:

For example, a BMP is 6.75 meters long (W). Using binoculars, the vehicle commander determines that a BMP measures 5 roils in length:

$$\frac{W}{mil} = R$$

Substitute the two known values for W and mil and round to the nearest tenth:

$$\frac{6.75}{5} = 1.35 = 1.4$$

Since R is expressed in thousands of meters, multiply by 1,000:

1.4 X 1,000 = 1,400 meters, the range to the BMP.

Table 4-2 shows the results of that computation for threat vehicles at various ranges. Determine the width of the target in mils. The range to the target is listed in the column below the mil measurement. Make sure to use the correct range, depending on whether the vehicle is viewed from the front or flank.

Table 4-2. Mil Relation for Various Targets.

Note. This table is a quick reference for determining the range to threat vehicles. Threat vehicles have been grouped and the sizes of the vehicles have been averaged.

Group 1 (BMP, Tank, BTR, ZSU, OT, MT-LB, and TAB)

TARGET WIDTH (Mils)	5	4.5	4	3.5	3	2.5	2	1.5	1
FLANK 6.75 METERS	1,400	1,600	1,800	2,000	2,300	2,800	3,400	4,600	6,900
FRONT 3.0 METERS	600	700	800	900	1,000	1,200	1,600	2,000	3,000

Group 2 (BMD and BRDM)

TARGET WIDTH (Mils)	5	4.5	4	3.5	3	2.5	2	1.5	1
FLANK 5.5 METERS	1,200	1,300	1,400	1,600	1,800	2,200	2,800	3,800	5,500
FRONT 2.35 METERS	400	500	600	700	800	1,000	1,200	1,600	2,400

Group 3 (HIND-D Helicopter)

TARGET WIDTH (Mils)	22.5	20	17.5	15	12.5	10	7.5	5	2.5
FLANK 17.255 METERS	800	900	1,000	1,200	1,400	1,800	2,400	3,600	7,000
TARGET WIDTH (Mils)	5	4.5	4	3.5	3	2.5	2	1.5	1
FRONT 6.9 METERS	1,400	1,600	1,800	2,000	2,400	2,800	3,600	4,600	6,900

MAPS

The vehicle commander must have a map to navigate. He may also use the map to determine range. In both offense and defense, the vehicle commander must continuously assess the likely enemy locations, engagement areas, and engagement ranges. He must constantly know where he is and where he is going. This information gives the vehicle commander the capability to determine rapidly the best battlesight setting for the terrain and enemy situation, and to adjust the battlesight when the situation changes.

OTHER METHODS

- Target reference points. TRPs are used as fire control measures for both direct and indirect fire and entered in the sector sketch to help the vehicle commander determine range and control his fires.

- Range cards. The primary use of the range card is to assist the crew in engaging targets during limited visibility. The vehicle commander may also use the range card to determine range, since ranging data is recorded on the range card.

- Laser range finder (AN/GVS-5). Using the laser range finder, the vehicle commander can quickly and accurately determine and announce the range.

Gunner and Driver (Naked Eye)

Like the vehicle commander, the driver and gunner can use the football field method to determine ranges quickly to close-in targets, especially those within M60 and M249 range (900 meters).

CHAPTER 5

Fire Commands and Engagement Techniques

This chapter discusses fire commands (including terminology, definitions, and the various formats), crew duties in response to fire commands, direct-fire adjustment techniques, and range card engagement.

Fire Commands

A fire command is given to deliver effective fire on a target quickly and without confusion. Fire commands increase kill ratio and crew survivability, as proven in previous conflicts.

ELEMENTS OF FIRE COMMANDS

Fire commands for all direct-fire weapons follow a pattern that includes similar elements. There are four elements in the fire command for the machine gun: alert, description, direction, and execution. TOW fire commands differ from the machine gun fire command; the weapon/ammunition element may also be given.

Alert

This element alerts the crew to an impending engagement and tells who will be firing it. This ensures that the crew is ready to receive further instructions; the vehicle commander announces "GUNNER."

Weapon/Ammunition

This element tells the crew what type of weapon or ammunition will be used for this engagement (“MISSILE”).

Description

The target description is used to create a picture of the target in the minds of the crew. To properly apply fire, the crew must know the type of target they are to engage. The vehicle commander should use the briefest possible term to clearly describe the target. Most targets may be designated by one of the following terms.

Type of Target	Term
Tank or tank-like target	TANK
Infantry fighting vehicle or APC	PC
Unarmored vehicle	TRUCK
Helicopter	CHOPPER
Fixed-wing aircraft	PLANE

If there are several similar targets, this element also tells the gunner which target to engage first ("TWO TRUCKS—LEFT TRUCK").

Direction

This element indicates the general direction to the target and maybe given in one or a combination of the following methods:

- Orally. The vehicle commander gives the direction to the target in relation to the position of the gun.

- Pointing. The vehicle commander can designate a small or obscure target by pointing with his arm or aiming with a gun. When he points with his arm, the gunner, standing behind him, should be able to look over his shoulder and sight along his arm and index finger to locate the target. When a gun has been aimed at a target, the gunner should be able to see the target through the sight.

- Using tracer ammunition. Tracer ammunition is a quick and sure method of designating a target not clearly visible. When using this method, the vehicle commander should first give the general direction to direct the crew's attention to the target area. To prevent the loss of surprise when using tracer ammunition, the vehicle commander does not fire until he has given all of the elements except the execution element. The vehicle commander may fire his individual weapon or fire one or more bursts from a machine gun. Firing the tracer(s) then becomes the last element of the fire command and is the signal to open fire ("TROOPS—WATCH MY TRACER—FIRE").

- Using reference points. Another method of designating obscure targets is to use easy-to-recognize reference points. All vehicle commanders and crews must be familiar with terrain features and the terminology used to describe them. To avoid confusion when using a reference point, the word "REFERENCE" precedes its description. The general direction to the reference point should be given ("GUNNER—TROOPS—FRONT—REFERENCE: LONE PINE TREE").

  - Successive reference points. Sometimes a target must be designated by using successive reference points (''GUNNER—TRUCK—RIGHT FRONT—REFERENCE: RED-ROOF HOUSE, LEFT TO HOUSE, LEFT TO HAYSTACK, LEFT TO BARN").

- Finger measurements. To direct the crew's attention to the right or left of reference points, use finger measurements ("GUNNER—LEFT FRONT—REFERENCE: CROSSROADS, RIGHT FOUR FINGERS").

- Mils. When the guns are mounted on tripods, lateral distance from reference points may be announced in roils. Lateral distance is assumed to be in roils so the word *mils* is not necessary ("GUNNER-TRUCK-FRONT-REFERENCE: KNOCKED-OUT TANK, LEFT FOUR ZERO").

Execution

Once the crew responds to the first elements of the initial fire command, the vehicle commander will announce the execution. Before announcing the execution command, the vehicle commander will mentally run through the confirmation process. As a minimum, he will reconfirm the target as hostile before firing. If immediate fire is required, the command "FIRE" is given without pause and the gunner fires as soon as he is ready. If the vehicle commander wants to delay firing, he may preface the command with, "AT MY COMMAND" or "AT MY SIGNAL." When the gunner is ready to engage the target, he reports "UP"; the vehicle commander then gives the command "FIRE" at the specific time desired ("GUNNER—TROOPS—FRONT—AT MY COMMAND [AT MY SIGNAL] [pause until crew members are ready and fire is desired] FIRE [or prearranged signal]").

INITIAL FIRE COMMAND

All engagements begin with an initial fire command. When the vehicle commander decides to engage a target that is not obvious to the gunner, he must provide him with the information needed to engage the target effectively.

For a machine gun fire command, he must alert the crew, and give the target description, direction, and execution.

Element	Gunner	Commander
Alert		"GUNNER—
Description		TROOPS—
Direction		FRONT—
	"IDENTIFIED"	
Execution		FIRE—
		CEASE FIRE."

Note. Defensive and offensive fire commands are the same.

The TOW fire command differs from a machine gun fire command. Once the target is identified, the vehicle commander aligns the vehicle for direction and announces the fire command.

Element	Gunner	Commander
Alert		"GUNNER—
Weapon/ammunition		MISSILE—
Description		TANK—
Direction		RIGHT FRONT—REFERENCE: HILL SEVEN SIX TWO, FROM HILL, LEFT TWO HUNDRED—
Execution	"IDENTIFIED	FIRE."
	ON THE WAY."	

If an engagement is fired from a short halt, the vehicle commander commands "DRIVER—STOP" before giving the execution element. When the engagement is completed, the vehicle commander commands "DRIVER—MOVE OUT," if necessary.

Whenever weapons-down positions are available, the vehicle commander commands "DRIVER—SEEK WEAPONS-DOWN" and initiates the fire command.

He must then direct the driver into the unmasked position while ensuring the gun has clearance. Once the vehicle is in position and the gunner has identified the target, the vehicle commander issues the execution command.

When the vehicle is in a weapons-down defensive position, the vehicle commander initiates the fire command to unmask the weapon "DRIVER—MOVE OUT." Upon destruction of the target, the vehicle commander terminates the engagement by commanding "CEASE FIRE-DRIVER—BACK UP." The driver moves back to the weapons-down position.

MULTIPLE TARGETS

In combat, light cavalry crews maybe required to engage multiple arrays of targets. These engagements require speed and accuracy to suppressor destroy all targets.

When engaging multiple targets, some of the elements of the fire command for the first target will not have to be repeated for the second target. Although each target engaged requires essential parts of the fire command, depending on the type of fire command used (machine gun, TOW), the fire commands will become shorter as the battle progresses.

Note. The vehicle commander acquires two trucks to the front. While *laying the vehicle for direction*, he issues a machine gun fire command. To complete the engagement, only the description and execution elements are needed for the second target.

Element	Gunner	Commander
Alert		"GUNNER—
Description		TWO TRUCKS—LEFT TRUCK—
Direction		FRONT—
	"IDENTIFIED	
Execution		FIRE—
	ON THE WAY—	TARGET—CEASE FIRE—
Description		SHIFT—RIGHT TRUCK—
	IDENTIFIED—	
Execution		FIRE—
	ON THE WAY."	
		TARGET—
		CEASE FIRE."

Note. The vehicle commander acquires one tank and one BMP to the front and issues a TOW fire command.

Element	Gunner	Commander
Alert		"GUNNER—
Weapon/Ammunition		MISSILE—
Description		TANK AND PC—TANK—
Direction		FRONT—
	"IDENTIFIED—	
Execution		FIRE—
	ON THE WAY—	
		TARGET—SHIFT LEFT PC—
	IDENTIFIED—	
Execution		FIRE—
	ON THE WAY."	
		TARGET—CEASE TRACKING,
		OUT OF ACTION."

Note. When a range card has been prepared, the vehicle commander can place fire on targets the gunner cannot see using only the alert, description, and execution elements. The vehicle commander describes the target by its number, saying the word "TARGET" before the number of the target ("GUNNER—TARGET NUMBER THREE—AT MY COMMAND—FIRE").

SUBSEQUENT FIRE COMMANDS

Subsequent fire commands are used to make adjustments in direction and elevation, change rates of fire after an engagement is in progress, interrupt fires, or terminate the alert.

Direct Fire Observations and Adjustments

If the gunner fails to engage a target properly, the vehicle commander must promptly correct him by announcing or signaling the desired changes (using subsequent fire commands). When these changes are given, the gunner makes the corrections and resumes firing without further command. Only the elements necessary to continue the engagement are announced.

Alert. The vehicle commander announces his range observation ("SHORT") as the alert. This notifies the gunner that a subsequent fire command follows.

Direction. Direction and elevation corrections are based on the vehicle commander's observation.

Direction corrections are given first. If the round went left of the target, the correction would be to the right ("RIGHT ONE ZERO—LEFT FIVE"). Direction corrections maybe given in roils or target forms (see *Other Adjustment Techniques,* page 5-9). Adjustment for elevation is given next ("ADD FIVE—DROP ONE FIVE").

Note. Direction and elevation corrections may also be given using arm-and-hand signals.

The vehicle commander bases his range correction on his observation. If the round went over the target, he subtracts range. If the round landed short of the target, he adds range. If he determines that the necessary correction is less than 200 meters, he may use the target form method. To execute a range correction, the gunner must index a different range or change range lines.

Note. Adjustments in direction and elevation with the biped or vehicle-mounted gun are always given in meters by using one finger to indicate 10 meters. Adjustments in direction and elevation on the tripod-mounted gun are always given in roils; one finger indicates one mil.

Execution. The vehicle commander completes the subsequent fire command with the execution command "FIRE."

Changes in the rate of fire are given orally or by arm-and-hand signals. To interrupt firing, the vehicle commander announces "CEASE FIRE" or signals to cease fire. The crew remains on alert and resumes firing when given the command "FIRE."

To terminate the alert, the vehicle commander announces, "CEASE FIRE—END OF MISSION."

Doubtful Elements and Corrections

When the gunner is in doubt about any element of the fire command, he replies, "SAY AGAIN—TARGET (or element in doubt)." The vehicle commander then announces, "THE COMMAND WAS—(repeats the element in question)" and continues with the fire command.

When the vehicle commander makes an error in the initial fire command, he corrects it by announcing "CORRECTION" then giving the corrected element ("GUNNER—TROOPS—FRONT; CORRECTION—TRUCK—FRONT—AT MY COMMAND").

When the vehicle commander makes an error in the subsequent fire command, he may correct it by announcing "CORRECTION" then repeating the entire subsequent fire command ("LEFT FIVE—DROP ONE; CORRECTION—LEFT FIVE—DROP ONE ZERO").

Crew Duties in Response to the Fire Command

In response to each element of a fire command, the vehicle commander, the gunner, and the driver have specific crew duties to perform. Crew duties common to light cavalry crews are shown in Table 5-1. Even though commands for the driver are not essential elements of the fire command, his actions are very important during an engagement.

Once the vehicle commander has given the fire command, his primary focus must be on retaining control and observing the sector. The gunner should take over the engagement, destroy or suppress the target, and report when he has completed the engagement. The vehicle commander assists only as necessary, giving subsequent commands to shift targets, organizing other targets, and planning the vehicle's next activity.

If an engagement is fired while on the move, the driver attempts to provide the gunner with a stable platform. When the situation and terrain permit, the front of the vehicle should be oriented toward the target.

Table 5-1. Crew Duties.

Element	Commander	Gunner	Driver
Alert: "GUNNER"	Lays vehicle for direction.	Starts searching for target as driver moves vehicle. Readies the weapon.	If moving, attempts to orient front of vehicle toward target; gives gunner as stable a platform as possible; looks for an unmasked position.
Description: "TRUCK"	Informs gunner of type of target.	Observes through sights and tries to identify target.	Orients front of vehicle toward target (helps to identify targets if stationary).
Direction: "RIGHT FRONT" (optional)	If needed, talks gunner into target area.	If issued, traverses turret in search of target. On identifying target, says "IDENTIFIED."	
	Commands "DRIVER—STOP." (Command to stop may be given by the gunner.)		Stops on command and attempts to sense rounds.
Execution: "FIRE"	Commands "FIRE." Assumes position to sense round and prepares to give subsequent fire command. Announces "TARGET—CEASE FIRE." Commands "DRIVER—MOVE OUT."	Uses correct sight picture, announces "ON THE WAY," and fires.	

Direct-Fire Adjustment

The crew's goal is to hit a target and destroy it as fast as possible. If the first round is not on target, an observation and an adjustment is made to hit the target. There are many techniques of direct-fire adjustment: burst on target (BOT), TOT, and other adjustment techniques.

BURST ON TARGET

BOT is the fastest method of adjustment. BOT is moving the burst of the round impacting on the ground onto the target. It is most effective when engaging from a stationary firing vehicle or a firing vehicle that is moving toward the target.

After the gunner has made his initial lay on the target and fired, to apply BOT, he must—

- Observe down the weapon sight.
- Re-lay after firing to maintain his correct sight picture.
- Concentrate on the target, noting the aiming point of the sight where the tracer round(s) appears as it passes, strikes short of, or hits the target.
- Announce his observation and BOT.
- Immediately adjust the aiming point of the sight, based on the impact of the previous round or burst, to bring the next round or burst on target. He must adjust quickly and accurately to make additional adjustments unnecessary.
- Announce "ON THE WAY" and fire a burst.

The gunner continues to fire, adjusting each burst onto the center of mass until the target is destroyed, the vehicle commander orders "CEASE FIRE," or the vehicle commander takes over adjustment of fire.

When the gunner applies BOT, the vehicle commander acts as an observer, observing the first round fired and subsequent burst of fire for deflection and range.

Accuracy of the BOT method of adjustment depends on the ability of the gunner to maintain correct sight pictures and make precise observations. To engage moving targets accurately using BOT, the gunner must continuously track before, during, and after the engagement.

TRACER ON TARGET

As the name implies, the gunner adjusts the strike of the rounds, based on observed tracers, onto the target area.

OTHER ADJUSTMENT TECHNIQUES

The gunner and vehicle commander can announce adjustments using any of the following adjustment techniques:

- Target form is the simplest method of adjustment. One form is the visible height or width of the target. Since the visual size in width and height differ, the visual height is used for adjusting in elevation and the visual width is used in azimuth adjustments. Target form can be used with all weapons (except TOW). The word "form" may be added after the announced change or the change may stand alone if target form is the standard adjustment technique in the unit's SOP. Form changes are always given in full- or half-form increments.

- Mil change-simple and accurate at all ranges, but requires the gunner to remember the mil relation of his reticle (TOW).

- Meter—vehicle commander's range correction based on his range observation. When this technique is used, meters must be converted into roils; this takes much longer to calculate.

Range Card Engagement

- DA Form 5517-R *(Standard Range Card)* is a rough topographical sketch of a designated sector of an assigned weapon system. A range card aids in planning for and controlling fires. It aids the crew in the target acquisition process during limited visibility and in the orientation of replacement personnel or units. During good visibility, the gunner should have little difficulty monitoring his orientation. During poor visibility, lateral limits may not be detectable. When the gunner becomes disoriented and cannot find or locate reference points or sector limit markers, he can use the range card to locate the limits of the sector. The gunner should prepare the range card so he becomes more familiar with the terrain in his sector. He should continually assess the sector and, if necessary, update his range card. Each range card contains, as a minimum, the following information:

- The appropriate symbol for the vehicle and weapon systems covering the sector.

- The left and right limits of the assigned sector to be covered by observation.

- The circle value shown in the sketch and data portions.

- TRPs and reference points (RP) (areas where targets are likely to appear).

- Dead space (areas that cannot be observed or covered by direct fire).

- Weapon reference point (WRP) (an easily recognizable terrain feature to locate the firing position).

- Maximum engagement lines (MEL).

- Magnetic North symbol (direction of magnetic north when the range card is oriented).

- Identification data.
  - Unit identification (no higher than troop).
  - Firing position (primary, alternate, supplementary).
  - Vehicle type and vehicle bumper number.
  - Date and time of preparation.

- Description.

- Direction and elevation.

SECTORS OF FIRE

A sector of fire is a piece of the battlefield for which a gunner is responsible. A sector of fire is assigned to ensure that weapon systems cover all possible enemy avenues of approach. Vehicle commanders should strive to overlap sectors to provide the best use of overlapping fire and to cover areas that cannot be engaged by a single weapon system. The vehicle commander assigns left and right limits of a primary sector of fire (including principal direction of fire [PDF] and final protective line [FPL] of fire using prominent terrain features or easily recognizable objects (such as rocks, telephone poles, fences, or emplaced stakes). The vehicle commander may also assign the gunner more than one sector of fire, designating each sector as primary, alternate, or supplementary.

Target Reference Points/Reference Points

Vehicle commanders choose natural or man-made terrain features to be designated as RPs to assist the gunner in target acquisition and range determination during limited visibility. There will also be predesignated TRPs.

A TRP is usually designated by the commander using the standard target symbol and target number issued by the fire support team (FIST) or fire support officer (FSO). If TRPs are located within the sector of fire, the vehicle commander points them out and tells the gunner their designated reference numbers.

The gunner depicts TRPs by a cross ($\frac{|}{|}\frac{001}{}$)with an abbreviated designation reference number in the upper right quadrant of the cross (in the sketch portion of his range card). The reference numbers are listed in the description column of the data portion of the range card.

The vehicle commander should assign additional RPs for his vehicle, to assist in the target acquisition and range determination process. RPs are depicted as a number within a circle. Normally, a gunner has at least one TRP, but should not have more than four. The range card should show only pertinent data for RPs or TRPs.

Dead Space

Dead space is any natural or man-made terrain feature (such as hills, draws, buildings, or depressions) that cannot be observed or covered by direct-fire systems within the sector of fire.

All dead space within the gunner's sector of fire must be determined to allow the vehicle commander and section leader to plan other weapon systems or other types of fire (mortars or artillery) to cover the area.

Dead space is indicated in the sketch portion of the range card by an irregular circle with a series of diagonal lines.

Dead space within the MELs for the weapon systems is circled with diagonal lines drawn in the circle. Dead space that extends out to or past the farthest MEL is drawn as an encased area with diagonal lines.

Maximum Engagement Line

The depth of the sector of fire is normally limited to the maximum engagement range of the vehicle's weapon systems; however, it can be less if there are any natural or man-made objects or features that prevent the gunner from engaging targets at maximum engagement range (for example,

hills, ridgelines, trees, urban areas). MELs are shown in the sketch portion of the range card by a heavily drawn line for each weapon system.

MELs are not drawn through dead space. MELs are drawn behind dead space when the terrain beyond the dead space is of a higher elevation. This represents terrain that can be covered by direct-fire weapon systems. MELs are drawn along the side and in front of dead space extending out to the farthest MEL. This represents terrain that cannot be covered by direct-fire weapon systems beyond the nearest point of dead space, in relation to the position for which the range card is drawn.

To assist in determining the distance of each MEL, the gunner or vehicle commander should use a map to make sure the MELs are shown correctly on the sketch portion of the range card.

Weapon Reference Point

The WRP is an easily recognizable terrain feature on the map. The WRP is used to assist vehicle commanders in plotting the vehicle's position, and to assist replacement personnel and units in finding the vehicle's position. The WRP location is given as a six-digit grid.

When there is no terrain feature to be designated as the WRP, the vehicle's location is shown as an eight-digit grid coordinate in the remarks block of the range card.

PREPARATION PROCEDURES

The gunner prepares two copies of the range card. If alternate and supplementary firing positions are assigned, two copies are required for those positions. A copy is kept with the vehicle and the other copy is given to the section leader for the section sector sketch. (DA Form 5517-R maybe locally reproduced on 8- by 11-inch paper. Figures 5-1 through 5-3 are samples of completed range cards. (See FM 7-7J for more detailed discussion on how to prepare a range card.)

FIRING POSITION

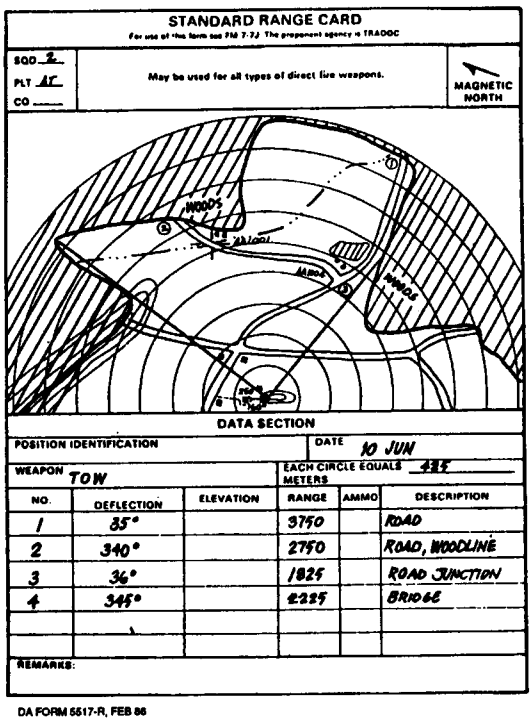
After a range card has been completed for a firing position, mark the position with ground stakes to enable the vehicle or another vehicle from a relief unit to reoccupy the position and use the data from the range card prepared for the position.

Stake the Position

Once the range card is completed and before the vehicle is moved to a hide position or to an alternate or supplementary position, stake the position. Three stakes are required to mark the position effectively.

Place one stake in front of the vehicle so it is centered on the driver's station and just touching the front of the vehicle. This stake should be long enough for the driver to see when the vehicle gets close. Place the other two stakes parallel to the left tire and lined up with the hub on the front and rear wheels. Place these stakes close to the vehicle with only enough clearance to allow the driver to move the vehicle into the position.

Figure 5-1. Completed Standard Range Card (TOW).



STANDARD RANGE CARD

SQD 2 PLT AT CO ____ | May be used for all types of direct fire weapons. | MAGNETIC NORTH

DATA SECTION

POSITION IDENTIFICATION | DATE 10 JUN

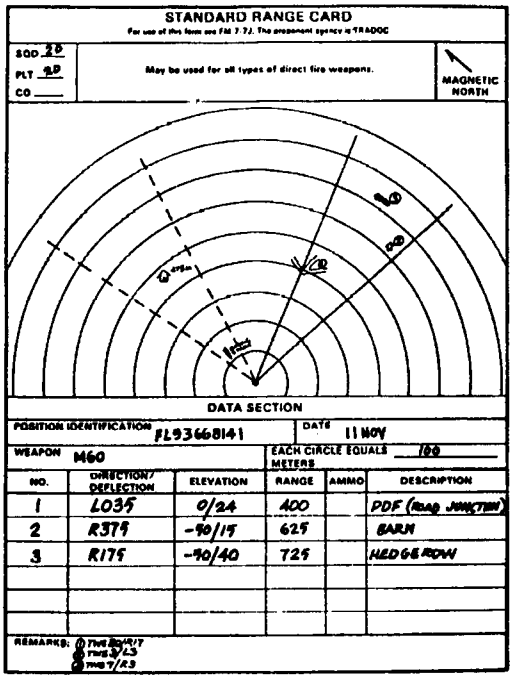
WEAPON TOW | EACH CIRCLE EQUALS 425 METERS

NO.	DEFLECTION	ELEVATION	RANGE	AMMO	DESCRIPTION
1	35°		3750		ROAD
2	340°		2750		ROAD, WOODLINE
3	36°		1825		ROAD JUNCTION
4	345°		2325		BRIDGE

REMARKS:

DA FORM 5517-R, FEB 86

Figure 5-2. Completed Standard Range Card (PDF).



STANDARD RANGE CARD

SQD 2D PLT 2D CO ____ | May be used for all types of direct fire weapons. | MAGNETIC NORTH

DATA SECTION

POSITION IDENTIFICATION FL9366814 | DATE 11 NOV

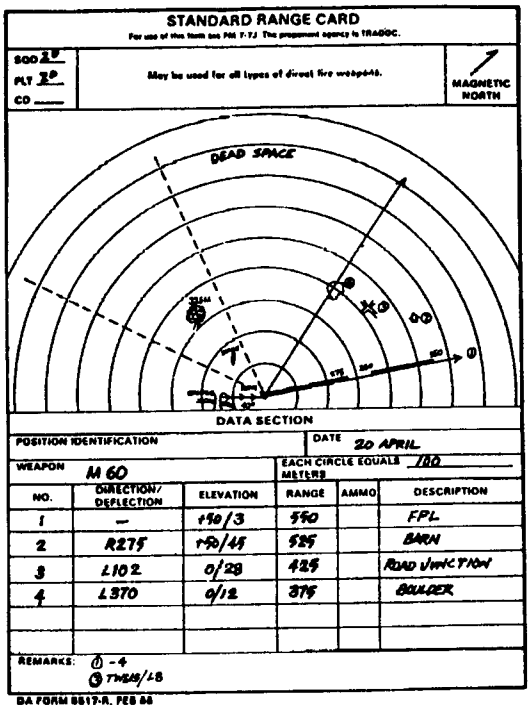
WEAPON M60 | EACH CIRCLE EQUALS 100 METERS

NO.	DIRECTION/ DEFLECTION	ELEVATION	RANGE	AMMO	DESCRIPTION
1	L035	0/24	400		PDF (ROAD JUNCTION)
2	R379	-90/19	625		BARN
3	R175	-90/40	725		HEDGEROW

REMARKS: ① TWS 2D/17 ② TWS 3D/L3 ③ TWS 4D/R3

DA FORM 5517-R, FEB 86

Figure 5-3. Completed Standard Range Card (FPL).



STANDARD RANGE CARD

SQD 2D PLT 2D CO ____ | May be used for all types of direct fire weapons. | MAGNETIC NORTH

DEAD SPACE

DATA SECTION

POSITION IDENTIFICATION | DATE 20 APRIL

WEAPON M 60 | EACH CIRCLE EQUALS 100 METERS

NO.	DIRECTION/ DEFLECTION	ELEVATION	RANGE	AMMO	DESCRIPTION
1	—	+90/3	550		FPL
2	R275	+90/45	525		BARN
3	L102	0/28	425		ROAD JUNCTION
4	L370	0/12	375		BOULDER

REMARKS: ① -4 ② TWS8/L8

DA FORM 5517-R, FEB 86

Drive the stakes firmly into the ground. Place engineer tape or luminous tape on the friendly side of the stakes to make it easier for the driver to see them during limited visibility. Place a rock at each of the front two comers of the vehicle to assist in reoccupation if the stakes are lost.

Move into Position

If the situation permits, a ground guide can be used to assist the driver as he moves the vehicle into position.

If a ground guide cannot be used because of enemy fire, the driver moves the vehicle in parallel to the side stakes, with the front stake centered on the driver's station.

If the stakes are lost and the position is not otherwise marked, the vehicle is moved to the approximate location. The vehicle commander or gunner can use a compass to find the left or right limits. The vehicle should be moved until it is within eight inches of the exact position, if time allows.

CHAPTER 6

Machine Gun Employment Techniques

M249 and M60

The M249 and M60 can engage area or point targets out to 900 meters. This is maximum effective range (tracer burnout). When using the M249 and M60, the gunner should—

- Lay on target center of mass (point targets and area targets).
- Fire bursts of 20 to 30 rounds (4 to 6 tracers).

M2 HB Caliber .50

The M2 can engage area and point targets out to 1,830 meters, its maximum effective range. The short-halt technique is recommended to engage targets effectively while on the move.

- Lay the weapon and estimate the range.
- Place the appropriate range line on target.
- Fire bursts of 5 to 7 rounds (1 to 2 tracers).

MK19

The MK 19 can engage point targets out to 1,500 meters and area targets out to 2,200 meters, its maximum effective range. The short-halt technique is recommended to engage targets effectively while on the move.

- Lay the weapon and estimate the range.
- Place the appropriate range line on target.
- Fire in 3- to 5-round bursts.

Area Target Engagements

The pattern of fire used to engage an area target should be dictated by the size and shape of the target and the engagement technique to be used. Engage area targets with a killing burst (the initial burst on target, designed to kill as many as possible before the enemy goes to the ground). Sweep through the forward edge of the target area with a killing burst, then switch to suppressive fires using intermittent bursts (20 to 30 rounds for light machine guns, 5 to 7 rounds for heavy machine guns, and 3 to 5 rounds for MK 19) to suppress the target.

Point Target Engagements

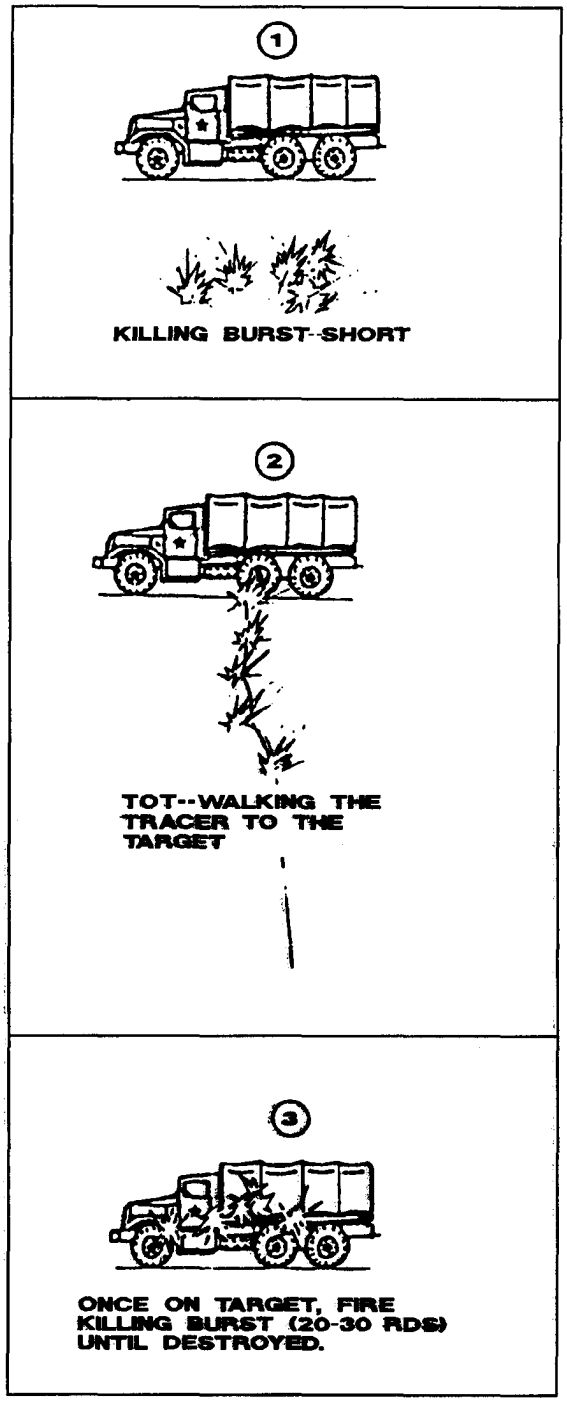
It is more difficult to engage point targets on the move; therefore, when the tactical situation will allow, stationary or moving point targets should be engaged from a short halt.

Figure 6-1. TOT Method.

Targets such as jeeps, trucks, RPG teams, and ATGM teams maybe engaged from either a moving or stationary vehicle. For personnel consolidated in a small area (1 to 10 meters), use the point target engagement technique.

To engage a point target, the gunner makes a precise lay on target, and fires a killing burst of 20 to 30 rounds (5 to 7 rounds for M2 HB, 3 to 5 rounds for MK 19). A killing burst kills as many enemy targets as possible with the initial burst of fire. The gunner fires additional bursts until the target is destroyed.

If the initial killing burst is short or long of the target, the gunner adjusts by walking the tracers onto the target. This is called the TOT method of adjustment. Once on target, the gunner continues to fire killing bursts until the target is destroyed or until he is told to cease fire.



Suppressive Fire Engagements

Suppressive fire is direct fire placed on known or likely enemy locations to degrade one or more of the enemy's basic combat functions—moving, shooting, observing, or communicating. Suppressive fire is most effective when fired at a sustained rate of 20- to 30-round bursts (4 to 6 tracers) every 10 seconds for machine guns, 5 to 7 rounds for M2, and 3 to 5 rounds for the MK 19. No specific pattern or engagement technique is prescribed; however, each burst should strike within 12 meters of the suspected target area. In dense terrain or areas of high enemy troop activity, overmatching vehicles can cover maneuvering vehicles with suppressive fire.

Reconnaissance by Fire

Use machine guns in reconnaissance by fire to cause a hidden enemy to react. Fire a single burst (20 to 30 rounds with the M249 or M60; 5 to 7 rounds with the M2; or 3 to 5 rounds with the MK 19) while constantly observing for enemy movement, return fire, or the flash of rounds striking metal. Reconnaissance by fire is the least desired method of acquiring targets. It is used when other means of enemy detection have been unsuccessful or are not available. It is best employed with a section. One vehicle can fire on a suspected enemy position or suspicious area to cause the enemy to react and compromise his position. The second vehicle can then engage and destroy the enemy from a different location.

Aircraft Engagement Techniques

Machine guns can be used to engage aircraft and helicopters, particularly when several vehicles are firing at the aircraft at the same time. It is difficult to track and hit aerial targets; therefore, a volume of fire should be established in front of the aircraft, forcing the aircraft to fly through the rounds.

ENGAGING HIGH-PERFORMANCE AIRCRAFT

A general rule of thumb is not to engage high-performance aircraft due to—

- Their great speed.
- Limited amounts of machine gun ammunition available to the gunner.
- Brief exposure time of the aircraft within effective machine gun range.

The decision to engage should be made if the aircraft is a direct threat to the crew or unit (actually making an attack run) or mission guidance includes active engagements of high-performance aircraft.

ENGAGING HELICOPTERS

Criteria for engaging high-performance aircraft also apply to helicopters; however, helicopters exposed on the ground and slow-moving or hovering helicopters are targets of opportunity that should be engaged if within effective machine gun range. Heavily armored attack helicopters (such as the HIND-D) should be engaged with armor-piercing incendiary tracer (API-T).

METHOD OF ENGAGEMENT

Engage aircraft using a continuous burst. The aiming points for aircraft engagements are—

Type of Aircraft	Aiming Point
Jet aircraft, flank target	2 football fields to front
Jet aircraft, frontal target	slightly above fuselage
Helicopter, flank target	1/2 football field to front
Helicopter, frontal target	slightly above fuselage

HELIBORNE INFANTRY AND PARATROOPERS

Infantry rappelling from a hovering helicopter should be destroyed by engaging the helicopter first, using volume fire. Airborne troops are more difficult to engage because of their rapid descent (approximately 10 feet per second). When using machine guns, lead the descending troops; the standard lead is two body lengths below their feet.

Note. The Geneva Convention of 1949 and our *Rules of War* prohibit engaging crewmen parachuting from a *disabled* aircraft.

Special Use of Machine Guns

Machine guns are effective weapons that also serve the vehicle crew in different ways. The crew is limited only by their ingenuity in using these weapons. Some special uses are—

- Ranging. Machine guns can be used as ranging guns out to their maximum effective range.
- Designating targets. Machine gun fire can be used effectively by section leaders to designate targets for other tanks, artillery forward observers, or aerial fire support. Limited use of this technique is recommended because it reveals your position.
- Firing through cover. Mounted machine guns can be used effectively to penetrate most cover (such as small trees, hasty barricades, or lightly constructed buildings) used by dismounted personnel.
- Incendiary effects. Machine gun tracers or incendiary ammunition, particularly API-T, can be used to set fire to any readily combustible material such as dry grass, grain, dried brush, or wood. Fire will deny a particular area to enemy use; smoke from a burning field can be used to screen movement.
- Ricochet fire. Use ricochet fire when fighting in built-up areas. Machine gun fire can be directed around comers by bouncing rounds off buildings, walls, or streets. Ricochet fire can also suppress sniper fire. Although not particularly accurate, it can produce a desired psychological effect.

CHAPTER 7

Fire Control and Distribution

The light cavalry unit will probably face a numerically superior force on the battlefield. To ensure the defeat of the enemy, the efficient use of available firepower is a must. How to use firepower efficiently can be trained through crew drills that emphasize proper use of fire commands and techniques of fire.

Principles of Fire Control and Distribution

Fire control and distribution is achieved through the proper use of boundaries, fire plans, pyrotechnics, and weapons-ready posture. In movement to contact, information about the enemy is scarce; therefore, proper use of fire control and distribution becomes increasingly important.

STANDING OPERATING PROCEDURES

A well-rehearsed platoon SOP ensures quick reaction times. Area coverage responsibilities, and weapons-ready postures for different situations (such as road marches, halts, and various battle drills) should be in the SOP. Battalion/squadron or troop SOPs should prescribe the combat load of ammunition, by type and amount. The section leader should prescribe the weapons-ready posture (battlecarry) that makes the best use of available firepower in the present situation.

Situations the section leader should plan for when forming his section SOPs (see ARTEP 17-57-10-MTP) are—

- Actions on contact.
- Reaction to ambush.
- Reaction to air attack.
- Deliberate ambush.
- Reaction to artillery strike.

The section should be prepared to engage personnel carriers and suppress ATGMs with machine guns and to engage tanks with TOWs. (TOWs can also be used on BMPs at long ranges.) TOWs are fired from covered and concealed positions. The weapons-ready posture may have to be adjusted, or ammunition redistributed, after an engagement to make sure that vehicles have the ammunition or missiles needed.

FIRE PLANNING MEASURES

Fire control and distribution measures must be simple and clear. Their use must be routine, with no need for detailed or lengthy instruction. A description of some simple measures that can be used to distribute and control fires effectively follows.

Sector of Fire and Engagement Area

Each crew or section is assigned a specific area (sector of fire) to cover. The sector of fire must be covered by observation and fire. A sector of fire is designated by easily recognizable terrain features (such as roads, streams, hills, or ridgelines) that outline the sector.

Each sector of fire can extend from a firing position to the maximum engagement range of the weapons on the vehicle, or it can be an enclosed area away from the firing position (an engagement area). If a weapon is assigned an enclosed sector (engagement area), the terrain between the sector of fire and the firing position must be covered by other weapons (such as those of tanks or rifle teams).

In most situations, the terrain and the number and type of weapons available to cover an area will dictate how sectors of fire are assigned. Sectors should be assigned so an area is completely covered with the appropriate type of fire and mutual support is established among the vehicles in the area. To ensure mutual support, each vehicle is assigned a primary sector of fire and a secondary sector of fire corresponding to another vehicle's primary sector of fire.

Fire is shifted to the secondary sector, on order, when there are no targets in the primary sector or to cover another vehicle (for example, when a vehicle is forced to move to an alternate position or is out-of action to reload its weapons).

If a mounted avenue of approach is narrow, or if there is a need to concentrate the fires of an entire platoon in a critical area (such as a choke point), overlapping sectors of fire can be assigned. Because this increases the problem of control and the probability of target overkill, additional control measures (such as engagement priorities, fire patterns, or TRPs) are needed. Vehicle commanders must select positions that allow them to observe and coordinate fires.

Target Reference Points

A TRP is an easily identifiable point on the ground—natural or man-made. It is used to designate targets of opportunity, shift fire, or assign sectors of fire.

In the defense, TRPs are assigned for vehicles along avenues of mounted approach. In the offense, TRPs are assigned on likely enemy locations or on prominent terrain features. To avoid confusion, the number of TRPs should be limited to the number required to distribute and control fire.

When using a TRP to hand off targets, compass directions—north, east, south, west—are used rather than right or left because each vehicle may be viewing the TRP from a different direction.

TRPs are indirect-fire targets that may also help control direct fires. The FIST will assign each TRP a target identification number. The target identification number consists of two letters and four numbers (for example, AB5010). These identification numbers are recorded on range cards in the data section for easy reference and control. To simplify fire commands, TRPs may be referred to by the last three digits (for example, TRP AB5010 may be referred to as TRP 010).

Phase Lines

A phase line is a simple and effective linear control measure normally used to control movement; it can also be used to control and distribute the fire of several widely separated vehicles. The section leader uses phase lines to indicate to his crews when to fire and when to displace to an alternate position. Any prominent (natural or man-made) linear terrain feature—ridgeline, river or stream, road, or railroad track—can be used as a phase line.

In either offensive or defensive operations, phase lines can be used to start or stop firing simultaneously, shift fire to another sector, or indicate when vehicles are to move to alternate or supplementary positions.

Engagement Priorities

Targets that present the greatest threat and break the momentum of an attack (such as command vehicles, mine-clearing vehicles, and bridging vehicles) should be engaged first. Usually, targets seen in formations on the battlefield will be of various types (such as tanks, personnel carriers, and air defense vehicles). Engagement priorities are used when no sectors of fire have been assigned and when overlapping sectors of fire have been designated.

FIRE PATTERNS

There are three basic fire patterns that can be used to distribute the section's fire when multiple targets appear and no other measures have been assigned—frontal fire, cross fire, and depth fire.

Frontal fire is used when targets are positioned in front of the vehicles in a lateral configuration. The section leader fires first to delineate sectors of fire. The left flank vehicle engages the left-most target; the right flank vehicle engages the right-most target. As targets are destroyed, friendly fires are shifted toward the center of the enemy formation.

Cross fire is used when targets are positioned laterally and obstructions prevent vehicles from firing to the front. The section leader fires first to delineate sectors of fire. The left wing vehicle engages the right-most target; the right wing vehicle engages the left-most target. As targets are destroyed, vehicles automatically shift their fires toward the center of the enemy formation.

Depth fire is used when targets are in a column configuration. The section leader fires first to delineate sectors of fire. The left wing vehicle engages the target farthest to the rear; the right wing vehicle engages the closest target. As targets are destroyed, vehicles shift fires to the center of the enemy formation.

Figure 7-1. Frontal Fire.

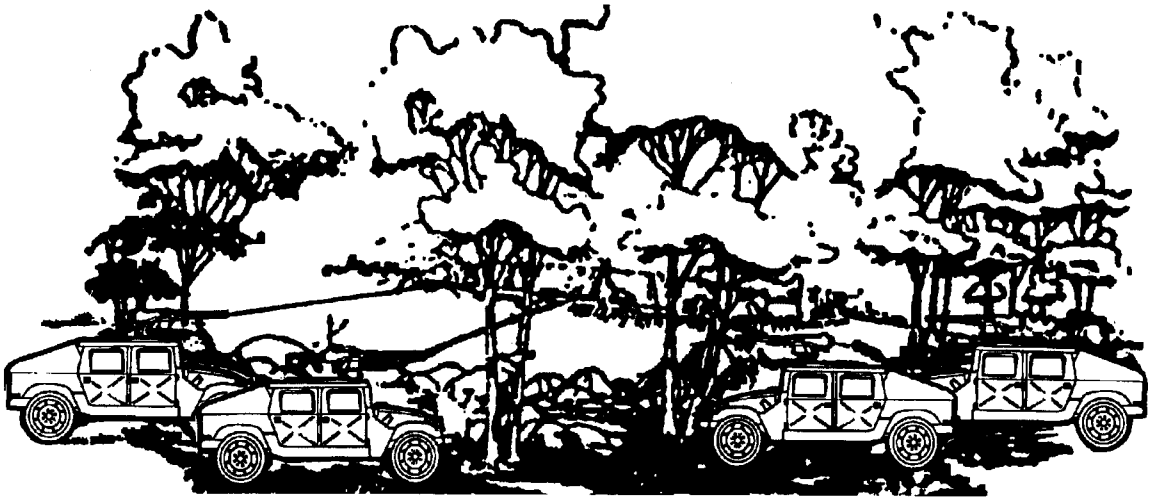


Figure 7-2. Cross Fire.

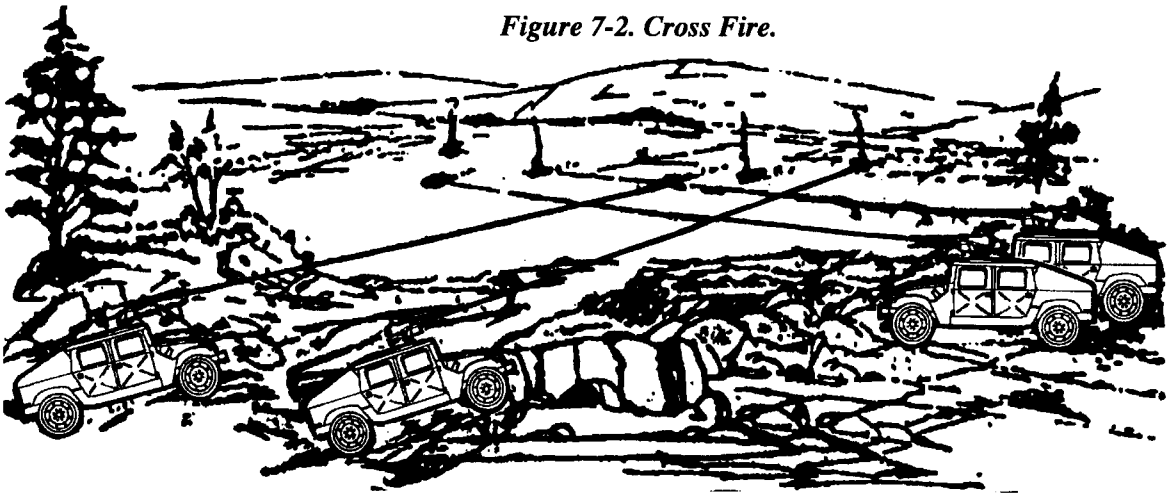
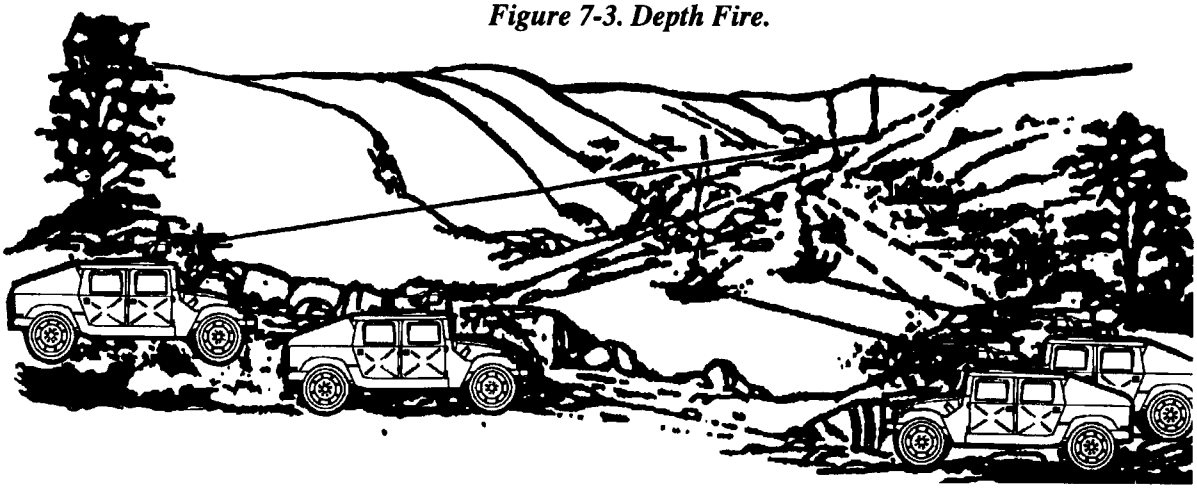


Figure 7-3. Depth Fire.



Section Fire Control

While mounted, one of the following three methods of fire control maybe used.

SIMULTANEOUS FIRE

Simultaneous fire is used when all vehicles of a section are firing into their assigned sectors at the same time. This technique is used when moving unprotected or when surprised by many enemy vehicles, requiring immediate massed fires.

OBSERVED FIRE

In observed fire, the firing vehicle of a section engages targets while its wingman (nonfiring) vehicle observes the effects of the fire and helps to spot and call fire corrections. The wingman (nonfiring) vehicle is also responsible for local security while the firing vehicle concentrates on the engagement area. If a weapon malfunctions or ammunition is low, the wingman (nonfiring) vehicle immediately assumes firing duties. This technique is also used when one (firing) vehicle has a target in its sector and the other (wingman) vehicle does not have targets in its sector. This technique is normally used when vehicles are in protected defensive positions and firing at or near maximum range of their weapon systems.

ALTERNATING FIRES

Alternating fires allow one vehicle to shift firing positions while the other engages targets. This method provides constant fire into the engagement area while hindering the enemy's attempts to acquire and suppress firing vehicles. (In the defense, continuous fire from the same location will allow the enemy to locate the vehicle's position.) At extended ranges (at least 1,100 meters) the vehicles can alternate firing and observing until both are satisfied they are delivering effective fire. At this point, simultaneous fires can be employed.

Section Fire Planning

Section fire planning begins when the section leader receives a mission. It is an integral part of the section leader's troop-leading procedures. Fire planning is a continuous process. It does not stop until the section mission is accomplished. The primary goal of fire planning is to prescribe how fire is to be distributed and controlled to best support the scheme of maneuver. The section fire plan provides the section leader the information he needs to distribute and control the fire of all available weapons. Fire planning also includes indirect fires.

DEFENSIVE FIRE PLANNING

Defensive fire planning is normally deliberate and detailed because sufficient time is available to consider the following:

- Individual vehicle targets.
- Section targets.

- Indirect fire targets.
- Fire distribution and control measures.
- Alternate firing positions.

To develop a defensive fire plan, the section leader—

- Assigns primary, alternate, and supplementary firing positions to each vehicle, and assigns to each position a primary and secondary sector of fire.
- Designates possible section point or area targets and other control measures (such as TRPs and RPs, phase lines, or target priorities) to coordinate the fire when more than one vehicle is firing into the same target area or sector.
- Receives information from vehicle commanders (provided on sector sketches and individual weapon range cards). The section leader then reviews this information to ensure that fire is properly distributed across the entire section sector and that sufficient control measures are met. This will assist the section leader in determining if positions must be adjusted, minefield and obstacles emplaced, and additional indirect-fire support requested.
- Completes the section fire plan and, if practical, gives a copy of the section sector sketch to the platoon leader and has each vehicle commander make a copy of the sector sketch. (If time is short, he may only be able to give the vehicle commander a quick briefing on the sector sketch.)

OFFENSIVE FIRE PLANNING

In offensive fire planning, time is normally not available to plan fire in the same detail as in defensive fire planning. The section leader relies more on fire commands and prearranged SOP signals to bring effective fire on enemy targets rapidly. Offensive action requires planning. A section leader must plan how to engage known or suspected enemy targets, where suppressive fire may be needed, and how to control section fires against both planned targets and targets of opportunity.

Scout Section Fire Commands

Speed and accuracy are vital when engaging targets; therefore, commands must be clear and concise. In the stress of battle, the section leader or vehicle commander must analyze a situation quickly and issue concise and complete fire commands without delay.

The following is an extract of sample Signal Operation Instructions (SOI) identifying scout section fire commands.

Extract	Abbreviated Call Sign
Section	C5T
Section Leader	C5T40
1st Squad	C5T41
2d Squad	C5T42
3d Squad	C5T43

A standard format for section fire commands ensures that all necessary information is given in minimum time, even under the worst conditons. The elements of a section fire command issued in proper sequence are—

Element	Example
Alert:	"TANGO—THIS IS TANGO FOUR ZERO—
Weapon/ammunition (optional):	MISSILE—
Description:	TWO BMPs, ONE TANK—
Direction (optional):	EAST OF TRP ZERO ZERO FOUR—
Control (optional):	DEPTH—
Execution:	AT MY COMMAND—FIRE."

Note. Weapon/ammunition may be given when tanks and BMPs appear together. Control maybe given to identify the fire pattern to be used by the section. The following are examples of section fire commands.

1.	Section leader's fire command to engage trucks with all vehicles of the section.	"TANGO (complete section)— THIS IS TANGO FOUR ZERO— FIRE MISSION (optional)— FOUR TRUCKS— FRONT—TWO HUNDRED (optional)— CROSS (optional)— FIRE."
2.	Section leader's fire command to engage moving trucks and dismounted infantry. The section leader alerts the entire section, indicating that he wants all vehicles to fire, but specifying that the second squad will engage the infantry. The other vehicles will engage the trucks.	"TANGO—THIS IS TANGO FOUR ZERO— TRUCKS AND INFANTRY— FIRE MISSION TRUCKS (optional)— TANGO FOUR TWO— TROOPS— FRONT (optional)— FIVE HUNDRED (optional)— FIRE."
3.	Section leader's command to end the engagement.	"TANGO—THIS IS TANGO FOUR ZERO— CEASE FIRE."

CHAPTER 8

Range Training Facilities

The light cavalry training program includes range firing and using training areas for dry-fire tables. This program builds on gunnery skills and tactical training gained in situational training exercises. This program is designed to provide a realistic environment and to use the vehicle's weapons to engage and destroy targets. The gunnery program must be planned with considerations for limited range densities and detailed planning of training ammunition. Tactical training must also be well planned to make maximum use of this expensive training, which may include threat vehicles and troops for a more realistic combat environment. This chapter outlines the procedures, duties, and responsibilities for establishing and operating gunnery and tactical training facilities.

Section I. LIVE-FIRE RANGES

A permanent light cavalry firing range is a designated post range or facility. There is a surface danger area diagram designating a firing line or maneuver area and safety limits, both on a map of the area and on the ground. Each range is designed for specific purposes-types of weapons and ammunition and particular firing tables. These ranges cannot be modified or used for other types of firing without approval (usually the range control officer is the approving authority).

Normally, temporary ranges are established to fill specific needs of units. These may be a home station subcaliber range where no permanent range exists or a special live-fire exercise range (combined arms live-fire exercises or ARTEP). Requests to establish a temporary firing range must be accompanied by a surface danger area diagram to inform the approving authority of the specific requirements and area desired.

Establishing a Live-Fire Range

Before selecting a site for a scaled range or a full-caliber range, make a detailed map and ground reconnaissance of areas available for firing.

SITE SELECTION

The range must be large enough to accommodate all weapon systems and types of ammunition to be fired, along with the scenario requirements of the table(s) to be fired. Realistic conditions not provided by the selected terrain should be constructed to enhance training. Examples are—

- Defilade stationary firing positions.
- Sufficient maneuver area and enough targets to provide multiple firing points and target locations.
- Targets in realistic arrays and, if possible, not marked by berms.

BALLISTIC FIRING TABLES

The ballistic data in firing tables for light cavalry ammunition are used to develop or modify surface danger area diagrams.

The use of ballistic characteristics combined with knowledge of the fire control system allows the crews to use the light cavalry weapons more effectively. (See FT .50-AD-1 and FT 7.62-A-2.)

The following terms explain the data in all gunnery firing tables. The data columns may differ sightly among various rounds of ammunition and types of weapons.

- Range. Vehicle-to-target distance.
- Superelevation. Additional elevation induced into the fire control system to raise the ballistic flight of a given projectile to ensure that the projectile hits a target at a given range.
- DX/DSE. Number of meters a l-roil elevation change will make in linear range, on the ground, at a given range and superelevation.
- DH/DX. Change in height (in meters) of a projectile for a 100-meter change in linear range, on the ground, at a given range.
- Drift. Number of roils the projectile moves to the right of the gun-target line because of the spin caused by the gun rifling.
- Time of flight. The amount of time it takes a projectile to reach a target at a selected range.
- Ten-kilometer per hour (kph) crosswind deflection. Generally, a round is most unstable when it exits the muzzle. This effect of wind deflection assumes a 10-kilometer per hour crosswind. The correction is applied into the wind; when wind speed is not 10 kilometers per hour, the point of aim must be estimated.
- Maximum ordinate. The maximum height the projectile travels above the line of sight at a given range.
- Range to maximum ordinate. The range at which the maximum ordinate is reached. Out to this range, the projectile is ascending; beyond this range, the projectile is descending. The range to the maximum ordinate will always occur shortly past half the target range.
- Angle of fall. The number of roils between the projectile's trajectory at impact and the line of sight.
- Remaining velocity. Speed of the projectile, in meters per second, at a selected range.

SURFACE DANGER AREA DIAGRAMS

Light cavalry units establishing ranges or modifying existing ranges must submit surface danger area diagrams to the range control officer before firing. Surface danger area diagrams show range boundaries and safety features in overlay form, including range limit markers for firing positions. Ballistic firing tables (FT .50-AD-1) that provide values for range, maximum ordinates, and superelevation for each ammunition type are also required to construct surface danger area diagrams.

Surface danger area diagrams on established ranges should be modified when these ranges do not provide realistic conditions or do not make maximum use of available terrain. Restrictions and precautions for surface danger area diagrams are in AR 385-63. When engaging ground targets, maximum range may be reduced to 1,500 meters if the firing elevation of the gun can be maintained at 15 degrees or less. If the weapon cannot be controlled at 15 degrees or less (when firing while moving over rough terrain), the maximum range should be used. (Range at 1,500 meters is the maximum distance the projectile can travel when fired at elevations of 15 degrees or less. This value was derived using data from the ballistic firing tables along with ricochet data.)

When laser range finders are used, an additional buffer area (area C) may be added (see AR 385-63). Every object the laser beam strikes reflects energy. In most cases, this energy is diffused and not hazardous. Remove mirrors (plastic or glass) and other flat mirror-like objects having a vertical or near vertical surface from the target area; these objects may reflect the laser beam and cause injury. If this is impractical, cover the surfaces with lusterless paint or some nonreflecting material, such as cloth or cardboard.

Reconnaissance

The OIC and NCOIC should conduct a reconnaissance and coordinate with range control before their unit occupies a range or training area. It is not possible to list all areas checked during a reconnaissance, but the following should be considered, as a minimum:

- Where are the routes to the range or training area?
- How many vehicles can simultaneously fire a stationary or moving course?
- Are there hull-down and defilade positions?
- What control facility (tower) is available; what is its condition?
- What communication hookups are available to operate the range?
- Are range limit markers visible during day, reduced visibility, and night firing?
- Which barriers and guard posts need to be closed or manned?
- Who furnishes the targets, target supplies, and training devices used on the range?
- What requirements will be necessary for target operators or target details?
- What ammunition can be used on the range?
- Has the range or training area been cleared of duds?
- Where are the following areas:
  - Ammunition pad?
  - Firing line and maneuver areas?

- Barriers and guard posts?
- Range bits?
- Helipad?
- Aid station?
- Parking areas?
- Maintenance area?
- Latrine?
- Briefing and debriefing areas?
- Tower?

Personnel, Equipment, and Layout

Good planning and execution of range or tactical training will allow progressive training and proper evaluation of the unit. Administrative requirements are in AR 385-63, local range regulations, and unit SOPS. A range book containing all applicable regulations and reference materials (for example, range schedules, firing tables, gunnery tables, maps, range logs) will assist the OIC in operating the range efficiently.

REQUIRED PERSONNEL

The following personnel are required for conducting range training:

- Officer in charge. The OIC is responsible for everything that occurs at the range or training site. This includes planning, preparing, coordinating, and executing the training exercise. AR 385-63 lists an overview of the duties to be completed or supervised by the OIC. The OIC will also designate assistants to be responsible for specific areas of operation. All personnel involved in the training exercise report to the OIC regarding their respective duties.
- Range safety officer (RSO). The RSO is a commissioned officer, warrant officer, or NCO (E6 or higher) who is weapon-systems qualified. The RSO is a direct representative of the OIC. The RSO will have no responsibilities during range firing other than the following:
  - Conduct a safety briefing before all live-fire exercises.
  - Enforce all safety regulations.
  - Ensure all ammunition is handled correctly.

- Enforce smoking restrictions near the vehicles; ammunition; and petroleum, oils, and lubricants (POL).
- Ensure misfires are handled as stated in AR 385-63 and the appropriate operator's manual.
- Investigate and report accidents, in accordance with all regulations.
- Ensure weapons on live-fire ranges are pointed toward the impact area at all times.
- Ensure personnel are clear of the danger area (except as authorized in AR 385-63).
- Check all DA Forms 2408-4 for proper combination of barrel, receiver, feeder, and round count.
- Check all ammunition (TB 9-1300-385) for suspended or restricted lots.
- Ensure barriers and guards are in place before the start of the exercise.
- Check for proper identification and qualifications and ensure transportation of medical personnel, if used or required.
- Inspect and clear all weapons following the completion of fire.

- Noncommissioned officer in charge. The NCOIC coordinates and supervises details and assists the OIC and RSO in operating the range or training area. Duties of the NCOIC include—
  - Prepare a surface danger area diagram and range overlay.
  - Prepare scaled ranges, if required.
  - Organize range firing exercises.
  - Set up range firing exercises.
  - Ensure range firing exercises are properly conducted.
  - Supervise the crews to ensure that proper boresighting and zeroing are accomplished.
  - Coordinate target array and layout for range firing and qualification.
  - Conduct remedial training on site, as needed.
  - Ensure an effective light cavalry crew evaluator program is implemented for standardization.

- Ammunition NCO. Duties of the ammunition NCO include—
  - Ensure ammunition is accounted for, by type and lot; correct for the scheduled firing; and properly stored and secured on the ammunition pad in the training area.
  - Check any ammunition resupply to be sure it is not restricted or suspended (check with RSO and TB 9-1300-385).
  - Issue the correct type and number of rounds as instructed by the OIC and keep a running inventory to cross-check daily expenditures turned in to the OIC by vehicle commanders.
  - Ensure the ammunition pad is continually policed of links, brass, and packaging materials.
- Target NCO. Target NCOs are not needed on many of the automated ranges. Where target NCOs are required, their duties include—
  - Ensure targets are the type, color, and scale (if applicable) required.
  - Ensure targets are in the proper location on the range.
  - Ensure the target detail is proficient in the operation and troubleshooting procedures for all target mechanisms used.
  - Ensure the target detail has the required equipment and supplies, and prepositioned targets are available when needed.
  - Ensure spare targets, target mechanisms, batteries, patches, and other related equipment are on the range or training site to support training.
  - Report to the OIC any mechanical malfunctions that require prompt repair to continue firing.
- Evaluator. Duties of the evaluator include—
  - Enforce required safety precautions.
  - Act as an instructor during practice.
  - Act as an evaluator during qualification.
  - Debrief crews at completion of firing.
  - Confer with OIC on any scoring discrepancy.

- Fire-fighting detail. This detail is required at some range facilities during dry seasons. When such a detail is used, consider the following:
  - Availability of fire-fighting equipment.
  - Designated vehicles for troops and equipment.
  - Access routes to the impact or target areas.
- Bunker personnel. Bunker personnel move targets, if applicable.
- Radiotelephone operators. These operators maintain communications during an exercise.
- Medic. The medic must—
  - Know how to get to the nearest aid station or hospital (must have strip map to nearest aid station or hospital).
  - Know radiotelephone operating procedures for use during air evacuation.
  - Have identification card (medical) or a memorandum for record from his commander stating that he is a qualified medic.
  - Be properly equipped for the mission.

RANGE EQUIPMENT

The OIC and NCOIC should make sure that the following equipment is on hand:

- For gunnery and tactical exercises—
  - Current gunnery standards for the table being conducted.
  - Targets and target operating and control mechanisms.
  - Target repair equipment.
  - Range regulations.
  - Flashlights for scorers.
  - Batteries for lights and radios.
  - Recovery means.
  - Evaluator communications.
  - Briefing tent.

- Scorecards.
- Stopwatches.
- Binoculars.
- Night vision devices with enough batteries.
- Field telephones, as required.
- Fire-fighting equipment.
- Vehicles:
  + Target and scoring detail.
  + Fire-fighting detail.
  + Backup aid vehicle.
  + Safety officer's vehicle (moving range).
- Generators to power light sets.
- Equipment for concurrent training.
- Boresight equipment.
- Other table(s) of organization and equipment (TOE) and expendable supplies.
- All other required regulations, SOPS, maps, and overlays.
- FM radio sets and antenna GRC-292 or OE-254.

● For gunnery exercises—

- Range flag.
- Range lights or lanterns.
- Flag sets for vehicles and tower.
- Compass for marking rounds out of impact area.
- Ballistic firing tables.

- For tactical exercises—
  - MILES equipment.
  - Opposing forces (OPFOR) equipment.
  - OPFOR personnel.

LAYOUT FOR GUNNERY EXERCISES

A well-organized gunnery range provides maximum firing time. If ranges are planned and organized and all items are collected before moving to the range, firing can start on time and finish in time to clear the range orderly.

A battalion or squadron level range operation SOP will save both time and energy for the firing unit. The SOP should include guidelines for occupying the range and describe actions to be taken for specific tasks:

- Coordinating with maintenance contact teams.
- Operating moving targets.
- Replacing targets.
- Repairing target mechanisms.
- Fighting range fires.
- Writing range scenario.
- Establishing firing orders.
- Policing the range.
- Departing the range.
- Breaking down ammunition.
- Moving vehicles to the ammunition point and ready line.

Moving ranges have a maneuver box not found on stationary ranges. If course roads exist, they should be used for movement. (The vehicle commander should also use available terrain for masking assistance to OICs in planning these exercises.) Maneuver boxes are used to allow the vehicle crew to acquire, range, and destroy targets arranged in a realistic array as outlined on appropriate gunnery tables. Maneuver boxes must be clearly defined and adhered to (start and stop points) and at no time will this area extend or surpass the exposure and engagement times.

To determine the size of a maneuver box, average vehicle speed for the course and target exposure time must be known. The procedure for determining the length of a maneuver box is as follows:

Vehicle Speed: 12 miles per hour.
Target Exposure: 42 seconds.

Convert vehicle speed into meters per second (multiply by the constant 0.447416).

12 (miles per hour) X 0.447416= 5.368992

Convert meters per second into maneuver box length.

5.368992 X 42 (target exposure)= 225.49766 meters

Round to the nearest whole number.

Maneuver box length is 225 meters.

Note. The maximum distance the vehicle could travel and still have the target exposed is the length of the maneuver box. Roundup to the next whole number if the number after the decimal point is 5 or more.

LAYOUT FOR TACTICAL TRAINING

Tactical training can be conducted either on ranges or in training areas, whichever is available. Most of the preparation that goes into a gunnery exercise also applies in tactical training.

The configuration of the course depends on local terrain. Each task must fit specific terrain, so tasks on gunnery tables probably will not be encountered in the order in which they appear in a particular table.

As in the gunnery tables, tactical tasks need a range operation SOP that will save time and energy for the firing unit. The SOP should include guidelines for setting up the tactical range or training area and should describe actions to be taken for specific tasks:

- Coordinating with maintenance contact team (for multiple integrated laser engagement system [MILES] devices).
- Testing MILES equipment.
- Setting up tactical tasks (layout) based on METT-T and task standards.
- Briefing OPFOR and control personnel on duties for each engagement.
- Test firing weapons (Hoffman signature device, machine guns with blank adapters).
- Moving vehicles to the start point and issuing fragmentary orders (FRAGO) to initiate movement down the course.
- Conducting after-action reviews (AAR) after each engagement and assembling crews (resetting MILES equipment).
- Controlling movement on the course to prevent congestion of HMMWVs or platoons.

- Policing the range or training area.
- Departing the range or training area.

TARGETS

Full-scale targets should be the same shape, size, and color as the threat targets they represent.

Note. For a detailed description of targets, target mechanisms, and target control, see TC 25-8.

Hard Targets (Live Fire)

When available and where ricochets do not present safety hazards, hard targets are preferred when firing high explosive (HE) service ammunition. Old tank hulls and turrets, APCs, and wheeled vehicles make good hard targets. When filled with sand or dirt, these hard targets will withstand many hits.

Soft Targets (Live Fire)

Soft targets are made from target cloth or wood by the unit or range control. These targets should be olive drab.

FLAGS

On all ranges, the vehicle will display flags to show the vehicle's weapon status. The following flags will be used:

- *Red.* Vehicle is engaged in firing. Weapons are loaded and pointed at the target area; safety is off.
- *Green.* All weapons are cleared and elevated; safety is on and all ammunition on board the vehicle is stowed.
- *Yellow.* There is a malfunction on the vehicle. This flag is used in conjunction with the red or green flag.
  - *Yellow and red.* The vehicle has a malfunction or misfire; weapons are pointing at the target area and are not clear. (Safety is on; if not, notify range safety personnel.)
  - *Yellow and green.* The vehicle has a malfunction; all weapons are clear and safety is on.
- *Red and green.* The vehicle is preparing to fire or the crew is conducting a nonfiring exercise. Weapons may be loaded, but safety is on. Ammunition is loaded in the ready boxes.

RANGE CONTROL

The range control officer is responsible for coordination and safe conduct of range activity for all units using range facilities. Normally, unit leaders are required to receive a range briefing from the range control officer before occupying a range. Schedule this briefing promptly to prevent any delay in training. Range control should also provide a set of local range regulations and policies.

RANGE COMMUNICATIONS

The installation range officer controls all ranges by wire and radio communication. The control system is used for obtaining clearance to fire, making reports, coordinating, and calling cease fire.

The OIC controls all training activities, including firing, by the best means available and always has a backup system.

Wire is the preferred means of communication between target operators and personnel in the impact area or, in tactical training, the OPFOR. In all cases, the OIC plans for a backup communication system to prevent delay.

Range Operations

A plan must be developed for conducting light cavalry training. This plan will vary with the tables to be trained. The plan should reflect consideration of the following areas.

ASSETS

Training can be conducted by battalion/squadron or troop/company.

Battalion/Squadron

The battalion/squadron signs for, administers, and clears the range or training site. (The training troop assists in range police and administrative duties.) This allows the troop/company to concentrate on gunnery, tactics, and maintenance. Advanced gunnery tables require support from outside the squadron because of the magnitude of the target array and number of personnel needed to control the range. The tactical tasks should not require assets from sources other than the squadron.

Troop/Company

The troop/company signs for, administers, and clears the range or training area. The squadron provides the necessary support in details, safety officers, range guards, and administrative personnel.

OPENING THE RANGE OR OCCUPYING THE TRAINING SITE

The required personnel perform the following tasks:

- The OIC—
  - Moves to the range or training site before the unit arrives.
  - Checks communications and, for live-fire exercises, ensures that backup communications are available.
  - Briefs the safety officer, the evaluators, and the units that will be trained.
  - Ensures range equipment is present and operational.

- The safety officer or safety NCO—
  - Ensures that barriers are closed and range guards are posted and briefed on their duties.
  - Ensures that no live ammunition is present on a nonfiring range.
  - Supervises placing vehicles in the correct order for firing or training.
  - Inspects stowage, handling, and lot number for restricted or suspended ammunition.
  - Inspects medics and vehicles.
  - Inspects DA Form 2408-4 for each weapon fired.
  - Gives safety briefing before all live-fire exercises.
- The NCOIC—
  - Gives final briefing to light cavalry crew evaluators.
  - Ensures concurrent training is setup properly.
  - Moves to the range or training site before the firing unit.
  - Sets up additional training areas.
  - Supervises ammunition, targets, and administrative details.

DURING THE EXERCISE

The following actions must be performed:

- The OIC—
  - Controls firing of live-fire exercises.
  - Maintains efficient throughput within units and between units going through the course.
  - Maintains all required communications.
- The NCOIC—
  - Supervises all details.
  - Controls the movement of personnel from firing positions to additional training and other administrative areas.

- Ensures range firing is conducted in accordance with the appropriate gunnery table.
- Ensures zeroing is accomplished correctly.
- Supervises remedial training on site as needed.
- Supervises light cavalry crew evaluators.
- Assists safety personnel, when required, in clearing weapons.
- Assists maintenance personnel, when required, in troubleshooting and correcting malfunctions.
- Assists the commander in determining or verifying alibi conditions.

- The safety officer or safety NCO—
  - Ensures that misfires are handled in accordance with safety regulations.
  - Observes for any safety violation.
  - Clears each vehicle upon completion of exercise.

CLOSING THE RANGE

The following tasks must be performed:

- The OIC—
  - Notifies range control that firing has terminated.
  - Debriefs unit personnel.
  - Ensures the range or training area is cleared in accordance with local regulations and SOPs.
- The NCOIC—
  - Supervises ammunition and target details.
  - Ensures range facilities have been policed and cleaned.
- The ammunition NCOIC—
  - Ensures no munitions are removed from the range by anyone other than authorized personnel.
  - Prepares residue certificates required by the ammunition supply point.
  - Ensures all DA forms are filled out properly and kept up to date.

TIPS FOR TRAINING ON THE RANGE

When conducting training on the range—

- Brief key personnel. Before moving to the training site, brief key personnel in setting up the site and in reacting to unusual circumstances. This will keep downtime to a minimum and prevent boredom.

- Start on time. Have the training site ready and communications setup early so crews can begin firing on time. Plan operations so there will be no interruptions of training for maintenance of the course except the prearranged or normal shutdown time, which will be posted in the range daily bulletin. This means there must be sufficient targets to complete all training before the scheduled break.

- Use range marker lights (live fire). Do not fire at night without a light and a thermal range marker on the range safety markers. If the range marker lights fail, all ranges that use the same impact area must be closed. To prevent this, consider placing two lights on each range safety marker, making sure that a backup light is available. Make sure lights are in good operating condition and batteries are fresh.

- Plan illumination. Register weapons providing indirect illumination before dark. For ease of control and reduction of support requirements (ammunition pads, OIC, safety officers, transportation, communications), locate indirect-fire weapons on the same range with firing vehicles.

- Keep a log. The OIC will maintain an accurate log. A log will help keep the OIC better informed of dry-firing and live-firing times and other important events. As a minimum, the log should contain the following entries:

  - When the unit occupied the range or training site.
  - For live fire, when permission to fire was received from range control.
  - Who gave the permission to fire.
  - When the range was in a cease-fire status.
  - When the range reopened.
  - Compass azimuth to any stray impacts and time of impact.
  - When the unit cleared and departed the range.

- Brief guards. Have a plan to check and change guards frequently. Also, make sure guards are briefed on their duties and their importance, and understand the instructions.

- Be prepared for fires. During dry seasons, there is always a danger that tracer illumination will cause grass and forest fires. Be prepared to control the situation quickly. It may be necessary to reduce the number of tracer rounds in linked ammunition, if fires persist.

- Police the area. Keep the area policed at all times. A clean training site reduces the chance of injury, especially at night. Police continually to avoid spending valuable time cleaning up after firing.

- Brief visitors. Have a plan for briefing visitors and designate a briefing NCO or officer. Brief visitors before escorting them to the primary training site.

- Check safety markers. Make sure range safety markers are present before live firing begins; if light markers are used, check operations before darkness.

- Coordinate for munitions. Coordinate with the support elements responsible for supplying live ammunition or pyrotechnics. This coordination ensures having the correct type of ammunition in the correct amounts at the right time and place. Ensure the ammunition to be fired has been checked against TB 9-1300-385 for restricted or suspended ammunition lot numbers.

- Conduct other training. Stress those areas in which the unit needs additional training. The following are suggested areas for additional training:

  — Target acquisition.

  — Range determination.

  — Movement techniques.

  — Crew tasks.

  — Section tasks.

  — Fire commands.

  — Methods of adjustment.

  — Prepare-to-fire checks.

  — Misfire procedures.

  — Target identification.

  — Maintenance of vehicles and weapons.

- Remove disabled vehicles. Quickly remove disabled vehicles from the course to prevent loss of training time. A manned recovery vehicle must be in position to support the unit.

- Brief bunker personnel (live fire). Brief bunker personnel on safety regulations and requirements. Bunker personnel must be given definite control measures, such as entering and exiting the bunker and bunker area. Bunker personnel must have two means of communication with the tower.

- Brief OPFOR personnel. Brief OPFOR personnel on the role they will play in tactical training. Make sure they know what to do and when to do it. Stress that their actions must be the same for each unit going through the course.

Section II. SCALED RANGES

The preparation and use of scaled ranges require only minor changes from procedures used to conduct live fire. Scaled range firing helps prepare crews and sections for live fire and qualification, and allows units to train themselves in range operation during home-station training. Unit leaders, gunners, and local range control officers may assist OICs in planning, executing, and evaluating scaled ranges.

The rising cost of ammunition, fuel, and spare parts makes it difficult to produce and maintain skilled light cavalry crews and sections. To overcome these training limitations, more gunnery training must be done at the home station using simulators, training devices, and innovative training techniques.

Range Use

The commander chooses the range scale that best suits his training needs and facilities.

Using scaled ranges, units can realistically simulate day and night firing by single vehicles and sections against single and multiple, stationary and moving targets. Targets representing friendly equipment can be placed in the target area to give the crew practice in distinguishing friend from foe. For overseas units, terrain and target arrays can be setup to resemble anticipated threat targets and actual terrain in front of prepared battle positions.

The crew, moving down the course, engages a series of machine gun targets. Although all targets are within battlesight range, precision and battlesight gunnery techniques should be practiced on the half-scale range. The crew also runs the course at night using available illumination (flare, infrared, or white light) or thermal sights.

Types of Ranges

The three types of scaled ranges are small-scale, stationary vehicle; small-scale, moving vehicle; and half-scale, stationary or moving vehicle.

SMALL-SCALE (1/60 OR 1/30), STATIONARY VEHICLE

This range is used for stationary single squad, and section firing exercises. The scale chosen (1/60 or 1/30) depends on the area available. Ideally, these ranges are large sand tables and, as such, offer the best possibility for deployed units to setup target arrays that resemble those expected in actual battle positions. Until sand-table ranges can be constructed, any surface can be used if berms are available for safety.

The size of the range depends on the area available and the caliber of the device used. The required size of the impact area can be reduced by adding berms.

Impact or laser targets, with appropriate mechanisms of the desired scale (targets), are emplaced on the scaled range to present challenging engagement exercises. Targets representing friendly equipment may be placed in the target area to give the crew practice in target identification. See the combat range versus scaled ranges for proper target emplacement distances. Appropriate scaled objects (roads, buildings, vegetation, and terrain features) add realism to the target area.

SMALL-SCALE (1/10), MOVING VEHICLE

A moving vehicle range requires a larger area than the stationary vehicle range. The 1/30- scale range can be used; however, the scale is so small that terrain changes too fast for a moving vehicle to use proper adjustment techniques. For example, in a course run simulating 1,200 meters on a 1/30-scale range, a moving vehicle traverses only 113 feet. A vehicle moving at three miles per hour travels this distance in 27 seconds. The suggested scale is 1/10. The exact configuration of the 1/10 scale range varies depending on local area assets and type of terrain.

This range can be easily constructed on an existing small-arms or machine gun range. Direction of vehicle movement can be parallel to the firing line or through the impact area, depending on the size and shape of the area available.

Simulated machine gun impact targets or laser targets with appropriate target mechanisms are emplaced within distance constraints of the scaled ranges. These are necessary so the desired scaled target range is retained when firing.

From marked firing locations, the vehicle moving along a designated route engages a series of activated machine gun targets. The vehicle keeps moving during engagements; however, their speed is considerably slower than normal because of the short distances between targets. Crew duties for battlesight and precision engagements should be practiced. Night firing and battlefield obscuration can be accomplished as in the stationary scaled course.

HALF-SCALE

Half-scale ranges are used for stationary or moving vehicle exercises. More realistic training can be conducted on half-scale ranges than on smaller scale ranges. Additionally, ranging on the target can be practiced.

The length of the range depends on the area available (for example, for the 7.62-mm coax, the impact area must beat least 4,800 meters).

Note. Impact areas may be waived to a lesser distance with the addition of berms. Approval for this can be granted by local range control.

Targets

The scaled impact target is available in scales of 1/60, 1/30, and 1/10. The target is mounted on a stationary scaled pop-up target mechanism. The target, a two-dimensional silhouette made from plastic, is easily replaced when destroyed. Targets are available in an assortment of threat vehicle silhouettes as well as some friendly equipment silhouettes for target identification practice.

Target Mechanisms

The following types of mechanisms are used with small-scale targets:

SMALL-SCALE MOVING TARGETS AND SCALED MOLDED RUBBER TARGETS

This target mechanism is used on the l/60-scale, l/30-scale, and l/10-scale ranges. It is to be made locally. Targets for use with this mechanism can be obtained locally.

SMALL-SCALE STATIONARY TARGETS

This device is a wire-operated target mechanism for popping up l/60-scale, l/30-scale, and 1/10-scale impact or laser targets. The device is powered by any 24-volt electrical source. When the target is struck by an impact weapon, the target falls. The mechanism comes with wire attached to the control box (or for l/60-scale and l/30-scale targets through a junction box). The wire and the target mechanism are buried in sand or in the ground to protect them from projectile impacts. When not in use, the mechanism should be removed or covered to protect it from the weather. Quick-connect plugs are used for easy removal.

M31A1 TARGET-HOLDING MECHANISM FOR SMALL-SCALE STATIONARY TARGETS

The M3lA1 target-holding mechanism is used for popping up impact targets of l/20-scale. This device is normally operated on 110 volt alternating current (AC).

Section III. TRAINING DEVICES

Because of the high cost of ammunition and the overcrowding of training areas, the use of training devices at home station is becoming increasingly more important. The use of training devices can enhance full-caliber gunnery by training personnel in their weak areas before they advance to the intermediate gunnery tables.

The MILES TOW equipment is the most realistic device available for simulating tactical engagements; it is valuable in maneuver training exercises and ARTEPs. However, MILES TOW is not a precision gunnery trainer and should not be used to train gunner tracking skills.

The MILES permits the vehicle and crew to take part in realistic combat training exercises. Although MILES is basically a tactical maneuver simulation device, it contributes significantly to crew interaction. Actual firing conditions of all vehicle weapons are simulated using laser beams. Blank ammunition and an antitank weapons effect simulator system (ATWESS) firing device add to the system realism (see TC 25-6-l).

The laser target interface device (LTID) is a MILES laser receptor that attaches to a target. It limits the target hit area and requires a more precise gunner sight lay. The interface is connected to the hit sensing connector of the target holding mechanism and will cause the target to fall upon receipt of a MILES target kill code. (See FM 17-12-7 for further information.)

The precision gunnery training system (PGTS) is a group of training devices used to train precision gunnery. The TOW gunnery trainer (TOW GT) is one of this PGTS group. This crew-portable trainer simulates the sights, controls, switches, and indicators of the TOW 2 guided missile system. The battlefield scenes presented include both threat and friendly vehicle targets. The gunner selects, tracks, and engages targets just as he would on the battlefield; he hears the commands from the instructor station and the battlefield sounds of small arms and guns firing.

The TOW field tactical trainer (TOW FTT) is another member of the PGTS group. This device is used to teach precision gunnery skills to TOW 2 gunners in the field; it may be used on designated ranges, general outdoor areas, or initial gunner familiarization in an outdoor environment and for gunner skill enhancement and progression. The TOW FTT trains gunners to adopt a correct firing position, to assess target engageability, and to engage and track the target. Missile launch, flight, and impact effects are realistically simulated by the TOW FTT.

The M70-series training set may be used to train TOW gunnery; this device measures the precision of a gunner's tracking overtimes approximating missile flight times. Although it does not measure tracking ability or teach target engagement skills, it can determine if a gunner possesses the necessary foundation for successful gunnery. The M70-series training set can duplicate targets out to 3,000 meters. TOW launch characteristics are simulated by having the gunner fire and track with the M80 blast simulator and missile simulation round (MSR). This prepares the gunner for an actual missile launch by simulating the time delay after trigger depression (1.5 seconds), the noise (160 decibels), and the backblast (75 meters).

Note. For further information on the TOW GT, TOW FTT, and M70-series training set, see Chapter 9.

CHAPTER 9

TOW Training Program

The TOW training program is a comprehensive program beginning with individual training (gunner's skills test [GST] and Tables I through IV), progressing through squad training (Tables V through VIII) and culminating in section- level testing and verification (Tables IX and X). All mandatory TOW training and testing are included in this program. Additional TOW training, such as situational training exercises (STX) and company exercise evaluations (CO EXEVAL), will be performed with the frequency prescribed by the Standards in Training Commission (STRAC).

Training Assessment and Planning

The heart of an effective training program is the mission-essential task list (METL) and the soldier, leader, and collective tasks that support the METL. Battle focus drives the METL development process; the METL is based on the wartime mission; the unit must train as it plans to fight. The METL is developed according to doctrine established in FM 25-100. FM 25-101, Chapter 2 illustrates this development process in clear and practical terms. When developing the unit training program, refer to FM 25-101; it shows how to apply the doctrine established in FM 25-100 and assists leaders in the development and execution of training programs.

Each unit must meet the standards outlined in DA Pam 350-38 to be certified in the training status Cl (fully trained). Soldier training publications (STP) and Army Training and Evaluation Program (ARTEP) battle drills for TOW provide tasks, conditions, and standards for combat-critical skills.

All aspects of the training program must be coordinated to ensure the unit training program is effective. Differences between resources required and resources available affect both the time required to conduct and sustain training and the unit's ability to meet the required standards. Required resources and maintenance should be planned and requested well in advance. If left to chance, resources will be wasted and training opportunities lost.

Note. A good program must have provisions for direct-support units to conduct routine inspection of TOW weapons.

COMMANDER'S RESPONSIBILITY

The commander must conduct an accurate assessment of TOW training in his unit to determine the weak spots and the additional training necessary to correct them; then, he must adjust the training program to meet the changing needs of the unit. Training should be concentrated in areas where it is most needed; time should not be wasted by training skills the unit and soldiers have already mastered. The commander should start early and be thorough, flexible, and creative.

TRAINING EVENTS

The TOW training program consists of the GST and 10 gunnery tables. Table 9-1 shows the frequency of training events for the different levels of training.

Table 9-1. Frequency of Required TOW Training Events.

EVENT/TABLE	TRC A gunner	TRC C asst gunner	TRC D USAR/ARNG
GST	4	2	1
TABLE I	4	2	1
TABLE II	4	2	1
TABLE III	4	2	1
TABLE IV	4	2	1
TABLE V	4	1	1
TABLE VI	4	1	0
TABLE VII	2	1	0
TABLE VIII	2	1	0
TABLE IX	2	1	0
TABLE X	2	1	0

Notes. Tables I and II should be conducted with the TOW GT, if available. If the TOW GT is not available, the M70-series training set may be used.

Tables III and IV must be conducted using the TOW GT (if a unit does not have the TOW GT, it cannot conduct Tables III and IV).

Tables V through X should be conducted with the TOW FIT. If the TOW FTT is not available, Tables V through X maybe conducted using MILES.

TRAINING GUIDELINES

Training should be conducted under realistic conditions. To develop combat skills, training must be conducted in a tactical environment with emphasis on the type of threat the crew can expect to face in combat.

When possible, tactical training should be conducted with the type of units to be supported in combat (cavalry, mechanized infantry, and armor). TOW units must be able to interface with the units they support.

Multi-echelon training should be conducted to save time and resources. For example, while squads are training in crew tasks, leaders should train to execute their tactical command and control responsibilities.

When a crewman becomes skilled in his crew position, he should be cross-trained in the other crew positions to ensure that the loss of one crew member does not make the squad combat-ineffective. Sections and squads will not always be at full strength. The mission in combat and in training can be accomplished if under-strength units are organized with the following rules in mind:

- Key leader positions should always be filled. For example, the gunner may have to fill the position of the squad leader.
- The primary weapon system should always be manned. If the loader becomes a casualty, the squad leader may have to load the TOW and control the squad at the same time. If the gunner becomes a casualty, the squad leader must operate and fire the TOW.

Note. As individual TOW crewmen, squads, and sections become qualified, the commander should maintain that status by sustainment training and evaluation, and by crew stabilization. Personnel changes are inevitable; however, before TOW squads lose crew integrity and combat readiness, personnel changes should be examined in detail and alternate solutions sought when possible.

Collective Training

Collective tasks are those tasks performed by two or more soldiers working as a team. The critical squad and section collective tasks are called battle drills. Battle drills are mostly independent of METT-T and require minimal leader actions to execute. They are standardized throughout the army. Battle drills for antiarmor sections are in ARTEP 7-91-DRILL.

Common crew tasks are also collective tasks performed by a TOW crew in the same manner as battle drills. Common crew tasks are crucial to applying tactics to enhance survival and to accomplish the TOW crew's mission of providing antiarmor direct fire support to destroy the enemy. These tasks require the basic technical skills used to accomplish the crew's wartime mission. Training these tasks shows the crewman "how to" and allows each soldier to perform his tasks.

Collective training of common crew tasks and battle drills trains all actions the crew must perform. The squad leader, gunner, driver, and loader combine their individual technical skills to perform as a crew on their vehicle. ARTEP training exercises are used to practice, evaluate, and sustain collective tasks and mission proficiency. The y have specific goals and are modified based on METL. Exercises are structured according to the availability of resources, time, and training area.

TOW Training Phases

TOW training involves individual and collective training divided into three phases: individual training, squad training, and section training. Each unit must complete each phase.

Phase I—Individual Training covers all tasks that are performed by a single TOW crewman. These tasks include Skill Levels 1 and 2 soldier's manual tasks and individual gunnery. These individual skills are the building blocks that form the foundation of TOW training. Individual training includes—

- Refresher training on STP tasks, as necessary to prepare for the GST.
- Sustainment training with the TOW GT or the M70-series training set, as necessary to prepare for TOW Gunnery Tables I through IV.

- Gunners' Skill Test.
- TOW Gunnery Table I, *Individual Gunnery Practice.*
- TOW Gunnery Table II, *Individual Gunnery Qualification.*
- TOW Gunnery Table III, *Advanced Gunnery Practice.*
- TOW Gunnery Table IV, *Advanced Gunnery Qualification.*

Phase 2-Squad Training covers collective tasks that are performed by a squad.

- Refresher training on the installation and operation of MILES or TOW FTT equipment, as necessary to prepare for TOW Gunnery Tables V and VI.
- TOW Gunnery Table V, *Baseline Gunnery Practice.*
- TOW Gunnery Table VI, *Baseline Gunnery Qualification.*
- Squad-level sustainment training, as necessary to prepare for TOW Gunnery Table VII.
- TOW Gunnery Table VII, *Squad Gunnery Practice.*
- TOW Gunnery Table VIII, *Squad Gunnery Qualification.*

Phase 3-Section Training covers collective tasks that are performed by a section.

- Section-level sustainment training, as necessary to prepare for TOW Gunnery Table IX.
- TOW Gunnery Table IX, *Section Gunnery Practice.*
- TOW Gunnery Table X, *Section Gunnery Qualification.*

TOW Gunnery Trainer

The TOW GT is one of the PGTS group. This crew-portable trainer simulates the sights, controls, switches, and indicators of the TOW 2 guided missile system. The battlefield scenes presented include both threat and friendly vehicle targets. The gunner selects, tracks, and engages targets just as he would on the battlefield; he hears the commands from the instructor station and the battlefield sounds of small arms and guns firing.

The TOW GT maybe used for TOW gunner training, practice, and qualification/verification. The following skills may be trained on the TOW GT:

- Determining the correct firing position.
- Identification of a target.
- Determining if a target can be engaged.
- Engaging targets (including tracking and firing).

The TOW GT attaches to a TOW 2 weapon system (will not operate on basic TOW) and replaces components of the TOW 2. (A properly operating TOW 2 weapon system is required to use the TOW GT.) Only the narrow field of view is seen through the night sight. This system—

- May be used either tripod-mounted or vehicle-mounted (HMMWV) (stationary only, should never be mounted on a moving HMMWV).
- Requires electrical power to operate; setup and operation of the TOW GT is limited to the length (96 inches) of the power cables. Extension cords must be grounded.
- Is an indoor system and is not designed to operate outside; it must be protected from extremes of temperature, humidity, and blowing dust.
- Is easy to operate and install (should be assembled and operated according to the instructions in TM 9-6920-452-10).

Note. Normally, only two people, the gunner and the trainer, will be involved in training with the TOW GT. The trainer is usually either the squad or section leader. Other members of the squad should be occupied with concurrent training. Other gunners should not be allowed to watch as the event is conducted.

When training on the TOW GT, the trainer must construct a planned group for each table (different missions should be used for each table). (See TM 9-6920-452-10 for specific instructions on constructing a planned group.)

The trainer should have the TOW GT inspected and warmed up, and the planned group constructed before the gunner is brought into the trainer. During training, battle sounds should be ON, target size should be set at 100 percent, and obscuration should be set to last for one second. When everything is ready, the trainer should bring the gunner in and brief him. The briefing should include the following items:

- Safety considerations.
- Breath control—remind student of proper procedures.
- Obscuration-tell student obscuration setting used.
- Sight—tell student sight he will use.
- Special conditions—tell student special conditions (multiple targets and so forth) that apply.

The mission score is displayed at the end of each mission. A mission maybe replayed or stored for future use.

Units that have the TOW GT are required to conduct monthly sustainment training. This training should not be confused with the quarterly tables. The trainer may choose the missions for monthly sustainment training from any of the videodiscs; however, the missions used on the quarterly tables should not be used for sustainment training.

TOW Field Tactical Trainer

The TOW FTT is another member of the PGTS group. This device is used to teach precision gunnery skills to TOW 2 gunners in the field; it may be used on designated ranges, general outdoor areas, or other representative tactical environments. The TOW FTT may be used for initial gunner familiarization in an outdoor environment and for gunner skill enhancement and progression. The TOW FTT trains gunners to adopt a correct firing position, to assess target engageability, and to engage and track the target. Missile launch, flight, and impact effects are realistically simulated by the TOW FTT. (See TM 9-6920-453-10 for further information.)

The TOW FTT attaches to a TOW 2 weapon system and replaces some of the TOW 2 components. A properly operating TOW 2 weapon system is required to use the TOW FIT. The TOW 2 may be tripod-mounted or mounted on the pedestal in an M151 truck or an M966 HMMWV.

The TOW FTT uses a retrore flector to sense targets. The retrore flector is designed for mounting on a variety of target vehicles which can be maneuvered, as required, during a training mission; it acts like a mirror and returns a portion of the laser beam generated by the laser transceiver in the trainer missile tube. This laser beam enables precise measurement of target range and location relative to the gunner.

The TOW FTT transmits MILES TOW code and can, therefore, kill targets equipped with a MILES harness. (The MILES target must be equipped with the proper retrore flector. Similarly, panel targets must also be fitted with a proper retrore flector for use with the TOW FIT.) The TOW FTT replicates the flight and performance characteristics of the TOW better than MILES; therefore, it should be used for precision gunnery training whenever possible.

The TOW FTT operator loads the M80 blast simulator, sets the duration of obscuration that simulates the smoke produced at missile launch, and selects the relative size of the target, as seen by the TOW FIT. After the missile is launched, the operator monitors the gunner's performance during missile flight. At the end of each mission, the operator is provided with a readout of mission results. During TOW FTT operations, the operator is notified of any current or impending failures of TOW FTT equipment.

The TOW FTT—

- Can operate in all weather conditions, except for limitations described in TM 9-6920-453-10.
- Can operate during day and night.
- Can operate in temperatures between -4 to +120 degrees Fahrenheit.
- Can operate at altitudes up to 10,000 feet (3,000 meters).
- Has a built-in self-test capability.
- Can operate without the remote control unit. (In this mode, obscuration time and target size cannot be changed and mission results are not available to the operator.)
- Can operate in dry fire mode without an M80 blast simulator.
- Has a built-in automatic power-down feature.

M70-Series Training Set

The M70-series training set measures the precision of a gunner's tracking over times approximating missile flight times. Although it does not measure tracking ability or teach target engagement skills, it can determine if a gunner possesses the necessary foundation for successful gunnery.

The M70-series training set can duplicate targets out to 3,000 meters. TOW launch characteristics are simulated by having the gunner fire and track with the M80 blast simulator and missile simulation round (MSR). This prepares the gunner for an actual missile launch by simulating the time delay after trigger depression (1.5 seconds), the noise (160 decibels), and the backblast (75 meters).

The trainer should ensure a system checkout has been conducted before setting up the carrier and training equipment. The carrier and training equipment must be working properly. A gunner engaging a stationary target in LOW RATE QUALIFY should consistently score about 90 percent. Failure to do so could indicate either poor tracking performance or a fault in the equipment.

Note. A qualified gunner should engage the stationary target board to verify that the system is working properly.

Battery power should be checked as part of troubleshooting or if scores are excessively high. Weak batteries invalidate the gunner's score. The battery in the missile guidance set (MGS) discharges faster than the battery in the instructor console. If the MGS battery fails self-test position 1 (TOW) or battery fail (TOW 2) and only a few tracking runs remain to be completed, the batteries in the instructor console and the MGS maybe rotated. (After rotation, batteries must be checked before continuing the tracking runs.)

Qualification and practice are fired on a standard tracking range. Requirements for this range include a target vehicle tracking road, a firing line, and a backblast area.

Note. Because the TOW GT is replacing the M70 in the force, no new M70 tracking ranges should be constructed.

The target vehicle tracking road must be as smooth as possible. A rough road causes the target vehicle to vibrate, making it difficult for a gunner to keep the sight cross hairs on the target board. The tracking road should be long enough for the target vehicle to reach the needed tracking speed, maintain that speed for the necessary tracking time, and stop safely.

The firing line should be level and allow for movement of the TOW/TOW 2 to and from the firing line. It should be long enough to allow about 5 meters betweens systems or carriers. The distance from the firing line to the tracking road should be at least 450 meters for TOW and 550 meters for TOW 2, but not more than 1,000 meters. The training set operates at greater ranges, but the vehicle speeds needed to simulate the tracking rates in the firing tables are unsafe at greater ranges or too slow for a driver to maintain a steady speed at closer ranges.

Table 9-2 is used to determine target vehicle speeds for qualification and practice firing. If the training situation requires tracking at ranges greater than 500 meters, the target vehicle must maintain a steady speed or the task becomes too difficult for the gunner. The driver of the target vehicle should be briefed thoroughly. He must maintain a constant speed throughout each tracking run. A variation of up to 10 percent from the speeds listed is acceptable; however, slowing down and speeding up affects a gunner's ability to maintain a steady track.

Table 9-2. Target Vehicle Speeds.

TARGET RANGE	TARGET SPEED	
(meters)	MPH	KPH
450	5	8
500	6	10
600	7	11
700	8	13
800	9	14
900	10	16
1,000	11	18

The area between the firing line and the tracking road must be free of trees, brush, or other objects that might break the infrared signal transmitted by the target set to the tracker. Even a short loss of signal causes a big drop in the gunner's score.

A backblast area of 75 meters is recommended so gunners become accustomed to the backblast area of the TOW. The gunner does not engage the target vehicle at traversing angles greater than 45 degrees left or right of the carrier (vehicle-mounted). At traversing angles greater than 45 degrees, the target lamp source becomes weaker and the backblast becomes a danger to other systems.

If the tracking road and firing line are level, the system (tripod mounted) or carrier (vehicle mounted) should be canted about 10 degrees to force the gunner to track in the vertical as well as the horizontal plane (sandbags or wooden blocks maybe used to cant the vehicle).

During qualification and practice, gunners are required to track for 16 seconds and traverse at a slow rate. The instructor console RANGE switch should be placed in the LOW RATE position to accomplish this. (After a gunner becomes proficient at the slow rate, he may practice at high rate.)

To allow the soldier to practice identifying and correcting faults on the M70, the trainer inserts a variety of faults into the system and discusses faults that cannot be inserted into the system (for example, discharged or weak battery assembly, power supply/modulator LAMP MOD indicator does not stay on, OPERATING RANGE meter with no IN-BAND). Table 9-3 may be used to help determine gunner faults and corrective action. Only through detection of faults and their correction can a gunner master the tracking techniques needed for qualification.

Table 9-3. Gunner Faults and Corrective Actions.

LOS INDICATOR	FAULT	CORRECTIVE ACTION
Increasing Azimuth Error Last Half of Tracking Exercise.	Wrong point of aim on target board. Trying to catch up to, or wait for, target board.	Assume correct body position. Place cross hairs on center of target. Execute smooth transition back to aiming point.
Sudden Elevation or Azimuth Error During Otherwise Good Track.	Loss of concentration, flinching caused by distraction or eye fatigue. If true with all firers, track road may be rough, target vehicle speed not steady.	Rotate firers. Reduce air in target vehicle tires; replace driver if he cannot maintain steady speed.
Constantly Off Target.	Wrong point of aim. Boresight out of adjustment. Collimation out of adjustment. V-ways not aligned.	Verify point of aim. Verify boresight. Verify collimation. Remove and reinstall optical sight; check V-way alignment.
Launch Excursion.	Flinching at launch.	Execute smooth track to keep cross hairs on aiming point during launch.

During gunner qualification and verification, all soldiers may not be able to fire at once. Therefore, trainers should try to conduct round-robin type training.

Example.

Station 1 — operation of M70-series training set.

Station 2 — dry firing (tripod and vehicle mounted).

Station 3 — refresher training on individual tasks.

The trainer—

- Monitors the LOS indicator and observes the gunner during each engagement.
- Critiques the gunner after each engagement, if a fault is detected in the gunner's firing position or technique of fire.

- Operates the instructor console, ensuring the RANGE switch is turned to the correct setting (HIGH RATE/LOW RATE) for the engagement being fired.

Note. Do not use the RAPID FIRE switch on the M70 instructor console at any time. When the RAPID FIRE switch is in the ON position, the MGS may overheat causing BATTERY power to drain quickly.

- Resets the SCORING switch after each engagement and records the score.
- Announces "READY," when the READY FLAG appears in the LOS indicator.
- Checks the battery power in the instructor console by rotating the MODE switch to battery and observing the score meter.
- Ensures the cables from the training set do not get snagged anywhere on the system (tripod mounted) or the vehicle (vehicle mounted).

The loader keeps the backblast area under observation and announces "CLEAR," to the gunner and trainer. When using M80 blast simulators, the loader loads and arms the system.

DA Form 5107-R

DA Form 5107-R is used to record both gunner qualification and practice firing. (See Figure 9-1 for a sample completed DA Form 5107-R.)

On DA Form 5107-R—

- Complete items 1 through 10 for each gunner.
- Enter the date for the event.
- When using the TOW GT, use the launch excursion column to mark hits and misses. When using the M70-series training set, mark the yes column for a hit or the no column for a miss.
- Enter a check mark for launch excursions (yes or no for each run).
- Enter gunner's score for each run.
- Total the scores for each event.

Figure 9-1. DA Form 5107-R.

TOW TRACKING PERFORMANCE SCORECARD
For use of this form see FM 23-34; the proponent agency is TRADOC

1. NAME (LAST, FIRST, MIDDLE INITIAL): THIELE, STEVE T.
2. SSN: 123-45-6789
3. RANK: SP/4
4. UNIT: E. Co. 1/58 INF
5. WEATHER: ☒ CLEAR ☐ FOG ☐ RAIN ☐ SNOW ☐ HAIL ☐ OTHER
6. TEMPERATURE: 82°
7. WIND SPEED: 5 KNOTS
8. WIND DIRECTION FROM FIRING LINE: ☐ RIGHT ☒ LEFT ☐ FRONT ☐ REAR ☐ VARIABLE
9. OBSERVATION EQUIPMENT: ☐ OPTICAL SIGHT ☒ NIGHT SIGHT
10. RANGE NO./NAME: 5/RED CLOUD

11. EVENTS

RUN NO.	TARGET VEHICLE	EVENT 1 DATE 4 JAN			EVENT 2 DATE 4 JAN			EVENT 3 DATE			EVENT 4 DATE			EVENT 5 DATE			EVENT 6 DATE			EVENT 7 DATE			EVENT 8 DATE			EVENT 9 DATE			EVENT 10 DATE		
		LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER	LAUNCH EXC YES	NO	M70 METER
1	LEFT TO RIGHT		✓	65		✓	86			63																					
2	RIGHT TO LEFT		✓	72	✓		0			68																					
3	LEFT TO RIGHT		✓	67		✓	75			72																					
4	RIGHT TO LEFT		✓	81		✓	91			78																					
5	LEFT TO RIGHT		✓	74		✓	77			64																					
6	RIGHT TO LEFT		✓	62		✓	81			59																					
7	LEFT TO RIGHT		✓	54		✓	65			61																					
8	RIGHT TO LEFT		✓	56		✓	72			68																					
9	LEFT TO RIGHT		✓	59		✓	83			65																					
10	RIGHT TO LEFT		✓	70		✓	80			72																					
	TOTALS			660			776			670																					

12. INSTRUCTOR NOTES
A. Verify Boresight.
B. Check Battery Power.
C. Insure Infrared Source Is Working Properly.
D. All Launch Excursions Are Scored As Zero.
E. Use Total Meter Score To Compute Performance.
F. Fire Until Performance Standards Have Been Achieved.
G. Cant Tripod Leg 10 Degrees Right Or Left.

13. DATA REQUIRED BY PRIVACY ACT OF 1974
AUTHORITY: Executive order 9397 PRINCIPAL PURPOSE: Record of individual's score on TOW tracking performance events ROUTINE USES: Evaluation of individual's TOW tracking performance. SSN is used for positive identification purposes only MANDATORY OR VOLUNTARY DISCLOSURE: Voluntary. However, individual not providing information cannot be rated or scored.

14. GROUND-MOUNTED CLASSIFICATION: ☐ 750-1000 EXPERT ☐ 649-749 1ST CLASS ☐ 550-649 2D CLASS ☐ 0-549 UNQUALIFIED
15. SCORER: SSG RUSSO, MARTIN
16. VEHICLE-MOUNTED CLASSIFICATION: ☐ 800-1000 EXPERT ☐ 700-799 1ST CLASS ☒ 600-699 2D CLASS ☐ 0-599 UNQUALIFIED
17. OFFICER'S SIGNATURE: David M. Brown, CPT

DA FORM 5107-R, SEP 87 EDITION OF JAN 85 IS OBSOLETE

Gunner's Skill Test

The Gunners' Skill Test comprises two parts:

- Part 1 consists of Skill Level 1 tasks for the TOW weapon system (STP 17-19D1-SM, STP 17-19D23-SM, and STP 21-1-SMCT) and tasks derived from FM 23-34. All 19D soldiers must receive a GO on all tasks on this portion of the test.

- Part 2 consists of vehicle-specific (HMMWV) tasks taken from STP 17-19D23-SM. All 19D soldiers must receive a GO on all tasks that apply to the vehicle with which his unit is equipped. Some of the tasks are combined individual/crew tasks. Since every member of the crew must be cross-trained, the combined individual/crew tasks will be performed in rotation and every member of the crew will be tested on each part.

Part 1 tasks are derived from the following tasks:

- Assemble the M220-Series Launcher (FM 23-34, Chapter 2, no task number).
- Maintain an M220-Series Launcher System (STP 17-19D1-SM, 071-056-0004).
- Load an M220-Series Launcher System (STP 17-19D1-SM, 071-056-0007).
- Unload an M220-Series Launcher System (STP 17-19D1-SM, 071-056-0008).
- Engage Targets with an M220-Series Launcher System (STP 17-19D1-SM, 071-056-0009).
- Perform Immediate Action for an M220-Series Launcher System Malfunction (STP 17-19D1-SM, 071-056-0010).
- Conduct a System Checkout on an M220A1 Launcher System (STP 21-1-SMCT, 071-056-0005, for units with M220A1).

  or

- Conduct a System Checkout on an M220A2 Launcher System (STP 17-19D1-SM, 071-056-0013, for units with M220A2).
- Determine M220-Series Launcher System Firing Limitations (STP 17-19D23-SM, 071-056-0030).
- Recognize Friendly and Threat Armored Vehicles and Aircraft (STP 21-1-SMCT, 878-920-1002).
- Conduct a Pre-Operation Inspection of an Encased Missile (FM 23-34, Chapter 1, no task number).
- Determine if a Target Can Be Engaged by a TOW (FM 23-34, Chapter 1, no task number).
- Prepare a TOW Antiarmor Range Card (FM 23-34, Chapter 1, no task number).

Part 2 tasks for M966 HMMWV-equipped units include—

- Conduct Dismounting and Remounting of an M220A1 Launcher System on an M966 Vehicle (STP 17-19D23-SM, 071-056-0032, for units with M220A1).

  or

- Conduct Dismounting and Remounting of an M220A2 Launcher System on an M966 Vehicle (STP 17-19D23-SM, 071-056-0034, for units with M220A2).
- Load, Arm, and Unload an Encased Missile on an M966 (FM 23-34, Chapter 3, no task number).
- Place the M966 HMMWV, in the Ready-to-Fire Configuration (FM 23-34, Chapter 3, no task number).

Note. The tasks, conditions, and standards for the GST are in Appendix A.

Field Tracking

Field tracking (tracking in a field environment) provides practice and experience in tracking evasive targets and should be performed in conjunction with field training exercises (FTX). This is not an element in the 10 required TOW Gunnery Tables, but is very useful in preparing for them, especially Tables VII through X. Other tactical employment tasks, such as occupying a firing position or completing a range card, should be performed at the same time. Careful planning by unit commanders will result in effective training that makes the best use of time, equipment, and personnel.

The tracking range should include an area more than 3,000 meters deep and at least 500 meters wide with hills and valleys, dead space, and covered terrain. Battlefield target conditions should be simulated as follows:

- Targets should be a variety of tanks, APCs, and other tactical vehicles. Many training installations now have various types of threat vehicles. These vehicles should be used when possible.
- Target vehicles should behave as much as possible like enemy vehicles on the battlefield. They should change directions constantly and quickly (including backing up for short distances) and should vary their speed. They should move within the gunner's sight picture from left to right, top to bottom, and bottom to top. The vehicles should move at angles to and from the weapon position as well as directly toward and away from the weapon.
- Gunners should see tanks and APCs in full and partial frontal, flank, and rear exposures.

Gunners must be able to engage the targets at all ranges with both the daysight tracker and the thermal sight. To do so, they must be able to determine if a target is in range. Targets should move in and out of range so gunners gain experience in range determination.

Armored vehicles should try to reduce their exposure and evade ATGM fire by moving quickly from one covered area to another. The squad leader must have the gunner acquire and fire at the target while it is exposed. During field tracking, target vehicle exposure time is reduced to the

minimum by having targets use covered areas during halts. This gives the gunner experience in tracking targets that disappear, then reappear.

Field tracking should be performed under conditions that normally occur on the battlefield. These conditions include limited visibility: darkness, smoke, or fog; the discomfort of MOPP gear; and the noise and distraction caused by indirect and small-arms fire around the firing positions.

Battlefield tracking conditions should be simulated. TOW crew members should train to engage targets during reduced visibility using both the daysight tracker and the thermal sight. Training should be conducted during daylight using the AN/TAS-4A (the AN/TAS-4A is a thermal sight, not just a nightsight). It offers many advantages in searching for and tracking targets in all kinds of weather and at any time of day. The AN/TAS-4A should be used extensively in conjunction with the daysight to maximize the abilities of the system.

Enemy capabilities include the use of nuclear, biological, and chemical munitions. These munitions may not affect the weapon, but a gunner's ability to track will be degraded if he has never tracked while wearing a protective mask and protective clothing. Training is more realistic when the entire crew wears protective masks and clothing during part of the field tracking exercises.

The enemy will try to suppress TOW fires with artillery and mortar fires. A gunner's ability to keep the sight cross hairs on a target maybe affected under these conditions, especially if he has not been properly trained. Distracters should be used in training to accustom gunners to such conditions and to minimize flinching. Grenade and artillery simulators are effective distracters. Small-arms fire can also be expected, but gunners should not be seriously distracted by its noise. Therefore, the simulation of small-arms fire is not required.

Any means available should be used to allow gunners to practice tracking targets that vary target speeds and directions of movement. If facilities and equipment are not available to conduct a field tracking exercise, gunners should be allowed to track evasive targets, such as military or civilian vehicles traveling on a nearby highway. This should be done often and maybe accomplished in any location that has vehicular traffic.

TOW crews must be proficient in combat vehicle identification to gain the most benefit from field tracking. Combat vehicle identification skills have been standardized by GTAs 17-2-13,30-3-14,30-3-20 and 44-2-10.

CHAPTER 10

Light Cavalry Gunnery Tables

The light cavalry gunnery tables are used to develop and test the proficiency of individual, crew, and section gunnery techniques at the basic, intermediate, and advanced levels. The series of engagements on each table replicate typical battlefield tasks under realistic conditions, against likely target arrays, but within the safety and resource constraints of live-fire gunnery ranges. This chapter discusses the light cavalry gunnery tables for the M2 HB caliber .50 machine gun, the MK 19 40-mm grenade machine gun, and the TOW; this chapter also discusses the qualification requirements for crews and sections, rating procedures, standards, and allowable variations for these tables. Section I is an introduction to the basics of the different tables; it discusses the purposes of the tables, the gunnery phases and variations, the timing procedures, and the standards required for qualification. Section II defines the basic and intermediate tables; Section III defines the advanced tables.

Basic tables include—

Table I	Ten-Meter Firing (M2 HB Caliber .50). Manipulation Exercise (MK 19). Individual Gunnery Practice (TOW).
Table II	Transition Firing (M2 HB Caliber .50). Tripod Exercise (NIK 19). Individual Gunnery Qualification (TOW).
Table III	Night Firing (M2 HB Caliber .50). Adjustment of Fire (Stationary) (MK 19). Advanced Gunnery Practice (TOW).
Table IV	Basic Qualification (M2 HB Caliber .50). Basic Crew Qualification (MK 19). Advanced Gunnery Qualification (TOW).

Intermediate tables include—

Table V	Transition to Vehicle (M2 HB Caliber .50). Adjustment of Fire (Moving) (MK 19). Baseline Gunnery Practice (TOW).
Table VI	Not Used (M2 HB Caliber .50 and MK 19) Baseline Gunnery Qualification (TOW).
Table VII	Practice for Qualification (M2 HB Caliber .50 and MK 19). Squad Gunnery Practice (TOW).
Table VIII	Intermediate Crew Qualification (M2 HB Caliber .50 and MK 19). Squad Gunnery Qualification (TOW).

Advanced tables include—

Table IX	Section Training Course (M2 HB Caliber .50 and TOW).
Table X	Section Qualification Course (M2 HB Caliber .50 and TOW).

Note. Because of the maneuvering constraints required by safety standards when firing MK 19 practice ammunition, these section tables cannot be fired on all ranges using the MK 19 weapon system.

Section I. INTRODUCTION

The light cavalry gunnery tables standardize the gunnery program for light cavalry units. These tables are consistent with the gunnery tables for heavier scout weapon systems, thus maintaining a consistent training standard between the light and heavy weapon systems.

Purpose

The following are the specific purposes for each table:

- Table I—This table trains the gunner in the basic skills such as zeroing the weapon and manipulating the weapon system. The M2 HB table uses paster targets. The MK 19 table uses target practice (TP) ammunition, infantry remoted target system (IRETS), and BRDM targets.
- Table II-This table uses timed events (fired from a tripod) to train the gunner to apply all the fundamentals of gunnery, including zeroing, immediate action (if necessary), and burst control against stationary targets. Some tasks are fired under NBC conditions.
- Table III-This table uses timed events to train the gunner to engage stationary targets under NBC conditions. For the MK 19, this table is fired vehicle mounted.
- Table IV-This is the basic qualification table. The gunner acquires and engages stationary and moving targets from a stationary weapon system for record fire.
- Table V—This table trains the gunner to acquire and engage stationary and moving targets, both day and night. It also transitions the M2 HB caliber .50 gunner from tripod firing to vehicle firing.
- Table VI—All HMMWV engagements, except TOW engagements, are fired from a short halt; therefore for consistency, Table VI is used only for the TOW weapon system.
- Table VII-This table trains the gunner to acquire and engage stationary and moving targets, both day and night, and prepares the gunner for Table VIII qualification.
- Table VIII-This is the intermediate qualification table. This table requires the crew to use all the skills trained on the previous tables.
- Table IX-This table transitions the training from individual crews and gunners to sections. Crews are trained to acquire and engage targets with another crew (as a section). If live ammunition is available; it should be used; if live ammunition is not available, use MILES.
- Table X—This table is the qualification exercise for sections; it is the same as Table IX except that it must be fired using live ammunition.

Gunnery Levels

The gunnery tables are used to train crew members progressively in three phases: basic, intermediate, and advanced gunnery.

- Basic gunnery techniques and engagements are trained on Tables I through III and tested on Table IV.
- Intermediate engagements are trained on Tables V and VII and tested on Table VIII.
- Advanced gunnery engagements are trained on Table IX and tested on Table X.

Tables IV, VIII, and X are qualification tables. Tables IV and VIII should be fired successfully (qualified) before advancing to the next higher level of gunnery. (The commander may advance crews at his discretion.) All other tables are recommended for training in sequence.

Gunnery Phases and Variations

There are two phases and two variations of the tables that may be used in a well-rounded light cavalry gunnery program.

PHASES

Day firing (A tables) trains and tests the crew and section in rapid engagement and destruction of targets during daylight.

Night firing (B tables) trains and tests the crew and section in rapid engagement and destruction of targets at night and during other reduced visibility conditions.

Note. Day firing should precede night firing when possible.

VARIATIONS

Device-based (day/night) firing trains gunnery procedures and crew duties without expending live ammunition.

Dry firing is used to develop teamwork before live fire. It is also used to sustain skills when live fire is restricted. All tables except the qualification tables (Tables IV, VIII, and X) may be fired dry.

Notes. If the scenario calls for a moving target and none are available, full-scale stationary targets of the same type may be substituted; however, moving targets are preferred.

At the commander's discretion, Tables III and IV may be fired from vehicle-mounted weapons.

Crew Evaluation

When evaluating Tables II through VII for the M2 HB and MK 19, the evaluator rates crew duties as satisfactory (SAT) or unsatisfactory (UNSAT). The evaluator will circle SAT or UNSAT in the crew duties column on the score sheet. If a firing crew commits more than one crew error, the crew duties for that task are rated UNSAT. This rating will be discussed with the crew during the AAR; however, it will not affect the GO/NO-GO evaluation. Crew errors include the following:

- Firing before receiving the command to fire.
- Incorrect engagement techniques (for example, engaging a *least dangerous* target before a ***most dangerous*** target).
- Incorrect driving techniques (for example, driver does not maintain course speed).
- Failure to fire from a short halt (MK 19 only).
- Crew does not adhere to the conditions of the firing task (for example, failure to mask during an NBC engagement).

Note. For further information on crew duties and their impact on Table VIII ratings, see page 10-30 (M2 HB) or page 10-51 (MK 19).
For information on crew errors for the TOW tables, see page 10-59.

Credit is not given if the crew uses a weapon that is not capable of destroying the target. However, if the wrong weapon is fired, hits the target, and is capable of destroying the target, credit for killing the target will be awarded.

Ammunition saved may be used on later engagements but may not be carried forward to another table.

Evaluation Procedures

An AAR is conducted after each table (day and night) for each crew. After-action feedback includes a discussion of actions executed during the conduct of the table. An evaluator critiques the entire crew.

The crew evaluator must record exposure times for each task fired (even when computers are used).

TIME

For Tables I through IV, time starts when the evaluator announces “COMMENCE FIRING” and stops when all targets have been engaged or the evaluator announces “CEASE FIRE.”

Performance (time) standards for each engagement on Tables V through X are based on an assessment of the simulated threat capability to hit the HMMWV. Exposure time is measured as the total time the firing vehicle is exposed to the threat. Time is determined as outlined; no variations are permitted.

Offensive Engagements

In an offensive engagement (firing vehicle is exposed in the open, on the move, or at a short halt), time starts when the target is fully exposed or the gunner fires the first round.

When the target array consists of more than one target, targets must be presented simultaneously; time begins when all targets for the task are exposed or the gunner fires the first round.

Timing (total engagement time) stops for the engagement when one of the following occurs:

- All targets are killed.
- Total target exposure time expires.

Defensive Engagements

Engagement time starts when the target (all targets) is fully exposed and the firing vehicle is stopped with the weapon system unmasked, or the gunner fires the first round.

Engagement time continues through each engagement, except when the firing vehicle is not exposed to the threat. Stop timing when the firing vehicle starts to move to the defilade position; restart time when the firing vehicle moves to the firing position and unmasks the weapon system.

Note. On ranges where prepared positions are not available, simulated positions should be established using stakes, engineer tape, flashlights, or chemical lights to depict the limits of the defilade and unmasked firing positions. An additional marker must be placed to signify the point on the ground where the firing vehicle becomes exposed.

If the firing vehicle starts the engagement from an unmasked position, time starts when the target(s) is fully exposed. If the firing vehicle fails to move during the engagement, the evaluator may inform the firing crew that the target(s) is up.

Target exposure time continues through each engagement, even if the firing vehicle does not move into the firing position and unmask to engage the target(s). Total exposure time stops for the engagement when one of the following occurs:

- All targets are killed.
- Total allotted target exposure time expires.

Target exposure time for a defensive engagement is figured using the following rule: Add 10 seconds for a day defensive task and 20 seconds for a night defensive task. For example, if target kill time for a particular target is 23 seconds, add 10 seconds for day; target exposure time is 33 seconds. This lets the defending vehicle strike when it is ready, after taking the additional time for day and night exposure for target acquisition.

Note. During NBC engagements, the crew will be told to prepare for NBC conditions before the engagement starts.

ALIBIS

Battalion/squadron commanders are the deciding authority on alibis. All alibi engagements will be refired. Alibis will be given for the following conditions only:

- Range failures.
- Equipment failures that are not the result of crew error.
- Unsafe conditions not related to the firing vehicle or crew.

Section II. BASIC AND INTERMEDIATE GUNNERY TABLES

The basic and intermediate light cavalry gunnery tables are used to train and evaluate a single firing crew. These tables take a single vehicle crew from the basic gunnery engagements on Table I through single vehicle crew qualification on Table VIII. Basic gunnery trains crews to engage targets during good and poor visibility conditions and in NBC environments.

Firing Tables I through IV is not mandatory, but is encouraged. These tables are conducted as the commander deems necessary for sustaining skills or training crews before firing the intermediate tables.

The intermediate gunnery tables are natural extensions of the basic gunnery tables; these tables train vehicle teams to engage stationary and moving, single and multiple targets with all HMMWV weapon systems during daylight and limited visibility, from stationary and moving vehicles. Vehicle teams must qualify on Table VIII A and B before moving to the advanced tables.

Note. The intermediate (marksmanship and engagement) gunnery tables are used to train crews to acquire and engage targets properly through various target or firing vehicle conditions. They are not fired in tactical scenarios and, therefore, are not fired using wingman techniques.

M2 HB Caliber .50 Basic Tables

CLASSIFICATION STANDARDS

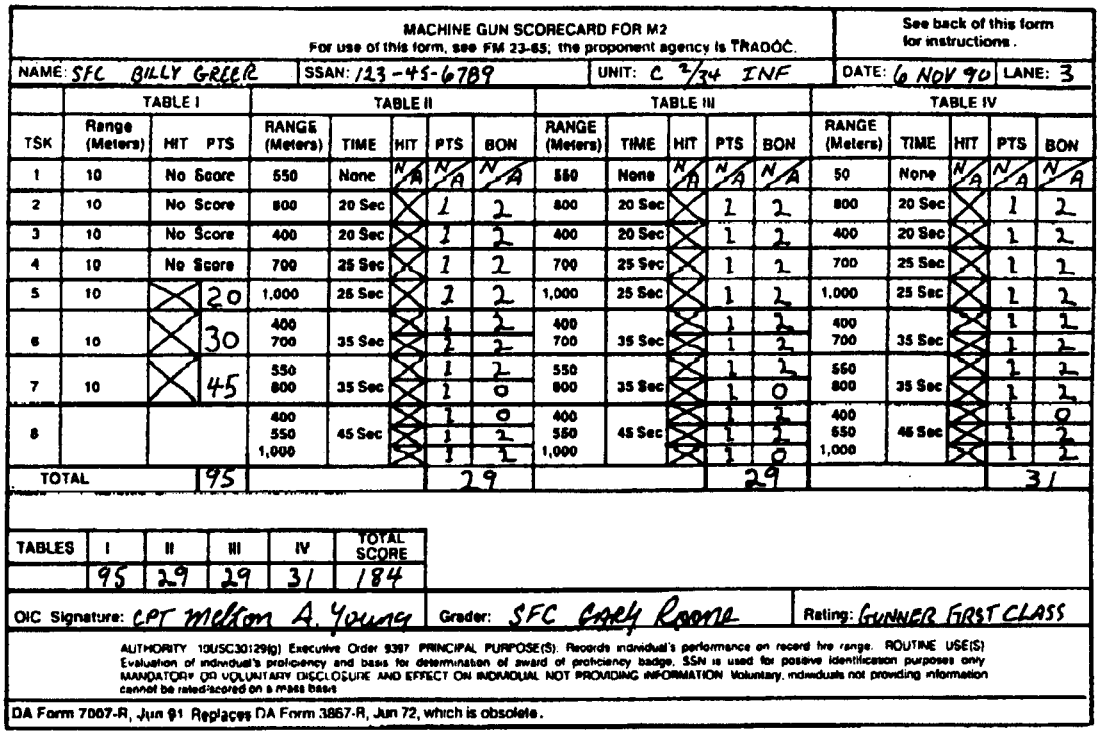
One point is given for each round impacting in each space for Table I. For tables II, III and IV, one point is allowed for each target hit with an additional 2-point bonus when the target is hit with the first burst. The maximum score possible for Table I is 119 points; a minimum of 29 points is required. The maximum score for Tables II, III, and IV is 33 points each; a minimum score of 23 points each must be obtained.

DA Form 7007-R *(Machine Gun Scorecard for M2)* is used to record the gunner's performance on Tables I through IV. Maximum total score possible for Tables I through IV is 218 points. Gunners are classified according to their overall points earned:

- Expert 193 to 218.
- First Class 171 to 192.
- Second Class 151 to 170.
- Unskilled 150 and below.

An example of a completed scorecard is shown in Figure 10-1.

Figure 10-1. DA Form 7007-R (Machine Gun Scorecard for M2).



MACHINE GUN SCORECARD FOR M2
For use of this form, see FM 23-65; the proponent agency is TRADOC.

See back of this form for instructions.

NAME: SFC BILLY GREER | SSAN: 123-45-6789 | UNIT: C 2/34 INF | DATE: 6 NOV 90 | LANE: 3

	TABLE I		TABLE II					TABLE III					TABLE IV				
TSK	Range (Meters)	HIT PTS	RANGE (Meters)	TIME	HIT	PTS	BON	RANGE (Meters)	TIME	HIT	PTS	BON	RANGE (Meters)	TIME	HIT	PTS	BON
1	10	No Score	550	None	N/A	N/A	N/A	550	None	N/A	N/A	N/A	50	None	N/A	N/A	N/A
2	10	No Score	800	20 Sec	X	1	2	800	20 Sec	X	1	2	800	20 Sec	X	1	2
3	10	No Score	400	20 Sec	X	1	2	400	20 Sec	X	1	2	400	20 Sec	X	1	2
4	10	No Score	700	25 Sec	X	1	2	700	25 Sec	X	1	2	700	25 Sec	X	1	2
5	10	X 20	1,000	25 Sec	X	1	2	1,000	25 Sec	X	1	2	1,000	25 Sec	X	1	2
6	10	X 30	400 700	35 Sec	X X	1 1	2 2	400 700	35 Sec	X X	1 1	2 2	400 700	35 Sec	X X	1 1	2 2
7	10	X 45	550 800	35 Sec	X X	1 1	2 0	550 800	35 Sec	X X	1 1	2 0	550 800	35 Sec	X X	1 1	2 2
8			400 550 1,000	45 Sec	X X X	1 1 1	0 2 2	400 550 1,000	45 Sec	X X X	1 1 1	2 2 0	400 550 1,000	45 Sec	X X X	1 1 1	0 2 2
TOTAL		95				29					29					31	

TABLES	I	II	III	IV	TOTAL SCORE
	95	29	29	31	184

OIC Signature: CPT Melton A. Young | Grader: SFC Early Roone | Rating: GUNNER FIRST CLASS

AUTHORITY 10USC3012(g) Executive Order 9397 PRINCIPAL PURPOSE(S): Records individual's performance on record fire range. ROUTINE USE(S): Evaluation of individual's proficiency and basis for determination of award of proficiency badge. SSN is used for passive identification purposes only. MANDATORY OR VOLUNTARY DISCLOSURE AND EFFECT ON INDIVIDUAL NOT PROVIDING INFORMATION: Voluntary. Individuals not providing information cannot be rated/scored on a mass basis.

DA Form 7007-R, Jun 91 Replaces DA Form 3867-R, Jun 72, which is obsolete.

TABLE I—TEN-METER FIRING

Ten-meter firing exercises allow the gunner to develop skills in the delivery of initial bursts on target, and train the gunner in the basic skills of zeroing, controlling bursts, traversing, and traversing and searching techniques. This table uses paster targets.

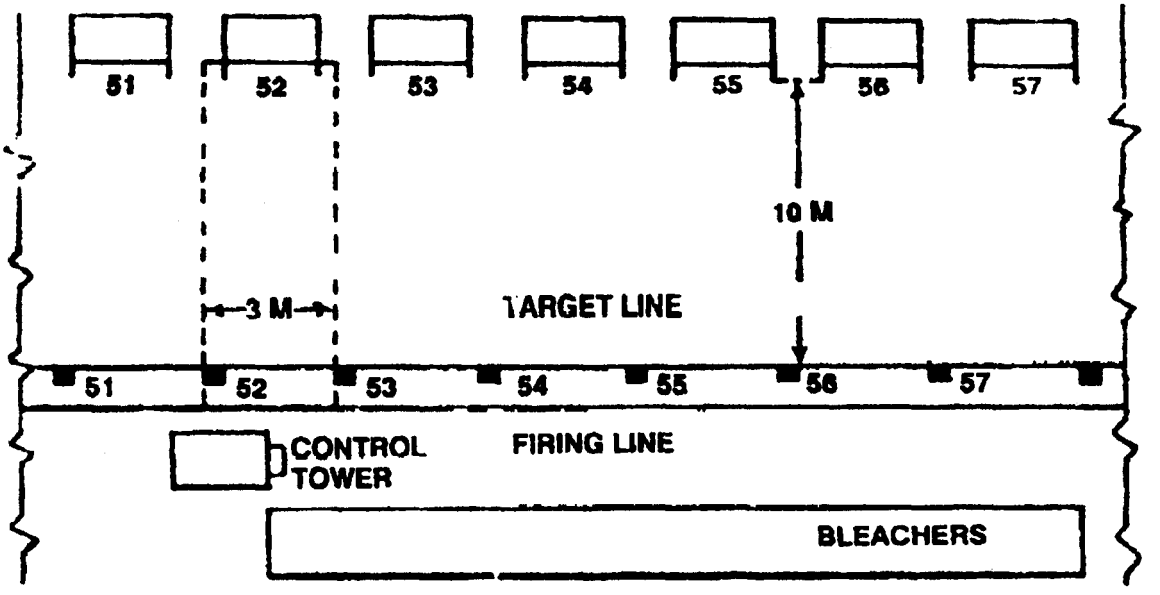
Range Layout

The standard 10-meter range can accommodate a unit of 200 to 250 soldiers at a time (concurrent training may be required). This range (see Figure 10-2) may be used to zero the M2 machine guns, and to fire the 10-meter portion of the tables. It is also used to familiarize soldiers with the characteristics, noise, and recoil of the weapon. This range may also be used to practice target observation, adjustment of fire, and traversing and searching; it is also used to develop speed and an accurate burst technique.

The 10-meter range should meet the following requirements:

- The firing line should be long enough to place 20 machine guns with 3 meters between positions; each position should be numbered.
- The target line should be 10 meters in front of the firing line. Paper targets should be pasted onto target cloth stretched over wooden frames. One target should be setup for each position and numbered to correspond with the position.
- The bleachers (to the rear of the firing line) should be set up for instruction of crews.
- The control tower should be located to the immediate rear and center of the firing line.

Figure 10-2. Ten-Meter Range Layout.



Each range should be staffed with the following personnel:

- Officer in charge (OIC).
- Range safety officer (RSO).
- Primary instructor (PI).
- Assistant instructor (AI) for every 10 students.
- Medic.
- Ammunition NCO.
- Tower operator.

Although more equipment may be required by local range regulations, safety regulations, or unit SOPs, the minimum equipment required to operate the range is as follows:

- Public address system.
- Machine gun for each firing lane and a backup for every five lanes.
- Cleaning rod for every AI.
- Scorecard per firer.
- Non-asbestos glove for every two weapons (NSN 8415-01-092-0039).
- Tripod for each lane.
- Pindle for each lane
- Traverse and elevation mechanism for each lane.
- Medical evacuation capability.
- Communication equipment (wire or radio as required by local range regulations or SOP).

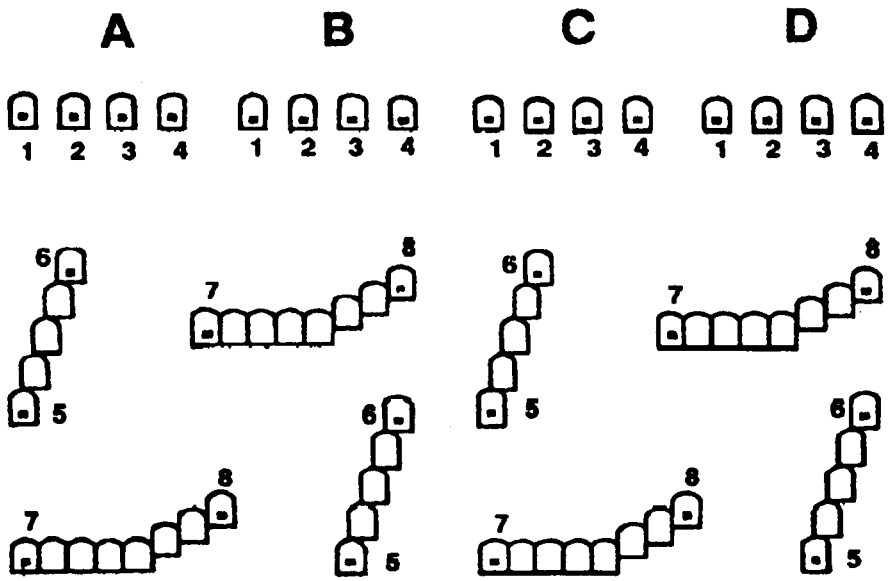
Target Analysis

Table I exercises use the basic machine gun target (FSN 6920-078-5 128) (Figure 10-3). This target consists of four sections lettered A, B, C, and D. Each section has four point targets numbered 1, 2, 3, and 4 and two sets of area targets numbered 5-6 and 7-8. Each space is 4 centimeters wide and 5 centimeters high. The black aiming pasters within the numbered scoring spaces are l-centimeter square.

Firing at targets 1 through 4 allows the gunner to use the traverse fire technique; target groups 5-6 and 7-8 allow practice in traverse and search techniques.

Target group 5-6 exposes the gunner to traverse and elevation manipulation when using the tripod mount and body position changes to engage targets in depth (elbow position changes). This causes the gunner to use a series of aiming points to disburse fire across the target when using the tripod. Target group 7-8 exposes the gunner to position changes to engage linear targets with depth. It causes him to control the burst length from the weapon, use a series of aiming points, and disburse fire across the target.

Figure 10-3. Basic Machine Gun Target.



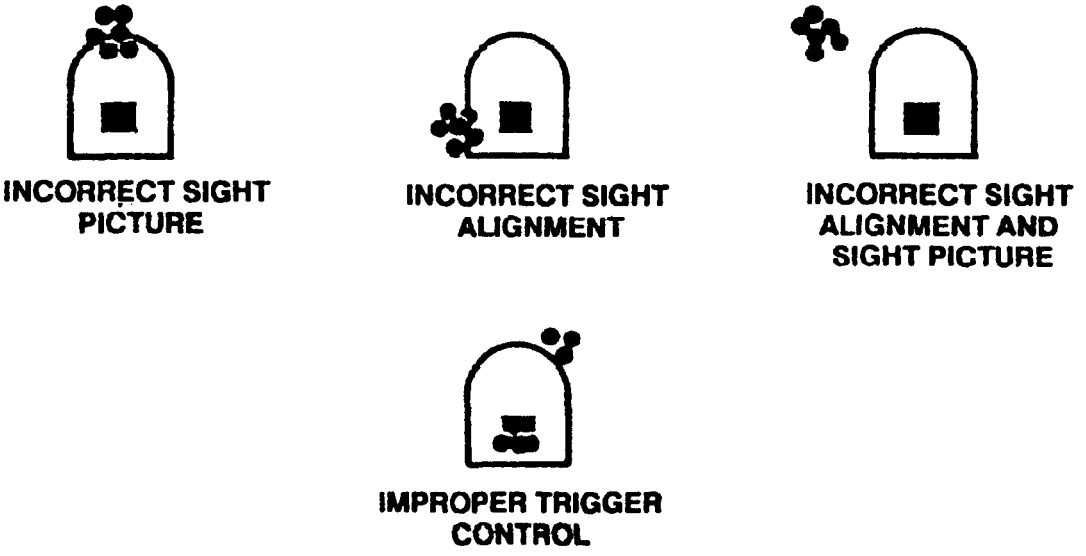
Scoring Procedures

Tasks 1 through 4 are not scored.

Tasks 5 through 7 are scored. When scoring the 10-meter target, one point is given for each round impacting within a scoring space. Rounds touching the boundary of a scoring space are considered hits and counted in one scoring space. (When firing with 28 rounds, the maximum score is 28 points.) The total possible score for Table I is 119 points.

Targets are analyzed and scored to determine the gunner's proficiency and to see if more training is needed in any of the fundamentals of machine gunnery. When firing with a properly zeroed weapon, a target is best analyzed by considering the common errors of gunnery (see Figure 10-4).

Figure 10-4. Common Errors on Machine Gun Target.



Notes. Adjustment does not apply to weapons with fixed rear sights.

Large shot groups are usually caused by incorrect position and grip; small shot groups outside the scoring space are usually caused by incorrect sight alignment, sight picture, or zero.

A minimum of 29 points is required to pass the 10-meter course. Soldiers failing to achieve minimum standards should be retrained and retested in a dry-fire mode until proficiency is demonstrated.

Scores are recorded on DA Form 7007-R.

Before progressing to Table II *(Transition Firing),* soldiers who fail Table I should re-fire the table with close supervision and coaching to ensure they understand the fundamentals of live fire.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point and issued to each assistant gunner as he is assigned a firing point. The total ammunition for this exercise is 236 rounds (117 for practice [Tasks 1 through 4] and 119 for gunner classification [Tasks 5 through 7]):

- Task 1—12 single rounds.
- Task 2—7-round belts (2).
- Task 3—35-round belt.
- Task 4—56-round belt.
- Task 5—28-round belt.
- Task 6— 56-round belt.
- Task 7—35-round belt.

Conduct of Fire

For 10-meter exercises fired on a multipurpose transition range, groups will be broken down to fit firing lanes. The course is designed to fire tripod-mounted machine guns. The basic machine gun target is used for all 10-meter firing and allows four gunners to use it for practice or two gunners for practice and two for gunner classification.

The unit is organized into groups of 10. Each group is assigned a firing order number. One order becomes gunners and the other assistant gunners. The gunners and assistant gunners are then assigned lanes and are required to setup their guns and perform pre-fire checks (in accordance with FM 23-65).

Task l —Zero M2 HB machine gun.

The gunner will fire 3 rounds, single shot, at Paster Al, then move downrange to observe the shot group and triangulate it. No adjustments will be made at this time.

The gunner will then fire another 3 single rounds at Paster Al and go downrange to observe that shot group, triangulate it, and make necessary adjustments to his weapon.

The gunner repeats these steps shooting at Paster A2.

Note. The gunner should zero his weapon using 9 rounds, he will use the remaining 3 rounds to confirm his zero. If he is unable to confirm his zero with 12 rounds, remove him from the firing line and administer remedial training.

Task 2 - Engage a target (controlled burst).

The gunner will from the first burst of 5 to 7 rounds at Paster 3, then go downrange to observe, mark the projectile holes, and analyze his burst.

The gunner then fires at Paster 4 of the same section and repeats the procedure.

Tasks 3 and 4 - Engage a target (traverse and search).

Using the traverse and search technique, the gunner will engage Pasters A5-6 firing 5- to 7-round bursts for each paster; then, he will move downrange to observe and analyze his targets.

Note. These tasks are fired from a tripod firing position. If the gunner has difficulty manipulating the weapon, remove him from the firing line and give him remedial training.

Using the traverse and search technique, the gunner will engage Pasters A7-8 firing 5- to 7-round bursts at each paster; then, he will move downrange to observe and analyze his targets.

Task 5 —Engage a target (traverse).

Using the traverse technique, the gunner will engage Pasters B 1 through 4 firing a 5- to 7-round burst at each paster; then, he will move downrange to observe and analyze his targets.

Tasks 6 and 7 —Engage a target (traverse and search).

Using the traverse and search technique, the gunner will engage Pasters B7-8, firing a 5-to 7-round burst at each paster; then, he will move downrange to observe and analyze his targets.

Using the traverse and search technique, the gunner will engage Pasters B5-6 firing a 5- to 7-round burst at each paster; then, he will move downrange to observe and analyze his targets.

Table I. Ten-Meter Firing.

Task	Conditions/ Target/Situation	Ammo	Standard	GO/NO-GO
1. Zero M2 HB machine gun.	Pasters 1 and 2, 10 meters.	12 single rounds (Ball)	Gunner must engage each target with 6 single rounds. Paster 1 must be engaged first; four of the six rounds fired at Paster 2 must impact on target.	NA
2. Engage a target (controlled-burst).	Pasters 3 and 4, 10 meters.	2 7-round belts (Ball)	Gunner must engage each target using controlled bursts (5- to 7-round bursts), Paster 3 first, then Paster 4; one round must impact on each target.	NA
3. Engage a target (traverse and search).	Pasters 5-6, 10 meters.	35-round belt (Ball)	Gunner must engage targets using traverse and search technique (5- to 7-round bursts); one round must impact on each target.	NA
4. Engage a target (traverse and search).	Pasters 7-8, 10 meters.	56-round belt (Ball)	Gunner must engage targets using traverse and search technique (5- to 7-round bursts); one round must impact on each target.	NA
5. Engage a target (traverse).	Pasters 1 through 4, 10 meters.	28-round belt (Ball)	Gunner must engage targets using traverse technique (5- to 7-round bursts); four rounds must impact on each target.	GO NO-GO
6. Engage a target (traverse and search).	Pasters 7-8, 10 meters.	56-round belt (Ball)	Gunner must engage targets using traverse and search technique (5- to 7-round bursts); one round must impact on each target.	GO NO-GO
7. Engage a target (traverse and search).	Pasters 5-6, 10 meters.	35-round belt (Ball)	Gunner must engage targets using traverse and search technique (5- to 7-round bursts); one round must impact on each target.	GO NO-GO

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Gunnery Points _____ Tasks Scored GO _____

Evaluator's Signature _____

TABLE II—TRANSITION FIRING

Table II *(Transition Firing)* teaches the gunner to incorporate the different techniques of fire learned in preparatory gunnery training and 10-meter firing. On some of these exercises, the gunner's capabilities will be degraded (NBC environment). The gunner will first field zero his weapon.

Note. Instructors should encourage gunners to perform immediate action if a stoppage occurs during fire, unless local policies require gunners to notify range personnel first.

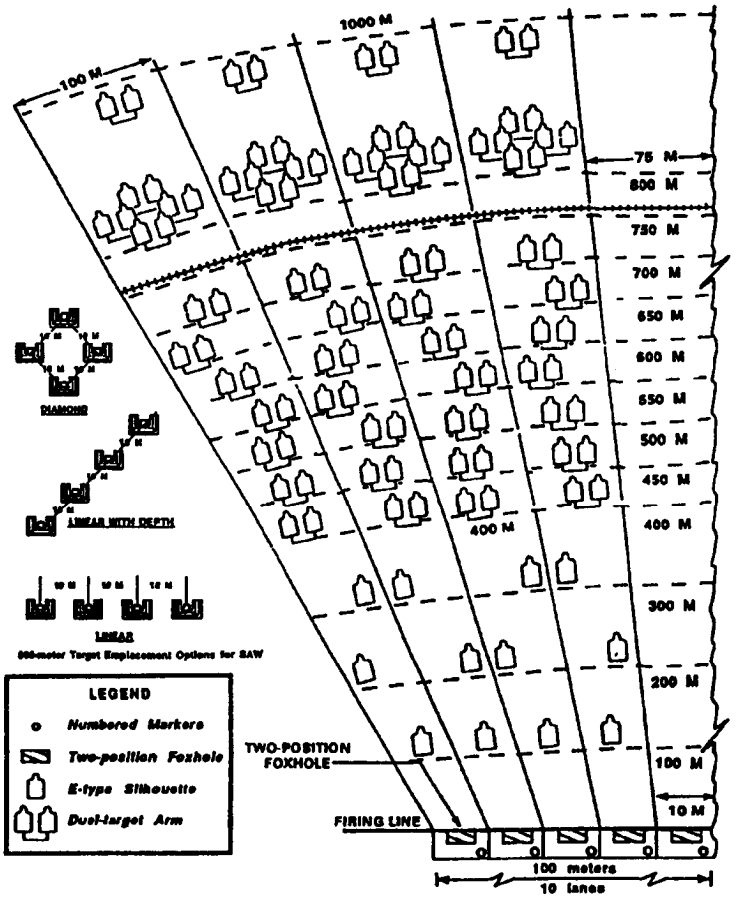
The objective of Table II is to ensure that the gunner—

- Understands the characteristics of fire.
- Field zeros the machine gun.
- Uses range estimation to determine the distance to targets.
- Engages targets at long ranges with the tripod-mounted machine gun.
- Applies the method of adjusted point of aim.

Range Layout

Tables II through IV are fired on a multipurpose machine gun transition range, as depicted in Figure 10-5.

Figure 10-5. Multipurpose Machine Gun Transition Range.



Scoring Procedures

Task 1 is not scored.

Tasks 2 through 8 are scored. One point is given for each target hit and an additional 2-point bonus is given if the target is hit with the first burst. The total possible for this table is 33 points.

Scores are recorded on DA Form 7007-R.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 182 rounds:

- 28-round belt.
- 154-round belt.

Conduct of Fire

The unit is organized for transition firing the same as for lo-meter firing. Field zeroing is the first firing task of transition day-fire course. All vehicle targets will be frontal BRDMs.

Table II will be conducted with a single gunner using a tripod-mounted machine gun.

Task l— Zero M2 HB machine gun.

The gunner must first center the rear sight in the same manner as the sight setting for the 10-meter firing. He selects the appropriate range mark with his elevation knob.

The gunner will load one 28-round belt of ammunition and fire a 5- to 7-round burst at the 550-meter, double E silhouette.

Note. If the impact of the rounds (beaten zone) is over the target, the gunner has probably fired with an incorrect sight picture (too high on the target). He needs tore-lay the gun on the original aiming point and fire again. If the gunner cannot zero with a proper sight picture, he should have the unit armorer inspect the weapon before continuing the zero procedure.

The gunner will observe the beaten zone and make adjustments to the sights so the rounds will impact on the target.

After adjustments are made, the gunner will re-lay on the center base of the target and fire another 5-to 7-round burst.

The gunner will repeat the steps with the remaining rounds.

Note. If the gunner is unable to zero with 28 rounds, he is removed from the firing line and given remedial training.

Tasks 2 through 8 - Engage single and multiple targets at various ranges.

The gunner will load a 154-round belt of ammunition and fire 5- to 7-round bursts at single and multiple targets (double E silhouettes and vehicle targets) at various ranges.

The gunner will observe the beaten zone and make adjustments, as necessary, to hit the targets.

After the gunner completes firing, he will clear the weapon and the AI will critique the gunner's performance.

Table II. Transition Firing.

Task	Conditions/ Target/Situation	Ammo	Standard	Crew Duties	GO/NO-GO
1. Zero M2 HB machine gun.	Double E silhouette, 550 meters. Stationary tripod firing position.	28-round belt	Gunner must engage target with 5- to 7-round bursts; one round must impact on the target.	NA	NA
2. Engage a single, double E silhouette.	Double E silhouette, 800 meters. Stationary tripod firing position.	14 rounds	Gunner must engage target with 5- to 7-round bursts; one round must impact on the target within 20 seconds.	SAT UNSAT	GO NO-GO
3. Engage a single, double E silhouette.	Double E silhouette, 400 meters. Stationary tripod firing position. NBC environment.	14 rounds	Gunner must engage target with 5- to 7-round bursts; one round must impact on the target within 25 seconds.	SAT UNSAT	GO NO-GO
4. Engage a single, double E silhouette.	Double E silhouette, 700 meters. Stationary tripod firing position. NBC environment.	14 rounds	Gunner must engage target with 5- to 7-round bursts; one round must impact on the target within 30 seconds.	SAT UNSAT	GO NO-GO
5. Engage a single, vehicle target.	Vehicle target, 1,000 meters. Stationary tripod firing position.	14 rounds	Gunner must engage target with 5- to 7-round bursts; one round must impact on the target within 25 seconds.	SAT UNSAT	GO NO-GO
6. Engage multiple targets (double E silhouettes).	2 double E silhouettes, 400 to 700 meters. Stationary tripod firing position.	28 rounds	Gunner must engage targets with 5- to 7-round bursts; one round must impact on each target within 35 seconds.	SAT UNSAT	GO NO-GO
7. Engage multiple targets (double E silhouettes).	2 double E silhouettes, 550 to 800 meters. Stationary tripod firing position. NBC environment.	28 rounds	Gunner must engage targets with 5- to 7-round bursts; one round must impact on each target within 35 seconds.	SAT UNSAT	GO NO-GO
8. Engage multiple targets, (double E silhouette and vehicle targets).	Double E silhouette, 400 meters; 2 frontal BRDMs, 550 to 1,000 meters. Stationary tripod firing position.	42 rounds	Gunner must engage targets with 5- to 7-round bursts; one round must impact on each target within 45 seconds.	SAT UNSAT	GO NO-GO

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Gunnery Points _____ Tasks Scored GO _____

Evaluator's Signature _____

TABLE III—NIGHT FIRING

On the modem battlefield, each soldier must be prepared to accomplish the mission during limited visibility and in degraded mode; therefore, limited visibility and degraded mode gunnery is an important part of our training and preparation for war.

This training is designed to ensure gunners know how to-

- Zero the AN/TVS-5.
- Detect targets using night vision devices.
- Engage targets at different ranges using the AN/TVS-5.

Range Layout

Table III is fired on a multipurpose machine gun transition range (see Figure 10-5 on page 10-13).

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 8 are scored. One point is given for each target hit and an additional 2-point bonus is given if the target is hit on the first burst. The total possible for day fire is 33 points.

Scores are recorded on DA Form 7007-R.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 180 rounds:

- Single rounds (12).
- 7-round belts (2).
- 154-round belt (l).

Conduct of Fire

Organization of a unit for night fire is the same as for day fire. Table III will be conducted with a single gunner using a tripod-mounted machine gun. All vehicle targets will be frontal BRDMs.

Task l — Zero AN/T'VS-5 to M2 HB.

The gunner must first mount the night vision device and place it into operation. Once the device is mounted, the gunner will fire a 5- to 7-round burst to seat the device, then fire another 5- to 7-round burst to make sure the device is seated.

The gunner must then center the reticle pattern in the field of view. He then places the reticle aiming point on the 50-meter target aiming point and fires three single rounds.

Notes. Each click of the azimuth or elevation adjustment actuator moves the strike of the round 1/2 inch at 50 meters. One click of adjustment moves the reticle one square off the target at 50 meters.

If the impact of the rounds (beaten zone) is over the target, the gunner has probably fired with an incorrect sight picture (too high on the target). He needs tore-lay the gun on the original aiming point, then fire again. If the gunner fails to zero with a proper device sight picture, he should have the unit armorer inspect the device before continuing the zero procedure.

The gunner will observe the beaten zone and make adjustments to the sights so the round will impact on the target.

After adjustments are made, the gunner will fire another round at the target until zero is obtained

Note. If the gunner is unable to zero with 12 rounds, he is removed from the firing line and given remedial training.

Tasks 2 through 8- Engage single and multiple targets at various ranges.

The gunner will load one 154-round belt of ammunition and fire 5- to 7-round bursts at single and multiple targets (double E silhouettes and vehicle targets) at various ranges.

The gunner will observe the beaten zone and make adjustments as necessary to hit the targets.

After the gunner completes firing, he will clear the weapon and the AI will critique the gunner's performance.

Table III. Night Firing.

Task	Conditions/ Target/Situation	Ammo	Standard	Crew Duties	GO/NO-GO
1. Zero AN/TVS-5 to M2 HB.	M16A1/A2 zero target, 50 meters. Stationary tripod firing position.	12 single rounds 2 7-round belts	Gunner must use 2 bursts to seat device, then engage target using single shots; 4 of 6 rounds must impact within a 4-cm circle, in accordance with FM 23-9.	NA	NA
2. Engage single, double E silhouette.	Double E silhouette, 800 meters. Stationary tripod firing position. Using night sight.	14 rounds	Gunner must engage using 5- to 7-round bursts; one round must impact on target within 20 seconds.	SAT UNSAT	GO NO-GO
3. Engage single, double E silhouette.	Double E silhouette, 400 meters. Stationary tripod firing position. Using night sight.	14 rounds	Gunner must engage using 5- to-7-round bursts; one round must impact on the target within 20 seconds.	SAT UNSAT	GO NO-GO
4. Engage single, double E silhouette.	Double E silhouette, 700 meters. Stationary tripod firing position. Using night sight.	14 rounds	Gunner must engage using 5- to-7-round bursts; one round must impact on target within 25 seconds.	SAT UNSAT	GO NO-GO
5. Engage single vehicle target.	1 frontal BRDM, 1,000 meters. Stationary tripod firing position. Using night sight.	14 rounds	Gunner must engage using 5- to-7-round bursts; one round must impact on target within 25 seconds.	SAT UNSAT	GO NO-GO
6. Engage multiple targets (double E silhouettes).	2 double E silhouettes, 400 to 700 meters. Stationary tripod firing position. Using night sight. NBC environment.	28 rounds	Gunner must engage using 5- to-7-round bursts; one round must impact on each target within 35 seconds.	SAT UNSAT	GO NO-GO
7. Engage multiple targets (double E silhouettes).	2 double E silhouettes, 550 to 800 meters. Stationary tripod firing position. Using night sight.	28 rounds	Gunner must engage using 5- to-7-round bursts; one round must impact on each target within 35 seconds.	SAT UNSAT	GO NO-GO
8. Engage multiple targets (double E silhouette and vehicle targets).	Double E silhouette, 400 meters. 2 frontal BRDMs, 550 to 1,000 meters. Stationary tripod firing position. Using night sight.	42 rounds	Gunner must engage using 5- to-7-round bursts; one round must impact on each target within 45 seconds.	SAT UNSAT	GO NO-GO

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Gunnery Points _____ Tasks Scored GO _____

Evaluator's Signature _____

TABLE IV—BASIC QUALIFICATION

Table IV *(Basic Qualification)* tests the gunner on the techniques of fire he may use in combat. The gunner must field zero his weapon and incorporate the appropriate techniques for the conditions of each task. The conditions of the tasks may include—

- Limited visibility.
- NBC environment.
- Degraded mode.

Note. Table IV is set up for gunners to engage targets out to 1,000 meters. However, if visibility is limited by other conditions, the commander may alter the ranges for better visibility.

On this table, the gunner will be required to apply all the fundamentals of gunnery learned in preparatory gunnery training and lo-meter firing.

Note. Instructors should encourage gunners to perform immediate action if a stoppage occurs during fire, unless local policies require gunners to notify range personnel first.

The objective of basic qualification is to test the gunners' ability to use different techniques of fire learned and practiced in the preliminary gunnery tables.

Range Layout

Table IV is fired on a multipurpose machine gun transition range (see Figure 10-5 on page 10-13).

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 8 are scored. One point is given for each target hit and an additional 2-point bonus is given if the target is hit on the first burst. The maximum score possible is 33 points (11 targets at 3 points each). A minimum score of 23 points is required for basic qualification.

Scores are recorded on DA Form 7007-R.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 182 rounds:

- 28-round belt.
- 154-round belt.

Note. The ranges for Table IV may be modified to accommodate local range facilities. Commanders are authorized to fire Table IV from FM 23-65 for basic qualification, if ranges cannot be modified.

Conduct of Fire

Organization for transition firing is the same as for night firing. Field zeroing is the first task of the day-fire phase. All vehicle targets will be frontal BRDMs.

Table IV will be conducted with a single gunner using a tripod-mounted machine gun.

Task l — Zero M2 HB machine gun. (See page 10-14 for day zero procedures and page 10-16 for night zero procedures.)

Tasks 2 through 8 — Engage single and multiple targets at various ranges. (See page 10-14.)

Table IV. Basic Qualification.

Task	Conditions/ Target/Situation	Ammo	Standard	Crew Duties	GO/NO-GO
1. Zero M2 HB machine gun.	Double E silhouette, 550 meters. Stationary tripod firing position.	28-round belt	Gunner must engage using 5- to 7-round bursts; one round must impact on the target.	NA	NA
2. Engage a single, double E silhouette.	Double E silhouette, 800 meters. Stationary tripod firing position.	14 rounds	Gunner must engage using 5- to 7- round bursts; one round must impact on the target within 20 seconds.	SAT UNSAT	GO NO-GO
3. Engage a single, double E silhouette.	Double E silhouette, 400 meters. Stationary tripod firing position.	14 rounds	Gunner must engage using 5- to 7- round bursts; one round must impact on the target within 20 seconds.	SAT UNSAT	GO NO-GO
4. Engage a single, double E silhouette.	Double E silhouette, 700 meters. Stationary tripod firing position. NBC environment.	14 rounds	Gunner must engage using 5- to 7- round bursts; one round must impact on the target within 25 seconds.	SAT UNSAT	GO NO-GO
5. Engage a single vehicle target.	1 frontal BRDM, 1,000 meters. Stationary tripod firing position. NBC environment.	14 rounds	Gunner must engage using 5- to 7- round bursts; one round must impact on the target within 25 seconds.	SAT UNSAT	GO NO-GO
6. Engage multiple vehicle targets.	2 frontal BRDMs, 400 to 700 meters. Stationary tripod firing position.	28 rounds	Gunner must engage using 5- to 7-round bursts; one round must impact on each target within 35 seconds.	SAT UNSAT	GO NO-GO
7. Engage multiple double E silhouettes.	2 double E silhouettes, 550 to 800 meters. Stationary tripod firing position.	28 rounds	Gunner must engage using 5- to 7- round bursts; one round must impact on each target within 35 seconds.	SAT UNSAT	GO NO-GO
8. Engage multiple targets (double E silhouette and vehicles).	Double E silhouette 400 meters. 2 frontal BRDMs, 550 to 1,000 meters. Stationary tripod firing position.	42 rounds	Gunner must engage using 5- to 7- round bursts; one round must impact on each target within 45 seconds.	SAT UNSAT	GO NO-GO

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Gunnery Points _____ Tasks Scored GO _____

Qualified/Unqualified _____

Points for Gunner Classification: Table I _____ Table II _____ Table III ____ Table IV _____

Evaluator's Signature _____ Gunner's Classification _____

M2 HB Caliber .50 Intermediate Tables

On area target engagements (infantry squad, motorcycle, and IWG team), full credit is given when five rounds impact in the target area within the time indicated in the task. On point target engagements (lightly armored vehicle targets, such as BRDM and BTR-70), full credit is given when two rounds impact on the target within the time indicated. The target array may be placed on line or in a wedge formation. Targets should not be more than 5 meters apart and will not extend beyond 30 meters in width or 20 meters in depth.

Note. Target area is the ground within a 5-meter radius of a target.

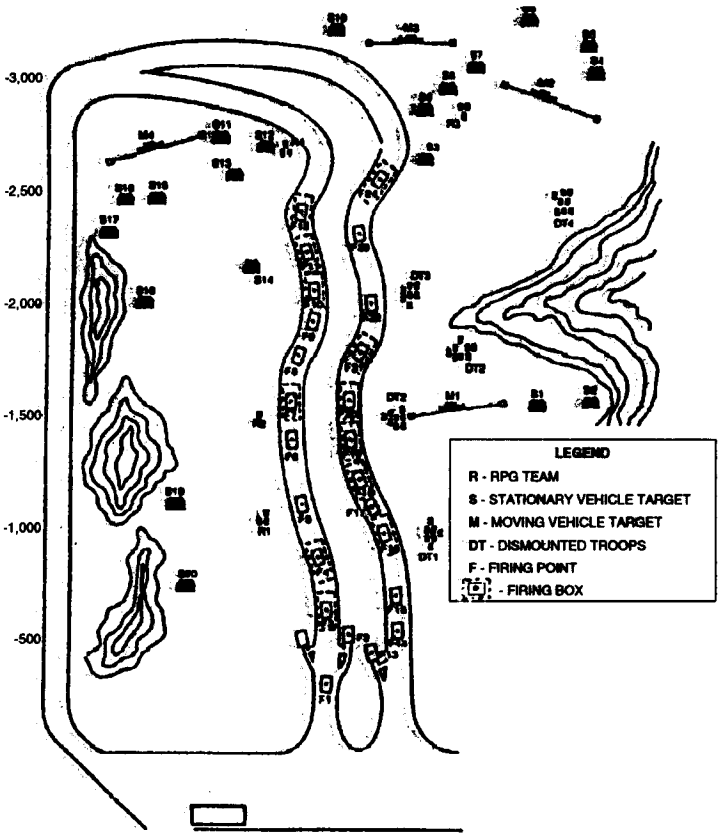
TABLE V—TRANSITION TO VEHICLE

This table transitions the M2 HB gunner from tripod firing to vehicle firing. It also trains the gunner to zero the M2 HB and acquire and engage moving targets from a stationary weapon system in an NBC environment, both day and night.

Range Layout

Tables V through VIII are fired on a multipurpose range complex (MPRC), as depicted in Figure 10-6.

Figure 10-6. Multipurpose Range Complex.



VEHICLE FIRING POINT	TABLE VII (AP) EVENT	TARGET	DISTANCE (METERS)
F1	A-1	M4	1,000-2,500
F2	A-3	M1 DT1	300-500 1,400-1,500
F3	B-9	S20	500-800
F4	A-2	S18	1,400-1,600
F5	A-5	S14 R2	300-500 800-1,000
F6	B-7	M2	1,800-2,500
F7	B-10	DT-5	1,200-1,400
F8	B-11	S8 DT3	300-500 1,200-1,400
F9	B-8	S11 M4	800-1,000 1,000-1,200
F10	A-5	M4 S12	800-1,000 600-800
F11	A-4	S3 S5	600-800 1,200-1,400
F12	B-12	SQ M3	600-800 1,000-1,200

VEHICLE FIRING POINT	TABLE VIII EVENT	TARGET	DISTANCE (METERS)
F13	A-1	M1 S2	500-1,500 900-1,300
F14	B-1	S3	1,200-1,400
F15	A-2	S15 RI	900-1,100 400-600
F16	A-3	DT1 DT2	400-600 700-900
F17	B-5A	M2	1,700-1,900
F18	A-4	S17 S18	1,400-1,600 1,400-1,600
F9	B-4	S16 M4	1,300-1,600 1,300-1,600
F20	B-5	M2 M3	1,400-1,600 1,400-1,600
F21	A-5A	S11 M3	1,400-1,600 1,400-1,600
F22	B-5	S7	1,200-1,400
F23	B-2	S5 S6	1,200-1,400 1,200-1,400
F24	B-3	S13 R4	400-600 400-600

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. (See *Evaluation Procedures* on page 10-4.)

Within the allotted time per exercise, the gunner must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task. The crew must score GO on a total of six of eight graded tasks on Tables VA and VB combined.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 241 rounds mix and 10 rounds illumination:

- Table VA: 126 rounds mix.
- Table VB:
  — 115 rounds mix.
  — 10 rounds illumination.

Conduct of Fire

Table VA will be fired during daylight; Table VB will be fired at night. Using four and one mix ammunition, the gunner acquires and engages moving targets from a stationary weapon system. Targets will be placed at ranges between 400 meters and 1,000 meters. An additional BRDM target is centered at 600 meters for weapon zero.

Task l — Zero M2 HB machine gun.

The gunner must first center the rear sight in the same manner as the sight setting for the 10-meter firing. He selects the appropriate range mark with his elevation knob.

The gunner will load one 15-round belt of ammunition and fire a 5- to 7-round burst at the BRDM target at 600 meters. (See page 10-14 for day zero procedures and page 10-16 for night zero procedures.)

Note. If the gunner is unable to zero, he is removed from the firing line and given remedial training.

Tasks 2 though 5 — Engage single, moving targets. (See page 10-14.)

Allowable Variations

The commander may use MILES and change the sequence of tasks.

If moving motorcycle targets are not available, use an infantry squad (7 IRETS).

Note. For more information on the use of MILES with the M2 HB, see FM 23-65.

Table V A. Transition to Vehicle (Day).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Time (Seconds)	Crew Duties	GO/NO-GO
1. Zero M2 HB Caliber .50 Machine Gun.	1 Stationary Frontal BRDM-2, 600 Meters.	Mix 15	NA	NA	NA	NA
2. Engage a Moving Target (Stationary).	1 Moving Flank BRDM-2, 800 Meters.	Mix 25	2	28	SAT UNSAT	GO NO-GO
3. Engage a Moving Target (Stationary).	1 Moving Flank Truck, 400 Meters.	Mix 25	2	26	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Stationary).	1 Moving Flank BRDM-2, 600 Meters. NBC Environment.	Mix 25	2	32	SAT UNSAT	GO NO-GO
5. Engage a Moving Target (Stationary).	1 Moving Flank BRDM-2, 1,000 Meters.	Mix 25	2	28	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM-2 (for zero)
3 Moving Flank BRDM-2s
1 Moving Flank Truck

Table _____ Date_____Vehicle Number_____

Gunner_____Assistant Gunner_____

Evaluator's Signature_____Tasks Scored GO _____

Table V B. Transition to Vehicle (Night).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Time (Seconds)	Crew Duties	GO/NO-GO
1. Zero AN/TVS-5 to M2 HB.	1 Stationary Frontal BRDM-2, 600 Meters.	Mix 26	NA	NA	NA	NA
2. Engage a Moving Target (Stationary).	1 Moving Flank Motorcycle, 600 Meters.	Mix 25	5	28	SAT UNSAT	GO NO-GO
3. Engage a Moving Target (Stationary).	1 Moving Flank BRDM-2, 1,000 Meters. NBC Environment.	Mix 25	2	34	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Stationary).	1 Moving Flank BRDM-2, 800 Meters.	Mix 25	2	32	SAT UNSAT	GO NO-GO
5. Engage a Moving Target (Stationary).	1 Moving Truck, 400 Meters.	Mix 25	2	28	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM-2 (for zero)
2 Moving Flank BRDM-2s
1 Moving Flank Truck
1 Moving Flank Motorcycle

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tasks Scored GO: Table IV A _____ Table IV B _____

Evaluator's Signature _____ Total Tasks Scored GO _____

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TABLE VI—NOT USED

TABLE VII—PRACTICE FOR QUALIFICATION

This table trains the gunner to zero the M2 HB and acquire and engage single and multiple, moving and stationary targets from a moving weapon system, both day and night and in an NBC environment. It also prepares the crew for Table VIII qualification.

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. (See *Evaluation Procedures* on page 10-4.)

Within the allotted time per exercise, the crew must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task. The crew must score GO on six of eight graded tasks on Tables VIIA and VIIB combined.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 316 rounds mix and 10 rounds illumination:

- Table VIIA: 140 rounds mix.
- Table VIIB:
  - 176 rounds mix.
  - 10 rounds illumination.

Conduct of Fire

Table VIIA will be fired during daylight; Table VIIB will be fired at night. Using four and one mix ammunition, the crew zeros the M2 HB then acquires and engages single and multiple, moving and stationary targets from a moving weapon system. Targets will be placed at ranges between 400 and 1,000 meters. An additional BRDM target will be placed at 600 meters for zero.

Note. All moving engagements are fired from a short halt.

Task l — Zero M2 HB machine gun. (See page 10-14 for day zero procedures and page 10-16 for night zero procedures.)

Tasks 2 through 5 — Engage single and multiple, moving and stationary targets from a moving weapon system. (See page 10-14.)

Allowable Variations

The commander may use MILES and change the sequence of tasks.

If moving motorcycle targets are not available, use an infantry squad (7 IRETS).

Note. For more information on the use of MILES with the M2 HB, see FM 23-65.

Table VII A. Practice for Qualification (Day).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Time (Seconds)	Crew Duties	GO/NO-GO
1. Zero M2 HB Caliber .50 Machine Gun.	1 Stationary Frontal BRDM-2, 600 Meters.	Mix 15	NA	NA	NA	NA
2. Engage a Moving Target (Moving).	1 Moving Flank Motorcycle, 400 Meters.	Mix 25	5	28	SAT UNSAT	GO NO-GO
3. Engage Multiple Targets (Moving).	1 Stationary Frontal BRDM-2, 800 Meters. 1 Stationary Frontal Truck,1,000 Meters. NBC Environment.	Mix 50	2 2	40	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Moving).	1 Moving Flank BRDM-2, 600 Meters.	Mix 25	2	32	SAT UNSAT	GO NO-GO
5. Engage a Moving Target (Moving).	1 Moving Flank Truck, 800 Meters.	Mix 25	2	34	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM-2 (for zero)
1 Stationary Frontal BRDM-2
1 Moving Flank BRDM-2
1 Moving Flank Motorcycle
1 Stationary Frontal Truck
1 Moving Flank Truck

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Evaluator's Signature _____ Tasks Scored GO _____

Table VII B. Practice for Qualification (Night).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Time (Seconds)	Crew Duties	GO/NO-GO
1. Zero AN/TVS-5 to M2 HB.	1 Stationary Frontal BRDM-2, 600 Meters.	Mix 26	NA	NA	NA	NA
2. Engage a Moving Target (Moving).	1 Moving Flank Truck, 800 Meters. NBC Environment.	Mix 25	2	24	SAT UNSAT	GO NO-GO
3. Engage Multiple Targets (Moving).	1 Stationary Frontal BRDM-2, 800 Meters; 1 Stationary Frontal Truck, 800 Meters. NBC Environment.	Mix 50	2 2	40	SAT UNSAT	GO NO-GO
4. Engage Multiple Targets (Moving).	1 Moving Flank Motorcycle, 400 Meters; 1 Stationary Frontal BRDM-2, 600 Meters.	Mix 50	5 2	36	SAT UNSAT	GO NO-GO
5. Engage a Moving Target (Moving).	1 Moving Flank Motorcycle, 400 Meters.	Mix 25	5	28	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM-2 (for zero)
2 Stationary Frontal BRDM-2s
2 Moving Flank Motorcycles
1 Stationary Frontal Truck
1 Moving Flank Truck

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tasks Scored GO: Table VII A _____ Table VII B _____

Evaluator's Signature _____ Total Tasks Scored GO _____

TABLE VIII-INTERMEDIATE CREW QUALIFICATION

Table VIII is a marksmanship, single vehicle qualification table. This table tests the crew's ability to zero the M2 HB and engage multiple and single, moving and stationary targets from a moving vehicle. These exercises are fired during day and night; some exercises are fired in an NBC environment.

Each crew member should qualify (or transition) on Table VII in the same crew position before firing Table VIII. Each crew must fire Table VIII for qualification.

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. (See *Evaluation Procedures* on page 10-4.)

Within the allotted time per exercise, the crew must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task. The crew receives 100 points for each of the eight graded tasks scored as GO; a 5-point penalty is subtracted for each crew error. There are four possible crew errors for the M2 HB for a possible crew duty penalty of 20 points:

- Firing before receiving the command to fire.
- Incorrect engagement techniques (for example, engaging a *least dangerous* target before a *most dangerous* target).
- Incorrect driving techniques (for example, driver does not maintain course speed).
- Crew does not adhere to the conditions of the firing task (for example, failure to mask during an NBC engagement).

These crew errors do not affect the GO/NO-GO rating of the task. To qualify, the crew must score GO on six of the eight graded tasks on Tables VIII A and B combined. The crew qualification standards are as follows:

- *Distinguished:* Qualified on 8 of 8 tasks on Table VIII A and B combined.
- *Superior:* Qualified on 7 of 8 tasks on Table VIII A and B combined.
- *Qualified:* Qualified on 6 of 8 tasks on Table VIII A and B combined.
- *Unqualified:* Qualified on 5 or fewer tasks on Table VIII A and B combined.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 280 rounds mix and 10 rounds illumination:

- Table VIIIA: 140 rounds mix.
- Table VIIIB:
  - 140 rounds mix.
  - 10 rounds iliumination.

Conduct of Fire

Table VIIIA will be fired during daylight; Table VIIIB will be fired at night. Using four and one mix ammunition, the crew acquires and engages single and multiple, moving and stationary targets. Targets will be placed at ranges between 400 and 1,000 meters. An addtional BRDM target will be placed at 600 meters for zero.

Note. All moving engagements are fired from a short halt.

Task l — Zero M2 HB machine gun. (See page 10-14 for day zero procedures and page 10-16 for night zero procedures.)

Tasks 2 through 5 — Engage single and multiple, moving and stationary targets from a moving weapon system. (See page 10-14.)

Allowable Variations

The commander may change the sequence of tasks.

If moving motorcycle targets are not available, use an infantry squad (7 IRETS).

Table VIII A. Intermediate Crew Qualification (Day).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Time (Seconds)	Crew Duties	GO/NO-GO
1. Zero M2 HB Caliber .50 Machine Gun.	1 Stationary Frontal BRDM-2, 600 Meters.	Mix 26	NA	NA	NA	NA
2. Engage a Moving Target (Moving).	1 Moving Flank Motorcycle, 600 Meters.	Mix 25	5	28	____	GO NO-GO
3. Engage Multiple Targets (Stationary).	1 Stationary Frontal BRDM-2, 800 Meters.	Mix 50	2	36	____	GO NO-GO
	1 Stationary Frontal Truck, 800 Meters.		2			
4. Engage a Moving Target (Stationary).	1 Moving Flank BRDM-2, 600 Meters. NBC Environment.	Mix 25	2	30	____	GO NO-GO
5. Engage a Moving Target (Moving).	1 Moving Flank Truck, 800 Meters.	Mix 25	2	28	____	GO NO-GO

Tasks Scored GO_____ x 100 = Points _____

- Crew Duties Penalties_____

= Total Points _____

Target Requirements
1 Stationary Frontal BRDM-2 (for zero)
2 Stationary Frontal BRDM-2s
1 Moving Flank BRDM-2
1 Moving Flank Motorcycle
1 Moving Flank Truck
1 Stationary Frontal Truck

Table _____ Date_____Vehicle Number_____

Gunner _____Assistant Gunner_____

Evaluator's Signature _____

Table VIII B. Intermediate Crew Qualification (Night).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Time (Seconds)	Crew Duties	GO/NO-GO
1. Zero AN/TVS-5 to M2 HB Caliber .50 Machine Gun.	1 Stationary Frontal BRDM-2, 600 Meters.	Mix 15	NA	NA	NA	NA
2. Engage a Stationary Target (Moving).	1 Stationary Frontal BRDM-2, 600 Meters. NBC Environment.	Mix 25	2	22	____	GO NO-GO
3. Engage a Moving Target (Moving).	1 Moving Flank Truck, 800 Meters.	Mix 25	2	18	____	GO NO-GO
4. Engage Multiple Targets (Moving).	1 Moving Flank Motorcycle, 400 Meters; 1 Stationary Frontal BRDM-2, 600 Meters. NBC Environment.	Mix 50	5 2	22	____	GO NO-GO
5. Engage a Moving Target (Moving).	1 Moving Flank Motorcycle, 600 Meters.	Mix 25	5	18	____	GO NO-GO

Tasks Scored GO_____ x 100 = Points _____

- Crew Duties Penalties_____

= Total Points _____

Target Requirements
1 Stationary Frontal BRDM-2 (for zero)
2 Stationary Frontal BRDM-2s
2 Moving Flank Motorcycles
1 Moving Flank Truck

Table _____ Date_____Vehicle Number_____

Gunner _____Assistant Gunner_____

Tasks Scored GO: Table VIII A and B_____Qualified/Unqualified _____

Evaluator's Signature _____

MK 19 40-mm Grenade Basic and Intermediate Tables

On area target engagements (infantry squad, motorcycle, and RPG team), full credit is given when suppression (one round impacts within 5 meters of the target) is achieved within the time standards indicated in the task. On point target engagements (lightly armored vehicle targets, such as BRDM and BTR-70), full credit is given when the gunner scores two hits on the target. Area target arrays may be placed on line or in wedge formations. Area targets should not be more than 5 meters apart and will not extend beyond 30 meters in width or 20 meters in depth.

Note. The MK 19 must be fired from a stationary vehicle (moving vehicles fire from a short halt). Some ranges cannot support the ranges listed on these tables; however, all targets should be placed as close as possible to the range listed in each task.

TABLE I—MANIPULATION EXERCISE

Table I trains the gunner to zero the MK 19, develops coordination skills, and familiarizes the gunner with the weapon system. The gunner practices moving from one target to another in a random fashion, thus developing his skills to manipulate the weapon. These exercises are fired during the day only.

Scoring Procedures

Task 1 is not scored

Tasks 2 through 4 are scored. Time for these engagements starts when the evaluator announces "COMMENCE FIRING." Time stops when all targets have been engaged or the evaluator announces "CEASE FIRE," whichever occurs first.

Within the allotted time per exercise, the gunner must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task. Before progressing to Table II *(Tripod Exercise)*, the gunner should score GO on all graded tasks.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 20 rounds 40-mm TP.

Conduct of Fire

Using 40-mm TP ammunition, the gunner (moving from one target to another) fires the manipulation exercises using the proper techniques. Two stationary BRDM targets and three double E silhouettes are set in three target arrays in front of each weapon system at ranges between 400 meters and 1,100 meters. An additional BRDM target is centered at 400 meters for weapon zero.

Task l — Zero MK 1940-mm grenade machine gun.

Move the leaf sight plate to the midpoint between the two studs.

Move the rear sight slide to the meter mark representing the distance to the target.

Set the windage knob at the zero index line.

Align the sights on the base of the target using the traverse and elevation mechanism.

Fire a single round and spot the impact of the round. If it is on target, fire a short burst to confirm zero.

If the round is not on target, estimate the round (how short or long, right or left).

Adjust the elevation knob to move the sights onto the target. (If the round was short, move the elevation knob clockwise; if the round was long, move the elevation knob counterclockwise.)

Adjust the windage knob to move the impact right or left. (To adjust to the right, turn the windage knob counterclockwise; to adjust to the left, turn the windage knob clockwise.)

Before firing the next round, realign the sights and adjust the gun back on target using the traverse and elevation mechanism.

Notes. If the adjustment was correct, the second round should be on target; fire the rest of the rounds to confirm the zero. If the second round is not on target, repeat all steps.
If the impacts are not observed, bold adjustments may be needed.

Once the zero is completed, align the range plate scale at the exact range of the zero, and tighten it.

Tasks 2 through 5 — Engage stationary targets from a tripod-mounted weapon.

The gunner will observe the beaten zone and make adjustments, as necessary, to hit the targets.

After the gunner completes firing, he will clear the weapon and the AI will critique the gunner's performance.

Allowable Variations

None.

Table I. Manipulation Exercise.

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun (Tripod-Mounted).	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	NA	NA	NA	NA
2. Engage a Stationary Target (Tripod-Mounted) (Manipulation Exercise).	1 Stationary Frontal BRDM, 800 Meters.	40-mm TP 6	2	NA	NA	GO NO-GO
3. Engage a Stationary Target (Tripod-Mounted) (Manipulation Exercise) (Traverse and Search).	1 Stationary Frontal BRDM, 800 Meters.	40-mm TP 6	2	NA	NA	GO NO-GO
4. Engage a Stationary Target (Tripod-Mounted) (Manipulation Exercise) (Traverse and Search).	Infantry Squad, 600 Meters.	40-mm TP 4	1	NA	NA	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM (for zero)
2 Stationary Frontal BRDMs
7 IRETS (dismounted infantry)

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Evaluator's Signature _____ Tasks Scored GO _____

TABLE II—TRIPOD EXERCISE

Table II trains the gunner to zero the MK 19, engage targets with speed and accuracy, and acquire and engage targets under NBC conditions. These exercises are fired during the day only.

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. Engagement time starts when the target is fully exposed. Engagement time stops when the command "CEASE FIRE," is given.

Within the allotted time per exercise, the gunner must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 26 rounds 40-mm TP.

Conduct of Fire

Using 40-mm TP ammunition, the gunner acquires and engages stationary targets from a tripod-mounted weapon system. Target arrays are placed at ranges between 400 meters and 1,100 meters. An additional BRDM target is placed at 400 meters for weapon zero.

Task l — Zero MK 19 40-mm grenade machine gun. (See page 10-34.)

Tasks 2 through 5 — Engage stationary targets from a tripod-mounted weapon. (See page 10-35.)

Allowable Variations

The commander may change the sequence of the tasks.

Table II. Tripod Exercise.

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun (Tripod-Mounted).	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	NA	NA	NA	NA
2. Engage a Stationary Target (Tripod-Mounted).	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	2	1 Min	SAT UNSAT	GO NO-GO
3. Engage a Stationary Target (Tripod-Mounted).	1 Stationary Frontal BRDM, 800 Meters. NBC Environment.	40-mm TP 6	2	1 Min 30 Sec	SAT UNSAT	GO NO-GO
4. Engage a Stationary Target (Tripod-Mounted).	1 Stationary Frontal BRDM, 600 Meters.	40-mm TP 6	2	1 Min	SAT UNSAT	GO NO-GO
5. Engage a Stationary Target (Tripod-Mounted).	Infantry Squad, 600 Meters. NBC Environment.	40-mm TP 6	1	1 Min	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM (for zero)
3 Stationary Frontal BRDMs
7 IRETS (dismounted infantry)

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Evaluator's Signature _____ Tasks Scored GO _____

TABLE III—ADJUSTMENT OF FIRE (STATIONARY)

Table III trains the gunner to zero the MK 19, engage targets with speed and accuracy, and acquire and engage targets under NBC conditions. These exercises are fired vehicle mounted, during the day only.

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. Engagement time starts when the target is fully exposed. Engagement time stops when the command "CEASE FIRE" is given.

Within the allotted time per exercise, the gunner must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 26 rounds 40-mm TP.

Conduct of Fire

Using 40-mm TP ammunition, the gunner acquires and engages stationary targets from a stationary weapon system. Target arrays are placed at ranges between 400 meters and 1,100 meters. An additional BRDM target is placed at 400 meters for weapon zero.

Task l — Zero MK1940-rnm grenade machine gun. (See page 10-34.)

Tasks *2* through 5 — Engage stationary targets from a stationary weapon. (See page 10-35.)

Allowable Variations

The commander may change the sequence of the tasks.

If moving motorcycle targets are not available, use an infantry squad (7 IRETS).

Table III. Adjustment of Fire (Stationary).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	NA	NA	NA	NA
2. Engage a Stationary Target (Stationary).	Infantry Squad, 800 Meters.	40-mm TP 6	1	1 Min	SAT UNSAT	GO NO-GO
3. Engage a Stationary Target (Stationary).	1 Stationary Frontal Motorcycle, 400 Meters. NBC Environment.	40-mm TP 4	1	1 Min	SAT UNSAT	GO NO-GO
4. Engage a Stationary Target (Stationary).	1 Stationary Frontal Truck, 700 Meters.	40-mm TP 6	2	1 Min	SAT UNSAT	GO NO-GO
5. Engage a Stationary Target (Stationary).	1 Stationary Frontal Truck, 800 Meters. NBC Environment.	40-mm TP 6	2	1 Min 30 Sec	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM (for zero)
2 Stationary Frontal Trucks
1 Stationary Frontal Motorcycle
7 IRETS (dismounted infantry)

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Evaluator's Signature _____ Tasks Scored GO _____

TABLE IV—BASIC CREW QUALIFICATION

Table IV tests the gunner to ensure he can zero the MK 19, engage targets with speed and accuracy, and acquire and engage targets under NBC conditions. These exercises are fired vehicle mounted, during the day and night.

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. Engagement time starts when the target is fully exposed. Engagement time stops when the command "CEASE FIRE" is given.

Within the allotted time per exercise, the gunner must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task.

The crew must score GO on a total of six of the eight graded tasks on Tables IVA and IVB combined.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 50 rounds 40-mm TP and 12 rounds illumination:

- Table IVA: 26 rounds TP.
- Table IVB:
  — 24 rounds TP.
  — 12 rounds illumination.

Conduct of Fire

Using 40-mm TP ammunition, the gunner acquires and engages moving and stationary targets from a stationary weapon system. Target arrays are placed at ranges between 400 meters and 1,100 meters. An additional BRDM target is placed at 400 meters for weapon zero.

Task l — Zero MK 19 40-mm grenade machine gun. (See page 10-34.)

Tasks 2 through 5 — Engage moving and stationary targets from a stationary weapon. (See page 10-35.)

Allowable Variations

The commander may change the sequence of the tasks.

If moving motorcycle targets are not available, use an infantry squad (7 IRETS).

Table IV A. Basic Crew Qualification (Day).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	NA	NA	NA	NA
2. Engage a Moving Target (Defense).	1 Moving Flank Truck, 600 Meters.	40-mm TP 6	2	1 Min	SAT UNSAT	GO NO-GO
3. Engage a Moving Target (Defense).	1 Moving Flank Motorcycle, 600 Meters. NBC Environment.	40-mm TP 6	1	1 Min	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Defense).	1 Moving Flank BRDM, 600 Meters.	40-mm TP 6	2	1 Min	SAT UNSAT	GO NO-GO
5. Engage a Stationary Target (Defense).	Infantry Squad, 400 Meters.	40-mm TP 4	1	1 Min	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM (for zero)
1 Moving Flank Truck
1 Moving Flank BRDM
1 Moving Flank Motorcycle
7 IRETS (dismounted infantry)

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Evaluator's Signature _____ Tasks Scored GO _____

Table IV B. Basic Crew Qualification (Night).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 2	NA	NA	NA	NA
2. Engage a Moving Target (Defense).	1 Moving Flank BRDM, 600 Meters.	40-mm TP 6	2	1 Min	SAT UNSAT	GO NO-GO
3. Engage a Moving Target (Defense).	1 Moving Flank Truck, 600 Meters. NBC Environment.	40-mm TP 6	2	1 Min	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Defense).	1 Moving Flank Truck, 600 Meters.	40-mm TP 6	2	1 Min	SAT UNSAT	GO NO-GO
5. Engage a Stationary Target (Defense).	Infantry Squad, 400 Meters.	40-mm TP 4	1	1 Min	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM (for zero)
2 Moving Flank Trucks
1 Moving Flank BRDM
1 Moving Flank Motorcycle
7 IRETS (dismounted infantry)

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tasks Scored GO: Table IV A _____ Table IV B _____

Evaluator's Signature _____ Total Tasks Scored GO _____

TABLE V—ADJUSTMENT OF FIRE (MOVING)

Table V trains the gunner to zero the MK 19, engage targets with speed and accuracy, and acquire and engage targets under NBC conditions. These exercises are fired during the day and night.

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. (See *Evaluation Procedures* on page 10-4.)

Within the allotted time per exercise, the gunner must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task.

The crew must score GO on six of the eight graded tasks on Tables VA and VB combined.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 52 rounds 40-mm TP and 10 rounds illumination:

- Table VA: 28 rounds TP.
- Table VB:
  — 24 rounds TP.
  — 10 rounds illumination.

Conduct of Fire

Using 40-mm TP ammunition, the gunner acquires and engages moving and stationary targets from a stationary weapon system. Target arrays are placed at ranges between 400 meters and 1,100 meters. An additional BRDM target is placed at 400 meters for weapon mm.

Task l — Zero MK1940-mm grenade machine gun. (See page 10-34.)

Tasks 2 through 5 — Engage moving and stationary targets from a stationary weapon. (See page 10-35.)

Allowable Variations

The commander may change the sequence of the tasks.

If moving motorcycle targets are not available, use an infantry squad (7 IRETS).

Table V A. Adjustment of Fire (Moving) (Day).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	NA	NA	NA	NA
2. Engage a Moving Target (Defense).	1 Moving Flank Truck, 1,000 Meters. NBC Environment.	40-mm TP 8	2	1 Min 30 Sec	SAT UNSAT	GO NO-GO
3. Engage a Stationary Target (Offense).	1 Stationary Frontal BRDM, 800 Meters.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Offense).	1 Moving Flank Motorcycle, 400 Meters.	40-mm TP 4	1	1 Min	SAT UNSAT	GO NO-GO
5. Engage a Stationary Target (Offense).	1 Stationary Frontal Truck, 600 Meters. NBC Environment.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM (for zero)
1 Stationary Frontal Truck
1 Stationary Frontal BRDM
1 Moving Flank Truck
1 Moving Flank Motorcycle

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Evaluator's Signature _____ Tasks Scored GO _____

Table V B. Adjustment of Fire (Moving) (Night).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 2	NA	NA	NA	NA
2. Engage a Moving Target (Offense).	1 Moving Flank Motorcycle, 400 Meters.	40-mm TP 4	1	45 Sec	SAT UNSAT	GO NO-GO
3. Engage a Stationary Target (Offense).	1 Stationary Frontal Truck, 600 Meters. NBC Environment.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Offense).	1 Moving Flank, BRDM, 600 Meters.	40-mm TP 6	2	1 Min 30 Sec	SAT UNSAT	GO NO-GO
5. Engage a Stationary Target (Defense).	1 Stationary Frontal BRDM, 800 Meters.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM *(for zero)*
1 Stationary Frontal Truck
1 Stationary Frontal BRDM
1 Moving Flank BRDM
1 Moving Flank Motorcycle

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tasks Scored GO: Table V A _____ Table V B _____

Evaluator's Signature _____ Total Tasks Scored GO _____

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TABLE VI—NOT USED

TABLE VII—PRACTICE FOR QUALIFICATION

Table VII trains the gunner to zero the MK 19, engage targets with speed and accuracy, and acquire and engage targets under NBC conditions. These exercises are fired during the day and night.

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. (See *Evaluation Procedures* on page 10-4.)

Within the allotted time per exercise, the gunner must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task.

The crew must score GO on six of the eight graded tasks on Table VIIA and VIIB combined.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 52 rounds 40-mm TP and 10 rounds illumination:

- Table VIIA: 26 rounds TP.
- Table VIIB:
  — 26 rounds TF.
  — 10 rounds illumination.

Conduct of Fire

Using 40-mm TP ammunition, the gunner acquires and engages stationary and moving targets from a stationary weapon system. Target arrays are placed at ranges between 400 meters and 1,100 meters. An additional BRDM target is placed at 400 meters for weapon zero.

Task l — Zero MK1940-rnm grenade machine gun. (See page 10-34.)

Tasks 2 through 5 — Engage moving and stationary targets from a moving or stationary weapon. (See page 10-35.)

Allowable Variations

The commander may change the sequence of the tasks.

If moving motorcycle targets are not available, use an infantry squad (7 IRETS).

Table VII A. Practice for Qualification (Day).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	NA	NA	NA	NA
2. Engage a Moving Target (Offense).	1 Moving Flank Motorcycle, 400 Meters.	40-mm TP 4	1	45 Sec	SAT UNSAT	GO NO-GO
3. Engage a Moving Target (Defense).	1 Moving Flank BRDM, 600 Meters.	40-mm TP 6	2	1 Min 30 Sec	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Defense).	1 Moving Flank Truck, 800 Meters. NBC Environment.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO
5. Engage a Stationary Target (Offense).	1 Stationary Frontal Truck, 800 Meters.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM (for zero)
1 Moving Flank Truck
1 Moving Flank BRDM
1 Moving Flank Motorcycle
1 Stationary Frontal Truck

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Evaluator's Signature _____ Tasks Scored GO _____

Table VII B. Practice for Qualification (Night).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 2	NA	NA	NA	NA
2. Engage a Moving Target (Defense).	1 Moving Flank Truck, 600 Meters.	40-mm TP 6	2	1 Min 30 Sec	SAT UNSAT	GO NO-GO
3. Engage a Moving Target (Offense).	1 Moving Flank Truck, 600 Meters.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO
4. Engage a Moving Target (Defense).	1 Moving Flank BRDM, 600 Meters. NBC Environment.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO
5. Engage a Stationary Target (Offense).	1 Stationary Frontal Truck, 800 Meters.	40-mm TP 6	2	2 Min	SAT UNSAT	GO NO-GO

Target Requirements
1 Stationary Frontal BRDM (for zero)
1 Moving Flank Truck
2 Moving Flank BRDMs
1 Stationary Frontal Truck

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tasks Scored GO: Table VII A _____ Table VII B _____

Evaluator's Signature _____ Total Tasks Scored GO _____

TABLE VIII—INTERMEDIATE CREW QUALIFICATION

Table VIII tests the gunner to ensure he can zero the MK 19, engage targets with speed and accuracy, and acquire and engage targets under NBC conditions. These exercises are fired during the day and night.

Scoring Procedures

Task 1 is not scored.

Tasks 2 through 5 are scored. (See *Evaluation Procedures* on page 10-4.)

Within the allotted time per exercise, the gunner must obtain the minimum hits per target (as listed in *Hits* column) to score GO on each task. The crew receives 100 points for each of the eight graded tasks scored as GO; a 5-point penalty is subtracted for each crew error. There are five possible crew errors for the MK 19 for a possible crew duty penalty of 25 points:

- Firing before receiving the command to fire.
- Incorrect engagement techniques (for example, engaging a *least dangerous* target before a *most dangerous* target).
- Increase driving technique (for example, driver does not maintain course speed).
- Failure to fire from a short halt (MK 19 only).
- Crew does not adhere to the conditions of the firing task (for example, failure to mask during an NBC engagement).

These crew errors do not affect the GO/NO-GO rating of the task. To qualify, the crew must score GO on six of the eight graded tasks on Tables VIII A and B combined. The crew qualification standards are as follows:

- *Distinguished:* Qualified on 8 of 8 tasks on Table VIII A and B combined.
- *Superior:* Qualified on 7 of 8 tasks on Table VIII A and B combined.
- *Qualified:* Qualified on 6 of 8 tasks on Table VIII A and B combined.
- *Unqualified:* Qualified on 5 or fewer tasks on Table VIII A and B combined.

Ammunition Issue

The ammunition for this exercise will be broken down at the ammunition point. The total ammunition for this exercise is 54 rounds 40-mm TP and 10 rounds illumination:

- Table VIIIA: 28 rounds TP.
- Table VIIIB:
  — 26 rounds TP.
  — 10 rounds illumination.

Conduct of Fire

Using 40-mm TP ammunition, the gunner acquires and engages stationary and moving targets from a stationary weapon system. Target arrays are placed at ranges between 400 meters and 1,100 meters. An additional BRDM target is placed at 400 meters for weapon zero.

Task 1 — Zero MK 19 40-mm grenade machine gun. (See page 10-34.)

Tasks 2 through 5 — Engage moving and stationary targets from a moving or stationary weapon. (See page 10-35.)

Allowable Variations

The commander may change the sequence of the tasks.

If moving motorcycle targets are not available, use an infantry squad (7 IRETS).

Table VIII A. Intermediate Crew Qualification (Day).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	NA	NA	NA	NA
2. Engage a Moving Target (Defense).	1 Moving Flank Truck, 800 Meters.	40-mm TP 6	2	2 Min	____	GO NO-GO
3. Engage a Stationary Target (Defense).	1 Stationary Frontal BRDM, 800 Meters. NBC Environment.	40-mm TP 6	2	2 Min	____	GO NO-GO
4. Engage a Stationary Target (Offense).	Infantry Squad, 600 Meters.	40-mm TP 6	1	1 Min	____	GO NO-GO
5. Engage a Stationary Target (Offense).	1 Stationary Frontal, Truck, 800 Meters.	40-mm TP 6	2	2 Min	____	GO NO-GO

Tasks Scored GO_____ x 100 = Points _____

- Crew Duties Penalties_____

= Total Points _____

Target Requirements
1 Stationary Frontal BRDM (for zero)
1 Stationary Frontal BRDM
1 Stationary Frontal Truck
1 Moving Flank Truck
7 IRETS (dismounted infantry)

Table _____ Date_____Vehicle Number_____

Gunner _____Assistant Gunner_____

Evaluator's Signature _____

Table VIII B. Intermediate Crew Qualification (Night).

Task	Conditions/ Target/Situation	Ammo/ Rds	Standards Hits	Standards Time	Crew Duties	GO/NO-GO
1. Zero Mark 19 Grenade Machine Gun.	1 Stationary Frontal BRDM, 400 Meters.	40-mm TP 4	NA	NA	NA	NA
2. Engage a Moving Target (Defense).	1 Moving Flank BRDM, 800 Meters.	40-mm TP 6	2	2 Min	____	GO NO-GO
3. Engage a Stationary Target (Offense).	Infantry Squad, 500 Meters. NBC Environment.	40-mm TP 4	1	2 Min	____	GO NO-GO
4. Engage a Moving Target (Defense).	1 Moving Flank Truck, 700 Meters. NBC Environment.	40-mm TP 6	2	2 Min	____	GO NO-GO
5. Engage a Moving Target (Offense).	1 Moving Flank Truck, 600 Meters.	40-mm TP 6	2	1 Min 30 Sec	____	GO NO-GO

Tasks Scored GO_____ x 100 = Points _____

- Crew Duties Penalties_____

= Total Points _____

Target Requirements
1 Stationary Frontal BRDM (for zero)
2 Moving Flank Trucks
1 Moving Flank BRDM
7 IRETS (dismounted infantry)

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tasks Scored GO: Table VIII A and B _____ Qualified/Unqualified _____

Evaluator's Signature _____

TOW Basic and Intermediate Tables

TABLES I AND II

TOW Gunnery Tables I and II train the basic TOW gunnery skills. Table I *(Individual Gunnery Practice)* prepares the gunner for Table II *(Individual Gunnery Qualification)* These tables should be conducted using the TOW GT. The trainer must construct a planned group of basic skill exercises. (See TM 9-6920-452-10 for a complete list of exercises on the TOW GT.)

When the TOW GT is ready for operation, the planned group has been constructed, and the gunner has been briefed and is in place, the trainer begins the first mission. At the beginning of each mission, the trainer gives the gunner a fire command and tells him to fire when ready. During the mission, the trainer does not coach the gunner in any way. The gunner must make a determination of when to fire and at which target. After each mission, the trainer gives the gunner the results then proceeds to the next mission.

Notes. The trainer has the option of thoroughly debriefing the gunner on his performance at the end of each mission or saving all 10 missions and reviewing them after the table is complete. The trainer must remember that the TOW GT will save a maximum of 20 missions at one time.

Units that do not have the TOW GT may conduct Tables I and II using the M70-series training set, M80 blast simulators, and a target vehicle equipped with an M70 target board.

For each table, the gunner must fire at least two 10-shot events. The trainer will record the results from each mission on DA Form 5107-R. To qualify on a table and progress to the next table, the gunner must receive a minimum of 550 points (tripod-mounted systems) or 600 points (vehicle-mounted systems) for one 10-shot event. If the gunner does not obtain the minimum score on a table, he should refire that table before progressing to the next table.

TABLES III AND IV

Table III *(Advanced Gunnery Practice)* prepares the gunner for Table IV *(Advanced Gunnery Qualification)*. The trainer must construct a planned group consisting of a series of missions that train and test the gunner's ability to track and hit targets and perform advanced gunnery skills. (See TM 9-6920-452-10 for a complete list of exercises on the TOW GT.) Only the assigned gunners in each squad are required to verify on Tables III and IV. (Other members of the squad may perform the tables if time permits.)

Along with basic gunnery skills, Tables III and IV train the following advanced gunnery skills:

- Determining if a target can be engaged with the TOW.
- Identifying targets (identify friend, foe, or neutral [IFFN]).
- Prioritizing targets.
- Determining the correct fire control method.
- Engaging targets that are evasive, obscured, hard to track, or at extreme ranges.

Tables III and IV must be conducted using the TOW GT; units that do not have the TOW GT cannot conduct Tables III and IV. The sequence of missions in each 10-shot event should be changed continuously to prevent the gunner from becoming familiar with them.

The trainer constructs the planned group according to TM 9-6920-452-10. Before each mission, the trainer must present the gunner with a fire command that clearly states what the gunner must do. Some missions (determining if a target may be engaged by TOW, engaging evasive or obscured targets, and identifying targets [IFFN]) may not require specific fire commands; the trainer need only give general instructions such as "GUNNER-TARGETS TO YOUR FRONT-FIRE WHEN READY!" Other missions (prioritizing targets—tanks as higher priority than APCs), the trainer gives the command "GUNNER-TARGETS TO YOUR FRONT-ENGAGE TANKS FIRST—FIRE WHEN READY!"

Tables III and IV gunnery is scored in the same manner as Tables I and II, except for target identification (IFFN) missions. If the gunner correctly identifies a target as friendly and does not fire on it, he receives 100 points. If he fires on a friendly target, he receives zero points whether he hits the target or not.

For each table, the gunner must fire at least two 10-shot events. The trainer must not only observe and record the gunner's tracking performance but brief, observe, and score the particular advanced gunnery task presented in each mission. To progress to the next table, the gunner must achieve a GO on at least 6 of 10 missions and receive a minimum of 550 points (tripod-mounted systems) or 600 points (vehicle-mounted systems) for one 10-shot event. If the gunner fails to meet the minimum qualification standards, he must retrain on Table III before firing Table IV. The trainer will record the gunner's performance on DA Form 5107-R.

On Table IV, the total tracking score (add scores from all 10 missions) determines the gunner's classification-expert, first class, second class, or unqualified as follows:

- Expert 750 to 1,000 (Tripod) 800 to 1,000 (Vehicle)
- 1st class 650 to 749 (Tripod) 700 to 799 (Vehicle)
- 2d Class 550 to 649 (Tripod) 600 to 699 (Vehicle)
- Unqualified 0 to 549 (Tripod) 0 to 599 (Vehicle)

The requirements for a mission to be scored as GO vary according to the advanced gunnery task that is presented in each mission. A successful mission is defined as follows:

- The gunner successfully engages (destroys) the correct target as determined by the trainer's instructions for that particular mission.
  - — In a mission to determine if a target can be engaged with a TOW, a hit on any target presented that can be destroyed by TOW is scored as a GO.
  - — In scenarios to prioritize targets or determine the method of fire control, the gunner must engage the correct target according to the instructions given to him in the fire command.
- In a scenario to identify targets (IFFN), the gunner must not fire on friendly targets.

Note. Evasive and obscured targets do not require special actions from the gunner to be scored as GO; they are simply targets that are hard to hit. A hit on any target is scored as a GO.

TABLES V AND VI

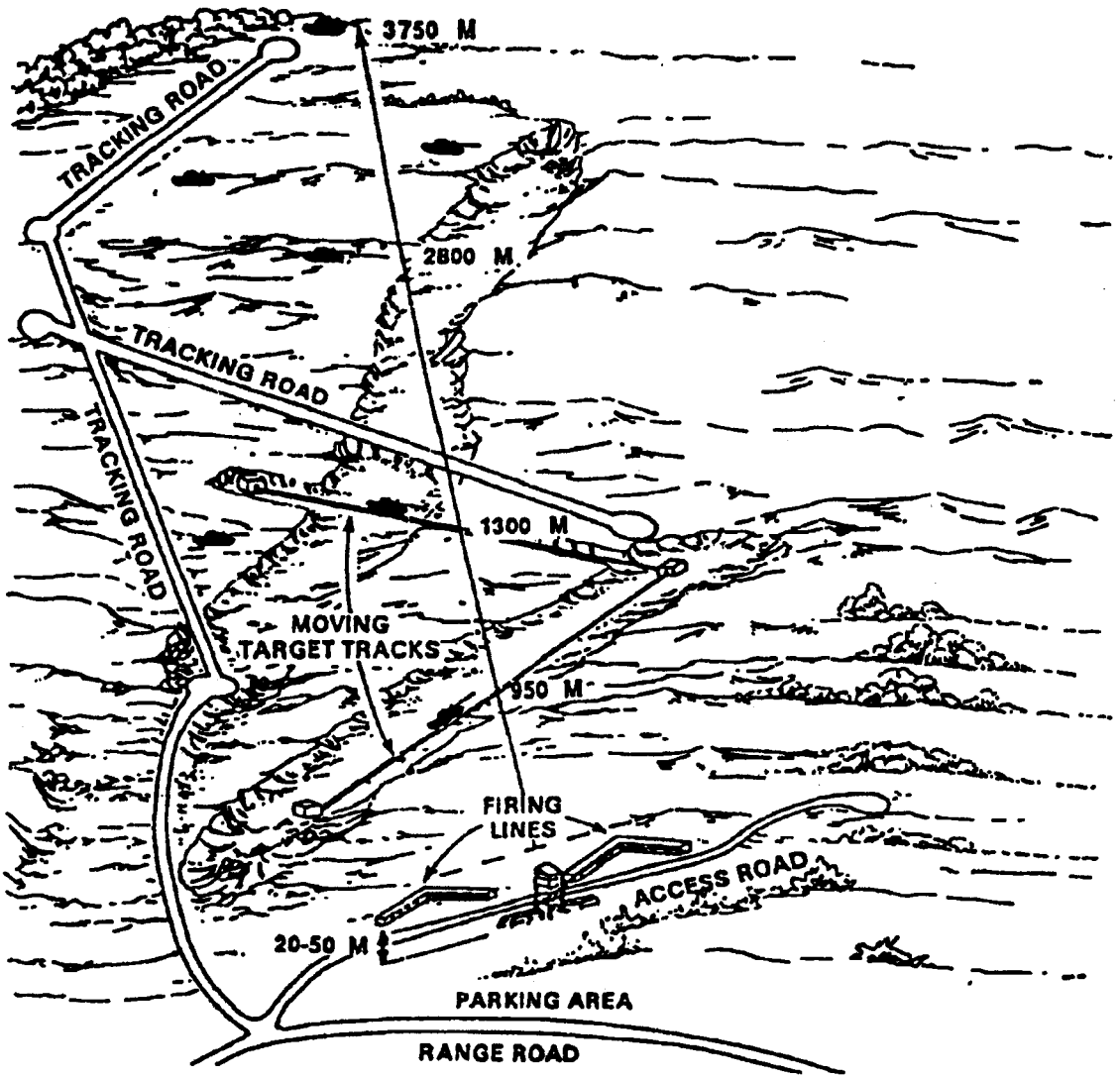
Table V *(Baseline Gunnery Practice)* prepares the gunner for Table VI *(Baseline Gunnery Qualification)*. Each table is performed, once during the day and once during the night, under realistic (simulated) battlefield conditions. Some of the engagements will be performed with the crew in MOPP 4.

Tables V and VI allow the crews to troubleshoot the equipment (MILES or TOW FTT) and refresh crews on MILES/TOW FIT gunnery and target engagement techniques to prepare the crews for the practice and qualification tables that follow.

Range Layout

Tables V through VIII are fired on an antiarmor tracking and live-fire range, as depicted in Figure 10-7.

Figure 10-7. Antiarmor Tracking and Live-Fire Range.



Scoring Procedures

Task 1 is not scored.

Tasks 2 through 6 are scored. To count as a successful engagement, the target must be kllled within 30 seconds after exposure. Engagement time begins when the target is exposed (for multiple targets from the same position, time begins each time the vehicle stops in the firing position. Each task counts as 100 points. (For tasks with multiple engagements, divide 100 by the number of targets presented to find the points for each target.) The scores for all engagements are then added.

Each table must be fired both day and night. Total maximum score for either day or night is 500 points for a maximum total of 1,000 points. Squads should achieve a minimum of 700 points on Table V before progressing to Table VI.

Conduct of the Range

Each task consists of one or more target engagements from one firing position. All firings will be from an unmasked position. All reloads will be made from a hide position. The systems and carriers are set up in static positions on a baseline; the systems do not move but engage a series of moving or pop-up targets from the baseline, All stationary targets should be mounted on pop-up mechanisms to facilitate target acquisition and scoring. Moving targets should be presented at speeds from 5 to 40 kph.

Note. If pop-up mechanisms are not available, exposed stationary targets will be placed in an appropriate array. If exposed targets must be used, the exercise should be designed so targets are presented only to the position from which they should be engaged.

The crew must successfully install, troubleshoot, and operate the MILES/TOW FTT equipment in accordance with the appropriate TM. The crew must also successfully acquire, engage, and destroy 6 of 10 targets presented in each table (once during daylight and once at night).

Note. DA Form 5107-R will be used to record the crew's score (day or night).

Tables V/VI. Baseline Gunnery Practice/Qualification.

Task	Conditions/ Target/ Situation	Points Per Target	Task Score
1. Install MILES/ TOW FTT.	NA	NA	NA
2. Engage a Stationary Target.	1 Stationary Flank T72; 1,000 to 1,500 Meters.	_____ _____	___
3. Engage Multiple Stationary Targets.	1 Stationary Frontal T72, 1 Stationary Flank T72; 1,000 to 1,500 Meters.	_____ _____	_____
4. Engage Multiple Targets.	1 Stationary Frontal T72, 1 Moving Flank T72; 1,600 to 2,000 Meters.	_____ _____	_____
5. Engage Multiple Stationary Targets.	2 Stationary Turret T72s, 800 to 1,500 Meters. NBC Environment.	_____ _____	_____
6. Engage Multiple Targets.	2 Stationary Frontal T72s, 1 Moving Flank T72; 2,100 to 3,750 Meters.	_____ _____ _____	_____

Table _____ Date _____ Squad _____

Section _____ Platoon _____

Day Score _____ Night Score _____

Evaluator's Signature _____ Total Score _____

Note. Tables V and VI must be fired both day and night.

TABLES VII AND VIII

Table VII *(Squad Gunnery Practice)* prepares the squad for Table VIII *(Squad Gunnery Qualification).* These tables train and evaluate the TOW squad on its ability to engage stationary and moving targets in a simulated battlefield scenario, Tables VII and VIII (and all subsequent tables) are moving exercises; the firing vehicle moves from point to point and engages a series of targets.

Note. A range with pop-up or moving targets equipped with MILES LTIDs or the TOW FTT equivalent should be used, if available. If such a range is not available, tactical vehicles equipped with MILES harnesses or the TOW FTT equivalent may be used.

Range Layout

Tables VII and VIII are fired on an antiarmor tracking and live-fire range. (See Figure 10-7 on page 10-56.)

Scoring Procedures

To count as a successful engagement, the target must be killed within the exposure time listed for each task. Each task counts as 100 points. (For tasks with multiple engagements, divide 100 by the number of targets presented to find the points for each target.) Any crew or leader cuts are deducted from this score.

- Crew 5-point penalties.
  - — Giving improper fire commands.
  - — Firing before receiving command to fire.
  - — Incorrect engagement techniques (such as engaging the least dangerous target before the most dangerous target).
- Crew 30-point penalties.
  - — Failure to conduct system self-test/boresight before engaging first target.
  - — Failure to collimate daysight/nightsight before engaging first target.
  - — Failure to assume MOPP 4 and close all doors during NBC engagement.
  - — Engaging friendly targets.
  - — Failure to go to defilade position while reloading.
- Leader 30-point penalty. Failure to distribute and control section fires properly.

Each table must be fired both day and night. Total maximum score for either day or night is 500 points for a maximum total of 1,000 points. Squads must achieve a minimum of 700 points on Table VII to progress to Table VIII.

The scores for the two events are added together (maximum possible score is 1,000 points) for the total score for each gunnery table.

Conduct of the Range

During move-out scenarios, the senior trainer is normally to the rear of the leader's vehicle, for evaluation and training purposes. An assistant evaluator is normally assigned to each additional vehicle evaluated as part of the same exercise. Scoring for night engagements will be made by both evaluators. Evaluators must monitor crew conversations and fire commands.

The following support requirements are recommended when conducting TOW Gunnery Table VII:

- Evaluators (evaluators will not assist the gunner in finding or identifying targets):
  — One evaluator per squad.
  — One evaluator in the range tower to record scores on engagements.
  Opposing forces: None.
- Support troops: None.
- Vehicles/communications:
  — One PRC 77/68 per squad evaluator.
  — Two PRC 77/68 for the tower evaluator (one primary, one spare).
  — One AN/GRA 39 for tower to record fire commands.
- Maneuver area
  — Multipurpose range complex.
  — A route for the element to move from the assembly area to the first firing position without damaging the underground wiring.
- Firing area:
  — The TOW backblast area (75 meters by 90 degrees) will be clear.
  — Area in which smoke may be used.
  — Training aids, devices, and special equipment:
  — MILES equipment for the TOW squad (extended range TOW) or TOW FIT gear if available.
  — Sufficient LTIDs or TOW FIT receivers to cover the targets.
- Ammunition: Ten ATWESS cartridges per TOW, per iteration.
- References: FM 7-91 and FM 23-34.

Note. Because this table is conducted on an MPRC, marking the firing positions may be necessary. At night, the roads should be marked with luminous tape.

Tables VII/VIII. Squad Gunnery Practice/Qualification.

Task	Conditions/ Target/Situation	Exposure Time		Hits/ Crew Cuts	Points/ Total
1. Engage a Target.	1 Stationary T72, 1,500 to 2,000 Meters. (Baseline).	27 Sec 27 Sec	MILES FTT	_____ _____	_____
2. Engage Multiple Targets.	1 Stationary BMP, 1 Moving T72; 1,200 to 2,500 Meters. (Phase Line 1).	2.5 Min 2.28 Min	MILES FTT	_____	_____
3. Engage Multiple Targets.	1 Stationary BMP, 2 Moving T72s; 3,000 to 3,750 Meters. (Phase Line 1).	4.18 Min 2.28 Min	MILES FTT	_____ _____	
4. Engage Multiple Targets.	1 Stationary BMP, 1 Moving T72; 1,500 to 2,000 Meters. (Phase Line 1). NBC Environment.	2.07 Min 2.08 Min	MILES FTT	_____ _____	_____
5. Engage Multiple Targets.	1 Stationary BMP, 1 Moving T72; 2,500 to 3,000 Meters. (Baseline). NBC Environment.	2.55 Min 2.56 Min	MILES FTT	_____ _____	_____

Table _____ Date _____ Squad _____

Section _____ Platoon _____

Day Score _____ Night Score _____

Evaluator's Signature _____ Total Score _____

Note. Tables VII and VIII must be fired both day and night.

Section III. SCOUT SECTION GUNNERY

Tables IX and X are used to train and evaluate the scout section's ability to conduct reconnaissance and limited security missions and to engage stationary and moving targets. Table IX trains section gunnery; Table X evaluates the scout sections.

Units may use device-based gunnery to train before a major gunnery density. Available resources (time, training area, range facilities, and ammunition) will determine the commander's method of training.

An AAR for the entire section will be conducted upon completion of each table. The evaluator will debrief each section on its strengths and weaknesses. Videotaped exercises provide visual feedback (of both positive and negative actions) to the section and should be used whenever possible.

Note. Because of the maneuvering constraints required by safety standards when firing MK 19 practice ammunition, these section tables cannot be fired on all ranges using the MK 19 weapon system.

Tactical Training

The focus of the tactical scenario used for these tables must be on the scout's primary mission of collecting and reporting information. The scout's ability to use his combat resources (direct- and indirect-fire assets) effectively while remaining undetected on the battlefield must be evaluated.

TASK LIST

To maintain tactical emphasis throughout the scout section tables, a standard list of nine combat critical tasks are mandatory in each table. Scenarios for each table will include the nine critical tasks and a minimum of three commander-selected tasks (total of twelve tactical tasks per table). Using the information provided as a guide, the commander designs his own tables, based on resources available and the unit's training needs. (The score sheets in this chapter are examples only.) This flexibility ensures that each unit receives the training required for their scout sections to function effectively.

Required combat critical tasks for Tables IX and X:

- Execute action on contact.
- Report enemy information.
- Call for and adjust indirect fire.
- Conduct tactical movement.
- Control scout section fires.
- Conduct a screen.
- Perform a passage of lines.
- Select firing positions
- Perform a zone reconnaissance.

Based on the METL, the commander may choose from, but is not limited to, the following tasks for the tactical scenario:

- Coordinate with adjacent platoon.
- Perform an area reconnaissance.
- Perform a route reconnaissance.
- Perform reconnaissance by fire.
- Prepare a route reconnaissance overlay.
- Emplace and retrieve a hasty protective minefield.
- Reorganize a squad following enemy contact while in the defense.
- Conduct unmasking procedures.
- Cross a chemically contaminated area.
- Prepare and submit NBC 1 reports.
- React to indirect fire.

Terrain, weather, and distance between engagements dictate course time. Tactical tasks may be conducted at a nearby training area if range areas are not extensive enough to allow tactical maneuvering; however, total integration of gunnery and tactics is preferred to maximize the training effectiveness of these tables.

EVALUATION PROCEDURES

To evaluate the tactical tasks, the evaluator may use the performance checklists provided in Appendix B; commanders may add subtasks to the checklists to reflect more accurately their METL. To evaluate tasks not included in Appendix B, the evaluator may develop performance checklists using ARTEP 17-57-10-MTP.

These evaluation procedures allow sections to train and practice the skills normally performed in combat. Evaluators will use AARs to critique sections upon completion of the tables.

Resources

Live-fire gunnery requires a multilane range facility (such as a multipurpose range complex [MPRC]) which will allow at least two vehicles to maneuver as a section. Local range SOPS will dictate support requirements.

Device-based gunnery requires the use of MILES. Equipping a scout section with MILES is simple; however, inattention to detail and failure to boresight or follow checkout procedures properly will cause a serious training degradation. Including MILES in the precombat inspection will help identify and correct shortcomings. Whenever MILES is used, ensure the mounting and checkout procedures are in accordance with TC 25-6-1.

Both device-based and live-fire gunnery tables require evaluator support. Evaluators will be identified, trained, and scheduled before the conduct of the table. A scoring packet with performance checklists and score sheets, scenarios, operation orders (OPORD), and sequence of events will be provided to the evaluator. Internal evaluation is acceptable; however, external evaluation is preferred.

To assist the commander in identifying resources needed for table execution, the following is a list of recommended equipment.

For live-fire gunnery:

- MPRC or suitable facility allowing two or more vehicles to maneuver as a section.
  — TOW backblast area (75 meters by 90 degrees) will be clear.
  — Area in which smoke may be used.
- Class V consisting of, but not limited to-
  — Caliber .50 four-and-one mix, 40-mm TP, or ATWESS.
  — Artillery simulators.
  — Smoke pots.
  — Red smoke grenades.
  — White smoke grenades.
  — Green smoke grenades.
  — Red star clusters.
  — White or green star clusters.
  — Illumination.

For device-based training:

- Training area 1 kilometer by 2 kilometers or larger.
- MILES equipment for each vehicle consisting of—
  — TM 9-1265-375-10.
  — Laser transmitter.
  — Man-worn helmet and torso harness detector assemblies.
  — Combat vehicle kill indicator.
  — Control console.
  — Battery box assembly.
  — Target-holding mechanisms with MILES target interface devices or OPFOR with VISMODS and MILES.
  — MILES controller guns.

- Class V consisting of, but not limited to—
  - — Caliber .50 blank.
  - — Hoffman devices.
  - — Artillery simulators.
  - — Smoke pots.
  - — Red smoke grenades.
  - — White smoke grenades.
  - — Green smoke grenades.
  - — Red star clusters.
  - — White or green star clusters.
  - — Illumination.

Other resources needed for both live-fire gunnery and device-based training:

- Evaluators and support packages consisting of—
  - — Score sheets.
  - — Performance checklists.
  - — Sequence of events.
  - — OPORD.
  - — Scenario.
  - — Dual net radio capability.
  - — Night vision devices.
  - — Vehicles for evaluators.
  - — Medical support as required by local SOP.
  - — Any items required by the supporting range facility SOP.

Table IX-Section Training Course

The section training course is used to train and evaluate scout section tactical and gunnery skills in preparation for Table X. It must be designed to evaluate, as a minimum, the nine combat critical tasks, three commander-selected tactical tasks, and the gunnery tasks. At least one NBC engagement will be planned within each table scenario. Day firing should precede night firing whenever possible.

Each crew in the section must have successfully qualified Table VIII within six months of firing Table IX.

Note. Due to crew turbulence, minimum requirement is 75 percent of the vehicle commanders and gunners in the section must have qualified in their respective positions within the last six months.

Each vehicle crew member must have passed the gunnery skills test (appropriate tasks for his specific weapon) in the position he will occupy in accordance with Appendix A.

SCORING PROCEDURES

All tasks are scored (see *Evaluation Procedures* on page 10-4).

Each table uses a 1,000-point scoring system (maximum points for tactics and gunnery combined is 1,000). The breakdown of scoring is as follows:

Tactics are worth 60 percent (600 points).

Note. Commanders may use the following formula to determine total tactical points; or, at the commander's option based on METL importance, point values may be assigned for each task. Total cumulative tactical points must not exceed 600.

To determine the number of tactical points awarded—

- Divide the number of tactical tasks passed by the number of tactical tasks (day and night combined) possible to establish a percentage:
  Tasks Passed ÷ Tasks Possible = Percentage
  9 ÷ 12 = .75
- Multiply by 600 possible tactical points:
  .75 X 600= 450
- The result is the points awarded for the tactical evaluation.

Gunnery is worth 40 percent or 400 points. Use the following formula to determine the number of gunnery points awarded.

- Divide the number of targets destroyed by the number of targets presented (combining day and night phases) to establish a percentage:
  Targets Destroyed ÷ Targets Presented = Percentage
  8 ÷ 10 = .80

- Multiply by 400 gunnery points:
  .80 X 400= 320
- The total points awarded is determined by adding the scores from the tactical and gunnery portions.

  450 (tactical) + 320 (gunnery)= 770 total

Each scout section is required to achieve a minimum qualifying score on Table IX prior to firing Table X. Minimum qualifying scores on tactics and gunnery areas follows:

- 70 percent of tactical tasks-420 points out of 600 points.
- 70 percent of targets presented (gunnery)-280 points out of 400 points.

Note. To determine the gunnery score without mathematical calculations, see the matrix in Figure 10-8 on page 10-75.

AMMUNITION ISSUE

The ammunition for this exercise will be broken down at the ammunition point. The ammunition for this exercise includes 10 rounds of illumination for each section and the following for each crew:

- Caliber .50: 14 rounds per target.
  14 rounds for zero.
- 40-mm TP: 10 rounds per target.
  4 rounds for zero.

CONDUCT OF THE RANGE

A two-vehicle section uses reconnaissance and engagement techniques against threat targets. The section detects elements of an enemy force, identifies the elements, and acquires and engages targets as appropriate. Moving and stationary targets appear individually and simultaneously. The minimum recommended area for this training is 1 kilometer by 2 kilometers.

Target arrays should be consistent with the type of threat forces a section could expect to encounter in combat. Based on the METL, the commander determines the number and types of targets to be engaged. At no time will the number of targets exceed the number of rounds allocated by DA Pam 350-38. The number and type of targets must be based on the weapons and size of the scout section. Thermal targets should be used to represent accurate thermal signatures of threat vehicles. When appropriate to the scenario, hostile fire simulators may be used to simulate the threat vehicle(s) firing at the section.

ALLOWABLE VARIATIONS

The commander may change the sequence of the tasks.

Table IX may be conducted in a live-fire or laser-fire mode, at the commander's discretion.

Live-fire, full-caliber gunnery integrated with tactical tasks is preferred; however, range and maneuver constraints may dictate conducting separate tactical and gunnery portions.

Note. On the advanced tables (Tables IX and X), the section is evaluated on its ability to perform tactical operations, in accordance with ARTEP 17-57-10 MTP, FM 17-98, and unit SOP.

Table IX A. Section Training Course (Day).

Task	Conditions/ Target/Situation	Tactical Tasks	Score Gunnery	Score Tactics
1. Conduct zone reconnaissance.	Order to conduct zone reconnaissance.	Conduct zone reconnaissance.	____	____
2. Establish screen.	Order to establish screen.	Conduct screen. Select firing positions.	____	____
3. Section detects reconnaissance patrol.	Section observes 2 BRDMs, 1BMP 1,000 to 1,500 meters.	Perform action on contact. Report enemy information.	____	____
4. Section develops situation and reports.	Section observes 5 BTR 60s, 4 T72s; 3,000 to 3,500 meters.	Call for and adjust indirect fire. Report enemy information.	____	____
5. Section develops situation and reports.	Section observes enemy advancing and is engaged by direct fire. 3 BTR 60s, 1 T72; 1,500 to 2,000 meters.	Call for and adjust indirect fire. Control scout section fires. Report enemy information.	____	____
6. Section continues to develop situation and requests permission to delay back to phase line specified in OPORD.	Section observes enemy continuing to advance. 3 BMPs, 2 BTRs; 800 to 1,200 meters.	Control scout section fires. Conduct tactical movement. Report enemy information.		
7. Section bounds to subsequent phase line and conducts passage of lines.	Section observes enemy continuing to advance and is ordered to conduct passage of lines at grid.	Conduct passage of lines. Reorganize and reconsolidate.	____	____

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tactical Points _____ Gunnery Points _____

Evaluator's Signature _____ Score _____

Table IX B. Section Training Course (Night).

Task	Conditions/ Target/Situation	Tactical Tasks	Score Gunnery	Score Tactics
1. Establish screen.	Order to establish screen.	Conduct screen. Select firing positions.	____	____
2. Detect reconnaissance patrol.	Section observes 3 BTR 60s; 1,200 meters.	Perform actions on contact. Report enemy information.	____	____
3. Section engages with direct and indirect fire.	Section observes enemy advancing and is engaged by direct fire. 5 BTR 60s, 4 T72s; 800 to 1,200 meters.	Call for and adjust indirect fire. Control scout section fires. Report enemy information.	____	____
4. Section continues to engage while requesting permission to delay back to screen line specified in OPORD.	Section observes enemy continuing to advance. 3 BMPs, 1 T72, 2 BTRs; 600 to 1,200 meters.	Control scout section fires. Conduct tactical movement. Report enemy information.	____	____
5. Section bounds to subsequent screen line and conducts passage of lines.	Section observes enemy continuing to advance and is ordered to conduct passage of lines at grid.	Conduct passage of lines.	____	____

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tactical Points _____ Gunnery Points _____

Table IXA Score _____ Table IXB Score _____

Evaluator's Signature _____ Total Score _____

Table X-Section Qualification Course

The Section Qualification Course is used to evaluate the scout section's tactical and gunnery proficiency in a realistic tactical and live-fire scenario. Day firing (Table X A) should precede night firing (Table X B) whenever possible.

Table X should be similar in task content to Table IX. Table X is a full-caliber gunnery exercise designed for a multilane range facility (such as an MPRC). Where range facilities permit free maneuvering, the tactical phase of the table should be conducted simultaneously with the gunnery phase.

Each vehicle crew member must have passed the gunnery skills test (tasks appropriate for the weapon system) in the position he will occupy (in accordance with Appendix A).

Each scout section should achieve a minimum passing score on Table IX, within three months before firing Table X.

SCORING PROCEDURES

All tasks are scored (see *Evaluation Procedures* on page 10-4).

Each table uses a 1,000-point scoring system (maximum points for tactics and gunnery combined is 1,000). The breakdown of scoring is as follows:

Tactics are worth 60 percent (600 points).

Note. Commanders may use the following formula to determine total tactical points; or, at the commander's option based on METL importance, point values may be assigned for each task. Total cumulative tactical points must not exceed 600.

To determine the number of tactical points awarded—

- Divide the number of tactical tasks passed by the number of tactical tasks possible (day and night combined) to establish a percentage:
  Tasks Passed ÷ Tasks Possible= Percentage
  9 ÷ 12 = .75
- Multiply by 600 possible tactical points:
  .75 X 600= 450
- The result is the points awarded for the tactical evaluation.

Gunnery is worth 40 percent or 400 points. Use the following formula to determine the number of gunnery points awarded:

- Divide the number of gunnery tasks passed by the number of gunnery tasks possible (combining day and night phases) to establish a percentage:
  Targets Destroyed ÷ Targets Presented = Percentage
  8 ÷ 10 = .80
- Multiply the decimal by 400 gunnery points:
  .80 X 400= 320

- The total points awarded is determined by adding the scores from the tactical and gunnery portions.

  450 (tactical) + 320 (gunnery)= 770 total

To qualify on Table X, the section must receive a minimum of—

- 70 percent of tactical tasks-420 out of 600 points.
- 70 percent of targets presented (gunnery)-280 out of 400 points.

Note. To determine the gunnery score without mathematical calculations, see the matrix in Figure 10-8 on page 10-75.

Sections will be rated by the following standards:

Distinguished: Combined score of 900 points or higher (420 tactical and 280 gunnery points).

Superior: Combined score of 800 to 899 points (420 tactical and 280 gunnery points).

Qualified: Combined score of 700 to 799 points (420 tactical and 280 gunnery points).

Unqualified: Combined score of 699 points or less, or section fails to achieve 420 tactical points or 280 gunnery points.

AMMUNITION ISSUE

The ammunition for this exercise will be broken down at the ammunition point. The ammunition for this exercise includes 10 rounds of illumination for each section and the following for each crew:

- Caliber .50: 14 rounds per target.
  14 rounds for zero.
- 40-mm TP: 10 rounds per target.
  4 rounds for zero.

CONDUCT OF THE RANGE

The gunnery phase of Table X requires a multilane facility capable of allowing at least two vehicles to maneuver as a section. The gunnery phase will be conducted live-fire, fill-caliber.

Note. Local range SOPs dictate the conduct of the range. Scenarios should be developed and approved for firing well in advance of the conduct of Table X.

The tactical phase of Table X requires a free-maneuver range facility or a separate l-kilometer-by-2-kilometer training area. OPFOR or target lift mechanisms may be used in the training area to reinforce acquisition, reporting, and call for fire procedures.

Target arrays should be consistent with the type of threat forces a section could expect to encounter in combat. Based on the METL, the commander determines the number and types of targets to be engaged. At no time will the number of targets exceed the number of rounds allocated by DA Pam 350-38. The number and type of targets must be based on the weapons and size of the scout section.

Thermal targets should be used to represent accurate thermal signatures of threat vehicles. When appropriate to the scenario, hostile fire simulators may be used to simulate the threat vehicle(s) firing at the section.

ALLOWABLE VARIATIONS

Depending on the availability of maneuver area and range time, sections may conduct the tactical portion of Table X in a local training area with MILES. The commander must decide, based on range time availability y and his design of Table X, the most appropriate location to conduct the table. MILES- conducted exercises, using force-on-force engagements or target lift mechanisms with LTID, represent realistic threat scenarios.

Notes. MILES may be used for the tactical portion only; the gunnery portion must be fired live.

On the advanced tables (Tables IX and X), the section is evaluated on its ability to perform tactical operations, in accordance with ARTEP 17-57-10-MTP, FM 17-98, and unit SOP.

Table X A. Section Qualification Course (Day).

Task	Conditions/ Target/Situation	Tactical Tasks	Score Gunnery	Score Tactics
1. Conduct zone reconnaissance.	Order to conduct zone reconnaissance during daylight.	Conduct zone reconnaissance.	____	____
2. Establish screen.	Order to establish screen.	Conduct screen. Select firing positions.	____	____
3. Section detects reconnaissance patrol.	Section observes 1 BTR 60, 2 BMPs; 2,000 to 2,500 meters.	Perform actions on contact.	____	____
4. Section develops situation and reports.	Section observes 3 BTR 60s, 2 BMPs; 1,000 to 1,400 meters.	Call for and adjust indirect fire. Report enemy information.	____	____
5. Section engages with direct and indirect fire.	Section observes enemy advancing and is engaged by direct fire. 3 BTR 60s, 2 BMPs; 800 to 1,200 meters.	Call for and adjust indirect fire. Control scout section fires. Report enemy information.	____	____
6. Section continues to develop situation while requesting permission to to delay back to phase line specified in OPORD.	Section observes enemy continuing to advance. 3 BMPs, 3 T72s, 2 BTRs; 2,500 to 3,000 meters.	Conduct tactical movement.	____	____
7. Section bounds to subsequent phase line and conducts passage of lines.	Section observes enemy continuing to advance and is ordered to conduct passage of lines at grid.	Conduct passage of lines. Reorganize and reconsolidate.	____	____

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tactical Points _____ Gunnery Points _____

Evaluator's Signature _____ Score _____

Table X B. Section Qualification Course (Night).

Task	Conditions/ Target/Situation	Tactical Tasks	Score Gunnery	Score Tactics
1. Establish screen.	Order to establish screen.	Conduct screen. Select firing positions.	____	____
2. Detect reconnaissance patrol.	Observes 4 BTR 60s; 800 to 1,200 meters.	Perform actions on contact. Report enemy information.	____	____
3. Section engages with direct and indirect fire.	Section observes enemy advancing and is engaged by direct fire. 3 BTR 60s; 600 to 1,000 meters.	Call for and adjust indirect fire. Control scout section fires. Report enemy information.	____	____
4. Section continues to engage while requesting permission to delay back to phase line specified in OPORD.	Section observes enemy continuing to advance. 3 BMPs, 2 BTRs; 800 to 1,500 meters.	Control scout section fires. Conduct tactical movement.	____	____
5. Section bounds to subsequent phase line and conducts passage of lines.	Section observes enemy continuing to advance and is ordered to conduct passage of lines at grid.	Conduct passage of lines.	____	____

Table _____ Date _____ Vehicle Number _____

Gunner _____ Assistant Gunner _____

Tactical Points _____ Gunnery Points _____

Table XA Score _____ Table XB Score _____

Evaluator's Signature _____ Total Score _____

Figure 10-8. Target Destruction Matrix.

	TARGETS DESTROYED								TARGETS PRESENTED																								
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
5	200	182	166	154	142	132	124	118	110	104	100	96	90	86	84	80	76	74	72	68	66	64	62	60	58	56	54	52	51	50	50
6	240	218	200	184	172	160	150	142	132	126	120	114	108	104	100	96	92	88	84	82	80	78	74	72	70	68	66	64	62	60	60
7	280	254	234	214	200	186	174	164	156	148	140	132	126	122	116	112	108	104	100	96	92	90	88	84	82	80	78	76	74	72	70
8	320	290	266	245	228	214	200	188	178	168	160	152	146	140	132	128	124	118	114	110	106	102	100	96	94	92	88	86	84	82	80
9	360	328	300	276	258	240	226	212	200	190	180	172	164	156	150	144	138	132	128	124	120	116	112	108	106	102	100	96	94	92	90
10	400	364	334	308	286	266	250	234	222	210	200	190	182	174	166	160	154	148	142	138	132	128	124	122	118	114	112	108	106	102	100
11		400	366	338	314	294	276	258	244	232	220	210	200	192	184	176	170	162	158	152	146	142	138	132	130	126	122	118	116	112	110
12			400	370	342	320	300	282	266	252	240	228	218	208	200	192	184	178	172	166	160	154	150	146	142	136	132	130	126	122	120
13				400	372	346	326	306	288	274	260	248	236	226	216	208	200	192	186	180	176	168	162	158	152	148	144	140	136	132	130
14					400	374	370	330	312	294	280	266	254	244	234	224	216	208	200	194	186	180	176	170	164	160	156	152	148	144	140
15						400	376	352	334	316	300	286	272	260	250	240	230	222	214	206	200	194	188	182	176	172	166	162	158	154	150
16							400	376	366	336	320	304	290	278	266	256	246	238	228	220	214	206	200	184	188	182	178	172	168	164	160
17								400	378	358	340	334	312	296	284	272	262	252	242	234	226	220	212	206	200	194	188	184	178	174	170
18									400	378	360	342	328	314	300	288	276	266	258	248	240	232	226	218	212	206	200	194	190	184	180
19										400	380	362	346	330	316	304	292	282	272	262	254	246	238	230	224	218	212	206	200	194	190
20											400	380	364	348	334	320	308	296	286	276	266	258	250	242	236	228	222	216	210	206	200
21												400	382	366	350	336	324	312	300	290	280	270	262	254	248	240	234	228	222	216	210
22													400	382	366	352	338	326	314	304	294	284	276	266	258	252	244	238	232	226	220
23														400	384	368	354	340	328	318	306	296	288	278	270	262	256	248	242	236	230
24															400	384	370	356	342	332	320	310	300	290	282	274	266	260	252	246	240
25																400	384	370	358	344	334	322	312	304	294	286	278	270	264	256	250
26																	400	386	372	358	346	336	326	316	306	298	288	282	274	266	260
27																		400	386	372	360	348	338	328	318	308	300	292	284	276	270
28																			400	386	374	362	350	340	330	320	312	302	294	288	280
29																				400	386	374	362	352	342	332	322	314	306	298	290
30																					400	388	376	364	352	342	334	324	316	308	300
31																						400	388	376	364	354	344	336	326	318	310
32																							400	388	376	366	356	346	336	328	320
33																								400	388	378	366	356	348	338	330
34																									400	388	378	368	358	348	340
35																										400	388	378	368	358	350
36																											400	390	378	370	360
37																												400	390	380	370
38																													400	390	380
39																														400	390
40																															400

APPENDIX A

Gunnery Skills Test

The GST evaluates the crew member's ability to perform gunnery-related skills. It does not replace tasks in the 19D soldier's manuals.

Section I. ADMINISTRATION AND EVALUATION

The GST is an evaluation tool with which the unit can determine readiness to move toward crew tasks and conduct live-fire gunnery to meet the prescribed training levels.

Administration

As a minimum, the appropriate tasks of the GST must be administered—

- Semiannually.
- When crew members change positions.
- Before gunnery qualification, unless the crew members qualified within the past three months in current vehicle positions.

The GST is administered using tasks, conditions, and standards, as well as training evaluation guidelines and performance checklists. At no time will tasks be deleted from the GST; however, the commander may add tasks for a more comprehensive evaluation.

All members of the scout squad should take the test. The commander and gunner must achieve a GO on all tasks (appropriate for their weapon systems) to achieve an overall GO.

The GST should also be used as a diagnostic tool to determine the level and effectiveness of cross-training throughout the section.

Evaluation

EVALUATORS

The test may be evaluated by either internal or external evaluators; external evaluation is recommended.

EVALUATION CRITERIA

The individuals performing the test must complete all actions outlined in the performance checklist within a specified time limit to achieve a GO for the task.

To achieve an overall GO on the GST, the individuals being tested must receive a GO on all tasks.

At the conclusion of each task, if the individual failed to meet the prescribed standards, he will be critiqued on those areas that caused him to fail the task and be directed to retake the test at a later date.

Scoring

Personnel receive either a GO or a NO-GO on each task.

NO-GOs are scored for—

- Failing to complete the task.
- Incorrectly performing task steps (or performing steps out of sequence).
- Failing to meet time standards.

Prerequisites

Preliminary gunnery training must be conducted before administering the GST.

Performance Checklists

The performance checklists for all stations must be cross-referenced with the applicable soldier's manuals and TMs to ensure standardization in training and testing.

Evaluation Procedures

Administrative Process. At all stations, the evaluator logs crew members in on a roster. The evaluator provides each crew member with all materials and equipment displayed in the manner outlined in this guide. The evaluator must use the criterion scoring checklist for each task. The evaluator informs the crew member of his performance on the task and directs him either to the next station or to further training. Only one crew member may be tested at a time.

Administrative Procedures for Personnel Receiving a NO-GO. If the crew member does not achieve the standard indicated on the checklist, he receives a NO-GO. When a crew member receives a NO-GO, he must be critiqued, to include an explanation of his mistakes and what he must do to correct them. The crew member will be retested in accordance with the local SOP.

Section II. ADMINISTRATIVE GUIDES AND PERFORMANCE CHECKLISTS (M249 SAW)

Station 1

TASK: Clear, disassemble (field strip), assemble, and perform a function check on the M249 SAW.

CONDITIONS: Given: An M249 SAW placed on a flat surface and cleared of ammunition.

STANDARDS: The crew will—

- Clear (in sequence) and disassemble the M249 SAW (4 minutes).
- Assemble the M249 SAW (3 minutes 30 seconds).
- Perform a function check on the M249 SAW (30 seconds).

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified corporal (CPL) or above.
- M249 SAW.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure that the equipment is operational and the weapon is removed from the vehicle and cleared.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	8 minutes
Total:	13 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to clear, disassemble (field strip), assemble, and perform a function check on an M249 SAW. You must clear the M249 SAW and perform a function check in sequence. The weapon is not clear. Do you understand these instructions?"

Pause for five seconds; ask examinee if there are any questions; then say **"You will have eight minutes to complete this test."** Pause; then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after eight minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Clear, disassemble (field strip), assemble, and perform a function check on the M249 SAW.

Performance Measures	GO	NO-GO
1. Cleared and disassembled M249 SAW.		
a. Cocked weapon.	_____	_____
b. Placed safety on SAFE.	_____	_____
c. Returned cocking handle to forward position.	_____	_____
d. Raised cover, inspected tray, and removed link ammunition (belt-fed ammunition).	_____	_____
OR Pushed down on magazine, released tab, removed magazine, and raised cover (box-fed ammunition).	_____	_____
e. Checked to ensure no rounds were present.	_____	_____
f. Closed tray.	_____	_____
g. Placed safety on FIRE.	_____	_____
h. Pulled cocking handle to rear.	_____	_____
i. Pulled trigger; rode bolt forward.	_____	_____
j. Raised cover.	_____	_____
k. Removed operating rod.	_____	_____
l. Separated operating rod group.	_____	_____
m. Removed barrel.	_____	_____
n. Removed thermal shield.	_____	_____
o. Removed gas regulator and collar.	_____	_____
p. Removed hand guard.	_____	_____
q. Removed buttstock and shoulder assembly.	_____	_____
r. Removed trigger mechanism group.	_____	_____
s. Removed gas cylinder group.	_____	_____
t. Removed biped group.	_____	_____
u. Completed all steps within four minutes.	_____	_____

Performance Measures	GO	NO-GO
2. Assembled M249 SAW.		
a. Replaced bipod group.		
b. Replaced gas cylinder group.		
c. Replaced hand guard group.		
d. Replaced gas regulator and collar.		
e. Replaced thermal shield.		
f. Replaced barrel group.		
g. Replaced trigger mechanism group.		
h. Replaced buttstock and shoulder assembly.		
i. Joined bolt, slide, and piston assemblies.		
j. Replaced piston, bolt, slide assemblies.		
k. Joined operating rod and spring assembly.		
l. Replaced buttstock and shoulder group.		
m. Completed all steps within three minutes 30 seconds.		
3. Performed function check on M249 SAW.		
a. Cocked weapon.		
b. Returned cocking handle to forward position.		
c. Placed safety on SAFE.		
d. Pulled trigger (weapon should not fire).		
Note. If weapon fires, disassemble and reassemble M249 SAW and perform a function check. If weapon still fires while on SAFE, squad leader must be notified and weapon must be turned in to maintenance.		
e. Placed safety on FIRE.		
f. Pulled cocking handle to rear and held.		
g. Pulled trigger; eased bolt forward.		
h. Completed all steps in 30 seconds.		

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Station 2

TASK: Clear, load, apply immediate action, and unload an M249 SAW.

CONDITIONS: Given: An M249 SAW placed on a flat surface and loaded with 10 rounds of M199 ammunition (dummy).

STANDARDS: Within three minutes, the crew member will—

- Clear (in sequence) the M249 SAW.
- Load the M249 SAW.
- Apply immediate action on the M249 SAW.
- Unload the M249 SAW.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- M249 SAW.
- Ammunition-10 rounds M199 (dummy).
- Clipboard and pen.
- One helper, qualified E5 or above.

PRETEST PREPARATION:

Ensure the equipment is operational and the weapon is removed from the vehicle and loaded with 10 rounds of M199 ammunition (dummy).

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	3 minutes
Total:	8 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to clear, load, apply immediate action, and unload an M249 SAW. You must clear the M249 in sequence. The weapon is not clear. Do you understand these instructions?"

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have three minutes to complete this test."** Pause; then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after three minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Clear, load, apply immediate action, and unload an M249 SAW.

Performance Measures	GO	NO-GO
1. Cleared M249 SAW.		
a. Cocked weapon.	_____	_____
b. Put safety on SAFE.	_____	_____
c. Returned cocking handle to forward position.	_____	_____
d. Raised cover, inspected tray, and removed link ammunition (belt-fed ammunition).	_____	_____
OR		
Pushed down on magazine, released tab, removed magazine, and raised cover (box-fed ammunition).	_____	_____
e. Checked to ensure no rounds were present.	_____	_____
f. Closed tray.	_____	_____
g. Placed safety on FIRE.	_____	_____
h. Pulled cocking handle to rear.	_____	_____
i. Pulled trigger; rode bolt forward.	_____	_____
j. Raised cover.	_____	_____
2. Loaded M249 SAW.		
a. Placed safety on FIRE.	_____	_____
b. Cocked weapon.	_____	_____
c. Returned cocking handle to its forward position.	_____	_____
d. Placed safety on SAFE.	_____	_____
e. Raised cover assembly.	_____	_____
f. Checked that receiver group and chamber were clear.	_____	_____
g. Placed first round of belt in tray groove.	_____	_____
h. Closed cover.	_____	_____

Performance Measures	GO	NO-GO
3. Applied immediate action on M249 SAW.		
Note. Have examinee attempt to fire M249 SAW.		
a. Cocked weapon; watched for ejecting rounds.	_____	_____
b. Ensured bolt remained to rear.	_____	_____
c. Returned cocking handle to forward position.	_____	_____
d. Took aim on target.	_____	_____
e. Fired weapon.	_____	_____
Note. If weapon fails to fire, clear it and inspect ammunition to determine cause of stoppage.		
4. Unloaded M249 SAW.		
a. Cocked weapon.	_____	_____
b. Placed safety on SAFE.	_____	_____
c. Returned cocking handle to forward position.	_____	_____
d. Raised cover; removed any ammunition or links (belt-fed ammunition).	_____	_____
OR		
Pushed down on magazine release tab; removed magazine (box-fed ammunition).	_____	_____
e. Checked that chamber was clear (belt-fed ammunition).	_____	_____
OR		
Raised cover and tray; checked that chamber was clear (box-fed ammunition).	_____	_____
5. Completed all performance measures within three minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Section III. ADMINISTRATIVE GUIDES AND PERFORMANCE CHECKLISTS (M60 MACHINE GUN)

Station 1

TASK: Clear, disassemble (field strip), assemble, and perform a function check on an M60 machine gun.

CONDITIONS: Given: An M60 machine gun placed on a flat surface and cleared of ammunition.

STANDARDS: Within eight minutes the crew member will—

- Clear (in sequence) and disassemble the M60 machine gun (4 minutes).
- Assemble the M60 machine gun (3 minutes 30 seconds).
- Perform a function check (in sequence) on the M60 machine gun (30 seconds).

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- M60 machine gun.
- Ammunition—10 rounds 7.62-mm (dummy).
- FM 23-67.
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the equipment is operational and the weapon is removed from the vehicle and loaded with 10 rounds of 7.62-mm dummy ammunition.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	8 minutes
Total:	13 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to clear, disassemble (field strip), assemble, and perform a function check on an M60 machine gun. You must clear the M60 machine gun and perform the function check in sequence. The weapon is not clear. Do you understand these instructions?"

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have eight minutes to complete this test."** Pause; then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after eight minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Clear, disassemble (field strip), assemble, and perform a function check on an M60 machine gun.

Performance Measures	GO	NO-GO
1. Cleared (in sequence) and disassembled M60 machine gun.		
a. Moved safety to FIRE.	_____	_____
b. Cocked gun.	_____	_____
c. Moved safety to SAFE; returned cocking handle to forward position.	_____	_____
d. Raised cover, inspected tray, and removed link or ammunition.	_____	_____
e. Raised tray and inspected chamber to ensure no rounds were present.	_____	_____
f. Closed cover, placed safety on FIRE, pulled cocking handle to rear, pulled trigger, and eased bolt forward.	_____	_____
g. Placed safety on SAFE and raised cover (if not disassembling gun, keep cover down).	_____	_____
h. Removed stock.	_____	_____
i. Removed buffer, operating rod assemblies, and bolt.	_____	_____
j. Separated bolt assembly from operating rod assembly.	_____	_____
k. Removed trigger mechanism group.	_____	_____
l. Removed barrel group.	_____	_____
m. Removed cover, feed tray, and hanger group.	_____	_____
n. Removed forearm assembly.	_____	_____
2. Assembled M60 machine gun.		
a. Replaced forearm assembly.	_____	_____
b. Replaced cover feed tray and hanger group.	_____	_____
c. Replaced barrel group.	_____	_____
d. Replaced trigger mechanism group.	_____	_____

Performance Measures	GO	NO-GO
e. Joined bolt to operating rod.		
f. Replaced bolt and operating rod group.		
g. Replaced buffer assembly.		
h. Replaced stock.		
3. Performed function check (in sequence) on M60 machine gun.		
a. Placed safety on FIRE.		
b. Pulled cocking handle to rear.		
c. Closed cover.		
d. Placed safety on SAFE and pulled trigger.		
e. Checked to ensure weapon would not fire.		
f. Pulled and held cocking handle to rear.		
g. Placed safety on FIRE; pulled trigger.		
h. Allowed bolt to ease forward.		
i. Placed safety on SAFE.		
4. Completed all performance measures within eight minutes.		

Note. Clearing and function checks are performed in sequence in accordance with FM 23-67.

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Station 2

TASK: Clear, load, apply immediate action, and unload an M60 machine gun.

CONDITIONS: Given: an M60 machine gun placed on a flat surface, and a 10-round belt of 7.62-mm dummy ammunition.

STANDARDS: Within three minutes, the crew member will—

- Clear (in sequence) the M60 machine gun.
- Load the M60 machine gun.
- Apply immediate action (in sequence) on the M60 machine gun.
- Unload the M60 machine gun.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- M60 machine gun.
- Ammunition-10 rounds 7.62-mm (dummy).
- FM 23-67.
- Stopwatch.
- Clipboard and pen.

PRETEST PREPARATION:

Ensure the equipment is operational and the weapon is removed from the vehicle and loaded with 10 rounds of 7.62-mm dummy ammunition.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	3 minutes
Total:	8 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to clear, load, apply immediate action, and unload an M60 machine gun. You must clear the M60 and apply immediate action in sequence. The weapon is not clear. Do you understand these instructions?"

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have three minutes to complete this test."** Pause; then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after three minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Clear, load, apply immediate action, and unload an M60 machine gun.

Performance Measures	GO	NO-GO
1. Cleared M60 machine gun (in sequence).		
a. Moved safety to FIRE.	_____	_____
b. Pulled cocking handle rearward; returned cocking handle to forward position.	_____	_____
c. Moved safety to SAFE.	_____	_____
d. Raised cover, inspected tray, and removed link or ammunition.	_____	_____
e. Raised tray and inspected chamber to ensure no rounds were present.	_____	_____
f. Closed cover, placed safety on FIRE, pulled cocking handle to rear, pulled trigger, and eased bolt forward.	_____	_____
g. Moved safety to SAFE.	_____	_____
2. Loaded M60 machine gun.		
a. Moved safety to FIRE.	_____	_____
b. Pulled cocking handle rearward; returned cocking handle to forward position.	_____	_____
c. Moved safety to SAFE.	_____	_____
d. Turned latch and opened cover.	_____	_____
e. Placed ammunition on feed tray, with open side of links down and first round in feed groove.	_____	_____
f. Closed cover.	_____	_____
g. Moved safety to FIRE.	_____	_____
3. Applied immediate action (in sequence) on an M60 machine gun.		
Note. Have examinee attempt to fire M60.		
a. Pulled cocking handle rearward.	_____	_____
b. Checked ejection port for ejected cartridge.	_____	_____
c. Pushed cocking handle forward and attempted to fire again.	_____	_____

Performance Measures	GO	NO-GO
4. Unloaded M60 machine gun.		
a. Moved safety to FIRE.	_____	_____
b. Pulled cocking handle rearward; returned cocking handle to forward position.	_____	_____
c. Moved safety to SAFE.	_____	_____
d. Raised cover; removed ammunition and link belt.	_____	_____
e. Raised feed tray and inspected chamber.	_____	_____
f. Lowered feed tray.	_____	_____
g. Closed cover.	_____	_____
h. Moved safety to FIRE.	_____	_____
i. Pulled cocking handle rearward and held.	_____	_____
j. Pulled trigger and allowed cocking handle to move forward.	_____	_____
5. Completed all performance measures within three minutes.	_____	_____

Note. Clearing and immediate action are performed in sequence in accordance with FM 23-67.

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Section IV. ADMINISTRATIVE GUIDES AND PERFORMANCE CHECKLISTS (M2 HB CALIBER .50)

Station 1

TASK: Clear, disassemble, assemble, set headspace and timing, and perform a function check on an M2 HB caliber .50 machine gun.

CONDITIONS: Given: An M2 HB caliber .50 machine gun placed on a flat surface and cleared of ammunition.

STANDARDS: Within 15 minutes, the crew member will—

- Clear (in sequence) an M2 HB caliber .50 machine gun.
- Disassemble and assemble an M2 HB caliber .50 machine gun.
- Adjust headspace (in sequence) on an M2 HB caliber .50 machine gun.
- Set timing (in sequence) on an M2 HB caliber .50 machine gun.
- Perform a function check (in sequence) on an M2 HB caliber .50 machine gun.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- M2 HB caliber .50 machine gun.
- Ammunition—linked caliber .50 (dummy).
- Headspace and timing gage.
- Stopwatch.
- Table.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure that the equipment is operational and the weapon is removed from vehicle and cleared.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	15 minutes
Total:	20 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to clear, disassemble, assemble, set headspace and timing, and perform a function check on an M2 HB caliber .50 machine gun. Clearing, setting headspace and timing, and performing a function check are scored in sequence. Do you understand these instructions?"

Pause for 5 seconds; ask the examinee if there are any questions; then say, **"You will have 15 minutes to complete this test."** Pause, then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after 15 minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Clear, disassemble, assemble, set headspace and timing, and perform a function check on the M2 HB caliber .50 machine gun.

Performance Measures	GO	NO-GO
1. Cleared (in sequence) caliber .50 machine gun.		
a. Unlocked bolt latch release.	_____	_____
b. Opened cover.	_____	_____
c. Lifted extractor and removed ammunition belt from feedway.	_____	_____
d. Pulled back on charging handle and locked bolt to rear.	_____	_____
e. Looked into both chamber and T-slot for ammunition.	_____	_____
f. Pulled back on charging handle and rode bolt forward.	_____	_____
g. Closed cover.	_____	_____
h. Pushed trigger to fire weapon.	_____	_____
Note. Did not close cover with bolt locked to rear.		
2. Disassembled and assembled caliber .50 machine gun.		
a. Removed barrel group.	_____	_____
b. Removed backplate group.	_____	_____
c. Removed driving spring rod assembly.	_____	_____
d. Removed bolt stud.	_____	_____
e. Removed bolt group.	_____	_____
f. Removed barrel buffer body group and barrel extension group.	_____	_____
g. Removed barrel buffer assembly.	_____	_____
h. Replaced barrel buffer assembly and barrel buffer body group.	_____	_____
i. Replaced barrel buffer group and barrel extension group.	_____	_____
j. Replaced bolt group.	_____	_____

Performance Measures	GO	NO-GO
k. Replaced bolt stud.	_____	_____
1. Replaced driving spring rod assembly.	_____	_____
m. Replaced backplate group.	_____	_____
n. Replaced barrel group.	_____	_____
3. Adjusted headspace (in sequence).		
a. Opened cover.	_____	_____
b. Retracted bolt until locking lug on barrel locking spring was centered in hole of right side plate of receiver.	_____	_____
c. Held bolt in position (as in 3b) and screwed barrel fully into barrel extension.	_____	_____
d. With bolt still retracted, unscrewed barrel two notches (clicks).	_____	_____
e. Allowed recoiling parts to go forward.	_____	_____
f. Cocked machine gun.	_____	_____
g. Rode bolt forward.	_____	_____
h. Retracted recoiling parts approximately 1/1 6 inch.	_____	_____
i. Raised extractor.	_____	_____
j. Inserted GO end of gage into T-slot between face of bolt and barrel.	_____	_____
k. If GO end did not enter T-slot—		
(1) Retracted bolt until locking lug on barrel locking spring was centered in hole of right side plate of receiver.	_____	_____
(2) Unscrewed barrel one notch (click).	_____	_____
(3) Allowed recoiling parts to go forward.	_____	_____
(4) Checked headspace in accordance with steps 3h through j.	_____	_____
l. If GO end entered T-slot, attempted to place NO-GO end of gage into T-slot.	_____	_____
m. If NO-GO end did not enter T-slot, went to step 4.	_____	_____
n. If NO-GO end entered T-slot—		
(1) Retracted bolt until locking lug on barrel locking spring was centered in hole of right side plate of receiver.	_____	_____
(2) Screwed barrel one notch (click).	_____	_____

Performance Measures	GO	NO-GO
(3) Allowed recoiling parts to go forward.		
(4) Checked headspace in accordance with steps 3h through j.		
4. Set timing (in sequence) (cocked weapon, if necessary).		
a. Checked headspace (cocked weapon; if necessary).		
b. Pulled charging handle to retract recoiling parts about 1/16 inch.		
c. Inserted NO-FIRE gage between barrel extension and trunnion lock.		
d. Ensured NO-FIRE gage beveled edge rested against barrel notches.		
e. Slowly released recoiling parts, allowing them to go forward.		
f. Depressed trigger.		
g. If firing pin did not release, went to step 4i.		
h. If firing pin released—		
(1) Removed NO-FIRE gage.		
(2) Retracted bolt and recocked machine gun.		
(3) Returned bolt forward.		
(4) Inserted FIRE gage.		
(5) Removed backplate.		
(6) Screwed timing adjustment nut to left until it rested on trigger bar.		
(7) Pushed upon trigger bar and attempted to fire.		
(8) Rotated timing adjustment nut to right one notch and attempted to fire.		
(9) Continued step 4h (8) and attempted to fire after each click, until weapon fired.		
(10) Turned timing adjustment nut two additional notches to right.		
(11) Replaced backplate.		
(12) Removed FIRE gage.		
(13) Cocked weapon.		
(14) Repeated steps 4c through g.		
i. Redated NO-FIRE gage with FIRE gage.		

Performance Measures	GO	NO-GO
j. Pressed trigger.		
k. If firing pin released, went to step 5.		
l. If firing pin did not release—		
(1) Removed backplate.		
(2) Turned trigger bar stop, adjusting nut one notch to right.		
(3) Pushed upon trigger bar.		
(4) If weapon fired, repeated steps 4c through g.		
(5) If weapon did not fire, repeated steps 41(2) and (3) until weapon fired.		
(6) Checked timing twice.		
5. Performed a function check (in sequence) on the caliber .50 machine gun.		
a. Placed weapon in single-shot mode.		
b. Opened cover and locked bolt to rear.		
c. Held retractor handles, pressed bolt latch release, and rode bolt forward.		
d. Pressed down on trigger (weapon should fire).		
e. Checked T-slot to ensure firing pin protruded.		
f. Placed weapon in automatic-fire mode.		
g. Pulled retractor slide handle to rear and held (bolt should not lock to rear).		
h. Released pressure on slide handles and rode bolt forward.		
i. Made sure firing pin did not protrude.		
j. Pressed trigger (weapon should fire).		
k. Made sure firing pin protruded.		
6. Completed all performance measures within 15 minutes.		

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Station 2

TASK: Load a caliber .50 machine gun, reduce a stoppage, and unload and clear a caliber .50 machine gun.

CONDITIONS: Given: An assembled and cleared caliber .50 machine gun with headspace and timing correctly set, and a belt of linked dummy ammunition.

STANDARDS: Within five minutes, each crew member will—

- Load a caliber .50 machine gun.
- Reduce a stoppage on a caliber .50 machine gun.
- Unload and clear a caliber .50 machine gun.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- M2 HB caliber .50 machine gun.
- Ammunition-linked caliber .50 (dummy).
- Table.
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the equipment is operational, the weapon is cleared, and the headspace and timing are set.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	5 minutes
Total:	10 minutes

INSTRUCTIONS TO EXAMINEE:

"**Let me have your attention. At this station, you will be tested on your ability to load, reduce a stoppage, unload, and clear a caliber .50 machine gun. The weapon has been cleared. Do you understand these instructions"?**

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have five minutes to complete this test."** Pause, then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after five minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Load a caliber .50 machine gun, reduce a stoppage, and unload and clear a caliber .50 machine gun.

Performance Measures	GO	NO-GO
1. Loaded caliber .50 machine gun.		
a. Ensured bolt was forward.	_____	_____
b. Inserted double-loop end of belt in feedway.	_____	_____
c. Pulled bolt to rear two times.	_____	_____
2. Reduced a stoppage (performed immediate action).		
Note. Have examinee attempt to fire caliber .50 machine gun.		
a. Pulled bolt to rear and ejected bad round (within ten seconds).	_____	_____
b. Resumed firing.	_____	_____
3. Unloaded and cleared caliber .50 machine gun.		
a. Unlocked bolt latch release.	_____	_____
b. Raised cover.	_____	_____
c. Lifted extractor from belt.	_____	_____
d. Lifted belt from feedway.	_____	_____
e. Pulled bolt to rear and locked it.	_____	_____
f. Checked T-slot and chamber for rounds.	_____	_____
g. Rode bolt forward	_____	_____
h. Closed cover	_____	_____
i. Fired caliber.50 machine gun.	_____	_____
4. Completed all performance measures within five minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Section V. ADMINISTRATIVE GUIDES AND PERFORMANCE CHECKLISTS (MK 19 GRENADE MACHINE GUN)

Station 1

TASK: Disassemble, assemble, and perform a function check on an MK 19 machine gun.

CONDITIONS: Given: An MK 19 machine gun placed on a flat surface and cleared of ammunition.

STANDARDS: Within eight minutes, the crew member will—

- Disassemble the MK 19 machine gun.
- Assemble the MK 19 machine gun.
- Perform a function check (in sequence) on the MK 19 machine gun.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- MK 19 machine gun.
- Stopwatch.
- Clipboard with pen.
- One helper, qualified ES or below.

PRETEST PREPARATION:

Ensure the equipment is operational and the weapon is removed from vehicle and cleared.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	8 minutes
Total:	13 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to disassemble, assemble, and perform a function check on the MK 19 machine gun. The weapon has been cleared. The function check is scored in sequence. Do you understand these instructions"?

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have eight minutes to complete this test."** Pause, then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after eight minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK Disassemble, assemble, and perform a function check on an MK 19 machine gun.

Performance Measures	GO	NO-GO
1. Disassembled an MK 19 machine gun.		
a. Removed bolt and backplate assembly.	_____	_____
b. Removed secondary drive lever.	_____	_____
c. Removed feed slide assembly.	_____	_____
d. Removed top cover assembly.	_____	_____
e. Removed feed tray.	_____	_____
f. Removed primary drive lever and vertical cam.	_____	_____
g. Removed alignment guide assembly.	_____	_____
h. Removed ogive plunger.	_____	_____
i. Removed round-positioning block.	_____	_____
j. Removed charger assemblies (left hand [LH], right hand [RH]).	_____	_____
k. Removed sear housing assembly.	_____	_____
2. Reassembled an MK 19 machine gun.		
a. Assembled sear housing assembly.	_____	_____
b. Assembled charger assemblies (LH, RH).	_____	_____
c. Assembled round-positioning block.	_____	_____
d. Inserted ogive-plunger assembly.	_____	_____
e. Inserted alignment guide assembly.	_____	_____
f. Attached vertical cam.	_____	_____
g. Attached primary drive lever.	_____	_____
h. Attached feed tray.	_____	_____
i. Attached feed slide assembly.	_____	_____
j. Attached top cover assembly.	_____	_____
k. Attached and engaged secondary drive lever.	_____	_____
l. Inserted bolt and backplate assembly.	_____	_____

Performance Measures	GO	NO-GO
3. Performed a function check (in sequence) on the MK19 machine gun.		
a. Closed top cover.	_____	_____
b. Moved safety to SAFE.	_____	_____
c. Charged weapon.	_____	_____
d. Locked charging handles forward.	_____	_____
e. Pressed trigger.	_____	_____
Note. If weapon fires, notify supervisor; if weapon does not fire, continue with 3f.		
f. Moved safety to FIRE.		_____
g. Pressed trigger (bolt should spring forward).	_____	_____
h. Moved safety to SAFE.	_____	_____
i. Opened top cover.	_____	_____
j. Checked tip of firing pin (it should be exposed).	_____	_____
k. Moved feed slide to left.	_____	_____
l. Closed top cover.	_____	_____
m. Pulled bolt to rear ensured safety was on.	_____	_____
4. Completed all performance measures within eight minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Station 2

TASK: Load, apply immediate action, unload, and clear an MK 19 machine gun.

CONDITIONS: Given: An MK 19 machine gun placed on an M3 tripod and 10 rounds of linked ammunition (dummy).

STANDARDS: Within three minutes, the crew member will—

- Load the MK 19 machine gun.
- Apply immediate action on the MK 19 machine gun.
- Unload and clear the MK 19 machine gun.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- MK 19 machine gun.
- Ammunition-10 rounds linked 40-mm (dummy).
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the equipment is operational and the weapon is removed from the vehicle and cleared.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	3 minutes
Total:	8 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to load, apply immediate action, and unload an MK 19 machine gun. The weapon has been cleared. Do you understand these instructions"?

Pause for five seconds; ask the examinee if there any any questions; then say **"You will have three minutes to complete this test."** Pause, then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after three minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Load, apply immediate action, and unload an MK 19 machine gun.

Performance Measures	GO	NO-GO
1. Loaded MK 19 machine gun.		
a. Moved safety to SAFE.	_____	_____
b. Opened top cover.	_____	_____
c. Ensured bolt was forward.	_____	_____
d. Slid rounds, female link first, through feed throat.	_____	_____
e. Inserted first round into feeder and across first pawl.	_____	_____
f. Moved feed slide assembly to left.	_____	_____
g. Closed top cover.	_____	_____
h. Charged weapon.	_____	_____
i. Locked charger handles forward.	_____	_____
j. Moved safety to FIRE.	_____	_____
k. Pressed trigger (bolt should move forward).	_____	_____
l. Charged weapon.	_____	_____
m. Locked charger handles forward.	_____	_____
n. Moved safety to SAFE.	_____	_____
2. Applied immediate action on MK 19 machine gun.		
Note. Have examinee attempt to fire MK 19.		
a. Waited 10 seconds.	_____	_____
b. Pulled bolt to rear.	_____	_____
c. Caught live round as it was ejected.	_____	_____
d. Pushed charger handles forward and up.	_____	_____
e. Attempted to fire; if nothing happened—		
(1) Moved safety to SAFE.	_____	_____
(2) Waited ten seconds.	_____	_____
(3) Pulled bolt to rear.	_____	_____

Performance Measures	GO	NO-GO
(4) Caught live round as it was ejected.	_____	_____
(5) Opened cover and cleared ammunition.	_____	_____
3. Unloaded and cleared MK 19 machine gun.		
a. Moved safety to SAFE.	_____	_____
b. Charged weapon.	_____	_____
c. Returned charger handles to forward position.	_____	_____
d. Inserted tip of cleaning rod through receiver rail, as close as possible to bolt face.	_____	_____
e. Pushed down on live round or case; forced round off bolt face and out bottom of gun.	_____	_____
f. Caught live round as it fell out.	_____	_____
g. Opened top cover.	_____	_____
h. Removed rounds from feed tray.	_____	_____
i. Inspected chamber.	_____	_____
j. Pulled charger handles rearward.	_____	_____
k. Pressed trigger.	_____	_____
l. Rode bolt forward.	_____	_____
m. Moved safety to SAFE.	_____	_____
n. Moved feed slide assembly to left.	_____	_____
o. Closed top cover.	_____	_____
4. Completed all performance measures within three minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Section VI. ADMINISTRATIVE GUIDES AND PERFORMANCE CHECKLISTS (TOW)

Station 1

TASK: Assemble the M220A2 TOW 2.

CONDITIONS: Given: A disassembled M220A2 TOW 2 launcher with all components.

STANDARDS: Within five minutes, assemble the M220A2 TOW 2 launcher so it is safe to fire.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- M220A2 TOW 2 launcher with all components.
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below

PRETEST PREPARATION:

Ensure the equipment is operational and the ground is solid and slopes less than 30 degrees.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	5 minutes
Total:	10 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to assemble the M220A2 TOW 2. The weapon has been cleared. Do you understand these instructions?"

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have five minutes to complete this test."** Pause, then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after five minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Assemble the M220A2 TOW 2.

Performance Measures	GO	NO-GO
1. Properly set up tripod.	_____	_____
2. Installed traversing unit.	_____	_____
3. Installed launch tube.	_____	_____
4. Properly mounted daysight tracker.	_____	_____
5. Properly mounted nightsight tracker.	_____	_____
6. Installed battery in MGS.	_____	_____
7. Connected coil to MGS.	_____	_____
8. Connected battery power conditioner to nightsight.	_____	_____
9. Completed all performance measures within five minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Station 2

TASK: Determine if a target can be engaged by TOW.

CONDITIONS: Given: Binoculars, nightsight and daysight tracker mounted correctly on an operational TOW weapon system positioned for firing, and 10 targets.

STANDARDS: Within one minute using either the nightsight, binoculars, or daysight tracker, determine whether each of 10 targets is within range and can be engaged.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- Complete operational TOW.
- Targets—ten 1:35-scale threat armored vehicles.
- Stopwatch.
- Clipboard and pen.
- Binoculars.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the equipment is operational and, at a minimum, two targets are out of range and two targets cannot be engaged due to obstacles.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	1 minute
Total:	6 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to determine if a target can be engaged by TOW. Do you understand these instructions"?

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have one minute to complete this test."** Pause, then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after one minute, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Determine if a target can be engaged by TOW.

Performance Measures	GO	NO-GO
1. Using either nightsight, binoculars, or daysight tracker—		
a. Correctly determined if targets were in range.	_____	_____
b. Correctly determined if targets could be engaged.	_____	_____
2. Within one minute, correctty determined if 10 targets were in range and could be engaged.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS _____

Station 3

TASK: Load, arm, and unload an encased TOW missile.

CONDITIONS: Given: An assembled, vehicle-mounted TOW launcher and encased missile (forward handling ring and the electrical connector dust cover in place), and a sector of fire.

STANDARDS: Within five minutes, the crew member will—

- Load an encased TOW missile.
- Arm the TOW launcher.
- Unload the TOW missile.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- Complete TOW system (vehicle mounted).
- Encased missile (simulation round).
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the equipment is operational and the complete vehicle-mounted system is assembled.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	5 minutes
Total:	10 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to load, arm, and unload an encased TOW missile. The weapon has been cleared. Do you understand these instructions"?

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have five minutes to complete this test."** Pause; then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after five minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME ._____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Load, arm, and unload an encased TOW missile.

Performance Measures	GO	NO-GO
1. Correctly loaded encased TOW missile.		
a. Inspected missile.	_____	_____
b. Picked up missile properly.	_____	_____
c. Removed forward handling ring and clamp.	_____	_____
d. Correctly placed missile in TOW.	_____	_____
e. Lowered and locked bridge clamp.	_____	_____
2. Properly armed TOW launcher.		
a. Ensured backblast area was clear.	_____	_____
b. Raised arming lever.	_____	_____
c. Told gunner, "UP."	_____	_____
3. Unloaded TOW launcher correctly.		
a. Fired missile.		
(1) Raised locking handle.	_____	_____
(2) Opened bridge clamp.	_____	_____
(3) Removed launch container.	_____	_____
(4) Ensured launch tube was clear of foreign matter.	_____	_____
b. Missile not fired		
(1) Lowered arming Iever.	_____	_____
(2) Raised locking handle.	_____	_____
(3) Opened bridge clamp.	_____	_____
(4) Removed missile.	_____	_____
(5) Replaced forward handling ring and clamp.	_____	_____
(6) Tagged missile with date, unit, and name.	_____	_____
4. Completed all performance measures within five minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Station 4

TASK: Conduct a system check-out procedure and preoperational inspection of a TOW 2 launcher and encased TOW missile.

CONDITIONS: Given: An assembled (ground-mounted or vehicle-mounted) TOW 2 launcher and encased missile, and TM 9-1425-472-12.

STANDARDS: Within 15 minutes, the crew member will—

- Conduct the system check-out procedure to determine if launcher will function properly, and correct or report any malfunctions.
- Perform the preoperation inspection of the encased missile and report any defects.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- Complete TOW 2 system (ground-mounted or vehicle-mounted).
- Encased missile (simulation round).
- TM 9-1425-472-12.
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below

PRETEST PREPARATION:

Ensure the equipment is operational and the TOW system is installed or assembled.
Note. A missile simulation round should be used instead of an actual TOW missile.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	15 minutes
Total:	20 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to conduct a system check-out procedure and preoperation checks on a TOW launcher and encased missile. The weapon has been cleared. Do you understand these instructions"?

Pause for 5 seconds; ask examinee if there are any questions; then say **"You will have 15 minutes to complete this test."** Pause; then say "Begin."

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after 15 minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Conduct a system check-out procedure and preoperational inspection of a TOW 2 launcher and encased TOW missile.

Performance Measures	GO	NO-GO
1. Conducted a system check-out procedure correctly.		
a. Boresighted weapon correctly.	_____	_____
b. Correctly reported or corrected malfunctions.	_____	_____
2. Properly performed a preoperational inspection of the encased missile.		
a. Inspected humidity indicator.	_____	_____
b. Inspected indexing indicator.	_____	_____
c. Reported all deficiencies.	_____	_____
3. Completed all performance measures within 15 minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Station 5

TASK: Install an M220A1 or M220A2 and encased missile on an M966.

CONDITIONS: Given: An M966, a complete TOW system that has passed the system checkout, and a TOW crew.

STANDARDS: Within five minutes, install and secure (with available straps) an M220A1 or M220A2 TOW on an M966.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- An M966 with all modification table of organization and equipment (MTOE).
- Complete TOW system that has passed the system checkout.
- Encased missile (simulation round).
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the equipment is operational and all equipment is removed from the M966.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	5 minutes
Total:	10 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to install an M220A1 or M220A2 TOW and encased missile on an M966. Do you understand these instructions"?

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have five minutes to complete this test."** Pause; then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after five minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Install an M220A1 or M220A2 and encased missile on an M966.

Performance Measures	GO	NO-GO
1. Adjusted gunner's platform.	_____	_____
2. Installed MGS (with TOW vehicle power cable [TVPC] or battery assembly).	_____	_____
3. Installed battery or batteries.	_____	_____
4. Stowed collimator on right shelf.	_____	_____
5. Loaded missile and secured all latches and straps.	_____	_____
6. Stowed nightsight.	_____	_____
7. Stowed traversing unit.	_____	_____
8. Stowed launch tube.	_____	_____
9. Stowed optical sight.	_____	_____
10. Stowed battery power conditioner or coolant cartridge case.	_____	_____
11. Stowed AN/TAS-4 battery case or spare battery pack.	_____	_____
12. Stowed tripod.	_____	_____
13. Completed all performance measures within five minutes.	_____	_____

EVALUATOR'S NAME: _____ _____

TEST DATE: _____

OVERALL SCORE: GO/NO-GO

REMARKS: _____

_____

Station 6

TASK: Place an M966 in the ready-to-fire configuration.

CONDITIONS: Given: An M966 with M220A1 or M220A2 installed and a TOW crew.

STANDARDS: Within five minutes, prepare the M966 and the M220A1 or M220A2 for firing.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- An M966 with all MTOE.
- Complete TOW system installed.
- Stopwatch.
- Clipboard and pen.
- One helper, qualified ES or below.

PRETEST PREPARATION:

Ensure the equipment is operational and the complete TOW system is installed.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	5 minutes
Total:	10 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to place an M966 in the ready-to-fire configuration. The weapon has been cleared. Do you understand these instructions"?

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have five minutes to complete this test."** Pause; then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after five minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop?'**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Place an M966 in the ready-to-fire configuration.

Performance Measures	GO	NO-GO
1. Released hatch cover latches.	_____	_____
2. Removed MGS from stowed position (removed MGS cover).	_____	_____
3. Positioned weapon station.	_____	_____
4. Installed MGS on tray.	_____	_____
5. Installed traversing unit.	_____	_____
6. Installed launch tube.	_____	_____
7. Connected coil cable to MGS.	_____	_____
8. Installed optical sight.	_____	_____
9. Installed nightsight.	_____	_____
10. Connected all cables.	_____	_____
11. Completed all performance measures within five minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

Station 7

TASK: Perform immediate action procedures for an M220A1 or M220A2 (hangfire or misfire) on an M966.

CONDITIONS: Given: An assembled and loaded M966 with mounted TOW launcher (ready-to-fire), two TOW encased missiles, and at least one other squad member to assist.

STANDARDS: Within five minutes, perform hangfire or misfire immediate action procedures.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- An M966 with all MTOE.
- Complete TOW system.
- Two encased TOW missiles (simulation rounds).
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the equipment is operational and the complete TOW system is installed.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	5 minutes
Total:	10 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to perform immediate action procedures for M220A1 or M220A2 on an M966. Do you understand these instructions"?

Pause for five seconds; ask the examinee if there are any questions; then say **"You will have five minutes to complete this test."** Pause; then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after five minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Perform immediate action procedures on an M220A1 or M220A2 (hangfire or misfire) on an M966.

Performance Measures	GO	NO-GO
Note. Have examinee attempt to fire weapon.		
1. Continued to track target for one minute.	_____	_____
2. Pressed trigger a second time.	_____	_____
3. Announced "Misfire" ("Hangfire").	_____	_____
4. Checked battery in MGS.	_____	_____
5. Checked MGS coil cable connection.	_____	_____
6. Checked bridge clamp.	_____	_____
7. Ensured missile was armed.	_____	
8. Pressed trigger.	_____	_____
9. Continued to track target for one minute.	_____	_____
10. Lowered trigger protective cover.	_____	_____
11. Lowered arming lever.	_____	_____
12. Locked elevation (eight degrees down) and azimuth.	_____	_____
13. Removed missile and placed it correct distance away.	_____	_____
14. Reloaded launcher.	_____	_____
15. Completed all performance measures within five minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

Section VII. ADMINISTRATIVE GUIDES AND PERFORMANCE CHECKLISTS (ALL WEAPONS)

Station 1

TASK: Prepare a range card.

CONDITIONS: Given: Combat equipment and individual weapon, a weapon system, a designated firing position, a sector of fire, target reference data, a standard range card, a pencil, and a compass.

STANDARDS: Within 15 minutes, prepare a range card that illustrates a representative sketch of the terrain including—

- Correct weapon symbol.
- Location of weapon system (series of arrows drawn from a reference point to weapon position, to include azimuth and distance).
- Sector of fire—
  - Complete boundaries (left and right sector limits).
  - All dead space.
  - Maximum engagement line (FPL or PDF).
- All prominent terrain features (natural and man-made).
- All target locations and TRPs—
  - Direction / deflection.
  - Elevation.
  - Range.
  - Ammunition.
  - Description.
  - TRP number.
- Magnetic North arrow (properly oriented).
- Marginal data or a data section that shows—
  - Correct interval between circles.
  - Unit designation (no higher than company).
  - Time and date of preparation.
  - Firing position designation (primary, alternate, supplementary).

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- Complete weapon system.
- DA Form 5517-R (Standard Range Card).
- Compass.
- Stopwatch.
- Clipboard and pen.
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the equipment is operational.

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	15 minutes
Total:	20 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to complete a range card correctly. I will give you the following information: type of position, type of weapon system, left and right limits, and any target reference points. Do you understand these instructions"?

Pause for 5 seconds; ask the examinee if there are any questions; then say **"You will have 15 minutes to complete this test."** Pause, then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the task after 15 minutes, announce **"Stop"** loud enough for the examinee to hear.

Note. If it appears that the examinee is going to damage the equipment or injure himself, announce **"Stop."**

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Prepare a range card.

Performance Measures	GO	NO-GO
1. Completed a range card, to include—		
a. Correct weapon symbol.	_____	_____
b. Location of weapon system (series of arrows drawn from a reference point to weapon position, to include azimuth and distance).	_____	_____
c. Sector of fire—		
(1) Complete boundaries (left and right sector limits).	_____	_____
(2) All dead space.	_____	_____
(3) Maximum engagement line (FPL or PDF for machine guns).	_____	_____
d. All prominent terrain features (natural and man-made).	_____	_____
e. All target locations and TRPs—		
(1) Direction / deflection.	_____	_____
(2) Elevation.	_____	_____
(3) Range.	_____	_____
(4) Ammunition	_____	_____
(5) Description.	_____	_____
(6) TRP number.	_____	_____
f. Magnetic North arrow (properly oriented).	_____	_____
g. Marginal data or a data section that shows—		
(1) Correct interval between circles.	_____	_____
(2) Unit designation (no higher than company).	_____	_____
(3) Time and date of preparation.	_____	_____
(4) Firing position designation (primary, alternate, supplementary).	_____	_____
Note. Range card must be readable and not cluttered.		
2. Completed range card within 15 minutes.	_____	_____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

Station 2

TASK: Identify combat vehicles.

CONDITIONS: Given a classroom with a 35-mm slide projector, screen, slide tray with 30 combat vehicle slides, stopwatch, chair, desk or clipboard, and pencil. (See the local Training Support Center for combat vehicle slides.) Views of these combat vehicles should replicate ranges between 500 and 1,200 meters. Twenty vehicles will be taken from the prescribed list and ten will be selected by the commander, based on the unit's contingency area. Twenty percent of the vehicles must be viewed through night sights.

STANDARDS: Within 11 minutes, the crew member must identify, by nomenclature, 27 of 30 combat vehicles from the front, side, oblique, or rear using day and night sights.

PERSONNEL, EQUIPMENT, AND MATERIAL:

- Qualified CPL or above.
- Classroom.
- Slides of combat vehicles (30) 35-mm.
- Slide projector with screen.
- Stopwatch.
- Chair, desk or clipboard (one per crew member).
- Pencil (one per crew member).
- One helper, qualified E5 or below.

PRETEST PREPARATION:

Ensure the slide projector is operational and the slides can be recognized from all locations in the classroom.

Note. Some projectors have an automatic setting for exposure of each slide; if used, this feature must be accurate.

Ensure the slides include the 20 required vehicle slides and 10 slides selected by the commander (see Table A-l).

TEST PLANNING TIME:

Administrative:	5 minutes
Test:	11 minutes
Total:	16 minutes

INSTRUCTIONS TO EXAMINEE:

"Let me have your attention. At this station, you will be tested on your ability to identify combat vehicles. You must correctly identify twenty-seven of thirty vehicles by nomenclature. You will have twelve seconds to view each slide and ten seconds between each slide to write your answer on the performance checklist provided. Be sure you do not get out of sequence or your answers will be incorrect. Do you understand these instructions"?

Pause 5 seconds; ask the examinee if there are any questions; then say **"You will have eleven minutes to complete this test."** Pause, then say **"Begin."**

Begin timing when the command **"Begin"** is given. If the examinee has not completed the test after 11 minutes, announce **"Stop"** loud enough for the examinee to hear.

Table A-1. Combat Vehicle Slides.

REQUIRED VEHICLES			
AMX40	ZSU23-4	T72M1	BRDM2
Challenger	2S1	T80	BTR60PB
Leopard 2	LAV-25	BMP1	M113
M1 Abrams	T62	BMP2	Marder
Merkava	T72	Bradley M2A2	Warrior
OPTIONAL VEHICLES			
Main Battle Tanks			
T64	T64K	Type 62	Type 80
T64A	T72 M84	Type 69	Type 90
T64B	Type 59	Type 79	
Other Tanks			
AMX13	Centurion RE	M60A1	T34 Medium
AMX30	Chieftain	M60A3	T54
AMX30 SA	Leopard 1	PT76	T55
Centurion	M48A5	PT76 Type 60	T55K
Centurion 155	M551 Sheridan	T80U	
Antitank Systems			
ASU57	AT5 Spandrel	MT12	Type 52 75-mm
ASU85	AT6 Spiral	RPG2	Recoilless Rifle
AT1 Snapper	B10	RPG7	Type 56 RPG-2
AT2 Swatter	PANHARD VCR HOT	SPG9	Type 70-1 62-mm
AT3 Sagger	ITV M901	SS11 Harpoon ATGM	Rocket Launcher
AT4 Spigot	Milan ATGM	Swingfire ATGM	Type 86
Artillery (Self-Propelled/Towed)			
2S3	CGT F1	M109A6	M1985 MRL 240-mm (SP)
2S4	Dana 152-mm (SP)	M110A2	M1989 170-mm
2S5	G-5 155-mm (towed)	M1972 122-mm	Majnoon 155-mm (SP)
2S7	G-6 155-mm (SP)	M1973 152-mm	MKF3
2S9	GCT 155-mm (SP)	M1974 152-mm (SP)	MLRS
AL FAO 210-mm	GHN-45 155-mm (towed)	M1975 130-mm (SP)	Type 54-1 122-mm
Astros (MRL) 127-mm	M107	M1977 122-mm (SP)	Type 59 130-mm
Astros (MRL) 180-mm	M109A1	M1978 170-mm (SP)	Type 85 122-mm
Astros (MRL) 300-mm	M109A2	M1981 122-mm (SP)	
BM21	M109A3	M1985 MRL 122-mm (SP)	
Antiaircraft			
AMX DCA 30-2	M163A1 Vulcan	ZPU4	ZU23
Chaparral	Roland	2S6	
Gepard	S60	ZSU57-2	
Self-Propelled Mortar			
M106 107-mm	T54 160-mm	Type 85 120-mm	YW381 120-mm
M125 81-mm	Type 85 82-mm	YW304 82-mm	
Miscellaneous			
Artillery Command and	AVLB	M728 CEV	PRP-3
Reconnaisance	Fox, NBC	M88A1	
Vehicle	Reconnainssance M93	M9 ACE	
Light Armor (APC/IFV/Reconnaissance			
AML	BRDM2 AT5	EE-9 Cascavel	NVH-1
AMX10	BRDM2 RKH	EE-11	OT64
AMX10P	BRDM2 SA9	Fox	OT65
AMX10RC	BRDM2 U	FV432	PSZH-IV
BMD1	BRM	IPR	Ratel
BMD 1979/3	BRM1	IRM	Rooikat
BMD2	BTR152	Jaquar 1	Saxon
BMP1K	BTR152K	Jaquar 2	Scimitar
BMP1KSH	BTR50PK	Luchs	Scorpion
Bradley M2	BTR60PA Cmd	M113A3	Striker
Bradley M2A1	BTR70	M3 APC (Fr)	VAB
Bradley M3	BTR80	MCT (S)	WZ523
Bradley M3A1	BTRD	Ferret MK1	WZ551
Bradley M3A2	Charrua	Ferret MK2	YW531
BRDM1	Condor	MTLB	YW534
BRDM2 AT3	Cougar	NFV-1	

PERFORMANCE CHECKLIST

SOLDIER'S NAME _____

GRADE _____ UNIT _____ DUTY POSITION _____

TASK: Identify combat vehicles.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____
25. _____
26. _____
27. _____
28. _____
29. _____
30. _____

EVALUATOR'S NAME: _____

TEST DATE: _____

OVERALL SCORE: GO / NO-GO

REMARKS: _____

_____

APPENDIX B

Scout Section Gunnery Tactical Tasks

The focus of tactical training must be on the scout's primary mission of collecting and reporting information. The scout's ability to use his combat resources (direct- and indirect-fire assets) effectively while remaining undetected on the battlefield must also be evaluated.

This appendix contains performance checklists that may be used to evaluate tactical skills of a scout section. It is recommended that these checklists be used to evaluate the tactical portion of the scout section tables (see Chapter 10, Section III). Commanders may add subtasks to the checklists to reflect more accurately their METL. To evaluate tasks not included in this appendix, the evaluator may develop performance checklists using ARTEP 17-57-10-MTP. The references used to develop the checklists in this appendix are given at the beginning of each task. These references maybe needed to perform the task.

Note. If a particular member (section sergeant) of the scout section performs a particular performance measure, it is stated in that performance measure; all other performance measures are performed by the section as a whole.

TASK: Execute Actions on Contact (17-3-1021) (FM 17-98, ARTEP 17-57-10-MTP).

CONDITIONS: While moving, the section encounters the enemy. The section may or may not be engaged by the enemy.

STANDARDS: The section defines the enemy location and makes a recommendation.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Deployed and reported.			
a. The enemy engaged—returned fire, moved rapidly to a covered and concealed position and sent a report to the platoon leader.	_____	_____	_____
b. The enemy did not engage—moved rapidly to a covered and concealed position and sent a report to the platoon leader.	_____	_____	_____
c. The section did not contact or see the enemy—did not send a report but moved to a covered position or provided overwatch.	_____	_____	_____
2. Developed the situation.			
a. Moved to a position where the section sergeant could best observe the enemy.	_____	_____	_____
b. Gathered information about the enemy positions and equipment.	_____	_____	_____
c. Moved (if not in contact) to flank of enemy position and attempted to further refine information about the enemy.	_____	_____	_____
d. On order, provided continuous suppression on the enemy position (either direct or indirect fire).	_____	_____	_____
e. Determined enemy—			
(1) Location.	_____	_____	_____
(2) Composition.	_____	_____	_____
(3) Strength.	_____	_____	_____
(4) Weapon orientations.	_____	_____	_____
(5) Obstacles.	_____	_____	_____
(6) Flanks	_____	_____	_____
(7) Supporting units.	_____	_____	_____
(8) Covered and concealed approaches into the enemy flank.	_____	_____	_____
3. Recommended a course of action to the platoon leader (section sergeant).	_____	_____	_____

TASK: Report Enemy Information (071-331-0803) (STP 21-1-SMCT).

CONDITIONS: The section can see enemy soldiers or vehicles with the naked eye or binoculars.

STANDARDS: The section makes a complete and accurate oral or written report to the platoon leader describing each point of interest expressed by the key word SALUTE.

PERFORMANCE MEASURES	GO	NO-GO	NA
Reported all information quickly, completely, and accurately.			
a. Reported size.	_____	_____	_____
b. Described activity.	_____	_____	_____
c. Gave location.	_____	_____	_____
d. Described unit.	_____	_____	_____
e. Reported time.	_____	_____	_____
f. Described or identified equipment.	_____	_____	_____

Example. Spot Report.

ALPHA: Observer or source.

BRAVO: What is observed. **(S-A-L-U-T-E)**

S—Size	(Number of sighted personnel and vehicles)
A—Activity	(What the enemy is doing)
L—Location	(May be descriptive, need not be grid or reference)
U—Unit	(Patches, signs, or markings)
T—Time	(Time the activity was observed)
E—Equipment	(All equipment associated with the activity)

CHARLIE: Actions or recommendations.

TASK: Call For and Adjust Indirect Fire (FM 17-98).

CONDITIONS: Given: Binoculars, radio, SOI, compass, pencil, coordinate scale, 1:50,000-scale map of the target area, the grid location of friendly troops, and a firing unit supporting with HE and quick firing into impact area.

STANDARDS: The section determines the target location (within 250 meters of its actual location), makes the initial call for fire within 60 seconds after the target is identified and adjusts the fire within 10 seconds after the round impacts. Observers adjust the indirect fire on the enemy personnel, weapons, or equipment to prevent fire affecting friendly forces. Rounds impact within 250 meters of the target.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Determined the target location by grid, shift, or polar method.			
2. Determined direction to target.			
3. Transmitted call for fire in three parts.			
4. Adjusted fire on target using bracketing method.			
5. Transmitted “End of Mission.”			
6. Announced “DANGER CLOSE” if applicable.			

TASK: Conduct Tactical Movement (17-3-1016) (FM 17-98, ARTEP 17-57-10-MTP).

CONDITIONS: The section must move from one location to another. Enemy contact is possible or expected.

STANDARDS: The section executes the appropriate technique of movement (traveling, traveling overwatch, bounding overwatch) and reaches its destination without significant loss of personnel or equipment or breaches of security.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Selected the technique of movement (traveling, traveling overwatch, bounding overwatch) depending on the enemy situation.			
2. Moved on designated axis or route.			
a. Moved in designated formation in accordance with designated techniques of movement.			
b. Moved on designated axis or route.			
c. Reported control measures.			
d. Maintained mutual support and security.			
3. Executed bounding overwatch (enemy contact is expected).			
a. Maintained orientation along the designated axis or route. Each vehicle commander knew—			
(1) Direction to enemy.			
(2) Location of overwatch position.			
(3) Route and destination of bounding element.			
(4) Location of overwatch element.			
(5) What he could expect to do next.			
b. Maintained visual contact between bounding and overwatch elements, whenever possible depending on terrain.			
c. Used terrain-driving techniques, to include—			
(1) Cover and concealment.			
(2) Good observation and fields of fire.			
(3) Stationary weapon platform.			
(4) Immediate and controlled reaction to any threat.			
d. Dismounted scouts, as necessary, to provide security.			
e. Maintained all-around security (vehicle commanders).			

TASK: Control Scout Section Fires (171-121-3005) (STP 17-19D23-SM).

CONDITIONS: Given: TOE equipment and personnel, and a mission that requires section fire control and distribution.

STANDARDS: To avoid target overkill, the section uses each weapon in its best role and—

- Engages only targets that offer a high probability of hit.
- Exposes only the vehicles that have the best shots and need to fire.
- Destroys the most dangerous targets first.
- Maintains combat loads as long as possible.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Maintained weapons-ready posture.	_____	_____	_____
2. Maintained weapon orientations of section vehicles.	_____	_____	_____
3. Selected and occupied firing positions.	_____	_____	_____
4. Prepared section sketches and range cards (defense).	_____	_____	_____
5. Issued a fire command to include—			
a. Alert.	_____	_____	_____
b. Ammunition.	_____	_____	_____
c. Description.	_____	_____	_____
d. Location.	_____	_____	_____
e. Control (optional).	_____	_____	_____
f. Execution.	_____	_____	_____
6. Sensed rounds and adjusted fires.	_____	_____	_____
7. Terminated engagement.	_____	_____	_____

TASK: Conduct a Screen (17-3-1023) (FM 17-98, ARTEP 17-57-10-MTP).

CONDITIONS: As part of a platoon, the section is ordered to screen a larger force. Enemy situation is unknown.

STANDARDS: The section warns the larger force of enemy approach and provides information on enemy equipment, organization, and axis of advance. The section does not suffer significant loss of personnel or equipment.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Established screen (occupied observation posts [OP]).			
a. Reconnoitered and selected specific locations.			
b. Reported actual OP location to platoon leader or platoon sergeant.			
c. Established local security.			
d. Improved position.			
2. Conducted screening operations.			
a. Maintained continuous surveillance of all named areas of interest or avenues of approach into sector.			
b. Provided early warning of enemy approach.			
c. Covered dead space (conducted irregularly scheduled mounted or dismounted patrols between OPs).			
3. Detected all enemy elements entering platoon section.			
a. Identified, reported, and maintained contact with reconnaissance patrols.			
b. Impeded and harassed the enemy by controlled use of artillery fires.			
c. Maintained contact with the enemy until ordered to break contact.			
4. Displaced to subsequent screen line.			
a. Requested permission to displace.			
b. Displaced most-threatened OPs first.			
c. Continued to adjust indirect fires.			
d. Maintained contact with advancing enemy elements.			
e. Reported when set on subsequent screen line.			
f. Kept platoon leader (or platoon sergeant) informed.			

TASK: Perform a Passage of Lines (17-3-1014) (FM 17-98, ARTEP 17-57-10-MTP).

CONDITIONS: The section is required to pass through a stationary force. Enemy contact is possible.

STANDARDS: The section performs the passage without significant loss of personnel or equipment or breaches of security.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Coordinated the passage (section sergeant).			
a. Sent a representative to the contact point with stationary unit representative.			
b. Coordinated, at a minimum, the information listed in SOP.			
2. Executed the passage.			
a. Issued a FRAGO.			
b. Arrived at the contact point at the time specified and displayed the proper recognition signals.			
c. Picked up guides and moved through passage lanes without halting.			
d. Employed stationary force indirect fires (as necessary).			
e. Completed the passage by the time specified in the higher headquarters' OPORD.			
f. Used stationary force service support assets, as necessary.			
g. Did *not* cause friendly fire casualties during passage.			
h. Reported completion of passage to next higher headquarters.			

TASK: Select Firing Positions (171-123-1002) (STP 17-19D23-SM).

CONDITIONS: Given: An operational scout vehicle with a crew.

STANDARDS: The section selects firing positions that are not on prominent terrain, with covered and concealed routes into and out of the positions, that are as level as possible, and that allow weapons-down firing without limiting the gunner's field of fire. In offensive operations (overwatch), the positions allow placement of suppressive fire on known or suspected enemy positions and ATGM early warning.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Selected a primary firing position.	_____	_____	_____
2. Selected an alternate firing position.	_____	_____	_____
3. Selected a supplementary firing position.	_____	_____	_____
4. Selected overwatch positions in the offense.	_____	_____	_____
5. Selected positions in the defense.	_____	_____	_____

TASK: Perform a Zone Reconnaissance (17-3-1018) (FM 17-98, ARTEP 17-57-10-MTP).

CONDITIONS: As part of a platoon, the section is ordered to conduct a zone reconnaissance. Enemy situation is unknown.

STANDARDS: The section provides the required information rapidly, accurately, and without significant loss of personnel or equipment.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Planned the mission in accordance with troop-leading procedures (section sergeant).			
2. Deployed in appropriate formation and used technique of movement specified in OPORD.			
3. Conducted the reconnaissance.			
a. Retained freedom to maneuver.			
b. Dismounted scouts, as necessary, to gather information and provide security.			
c. Collected and recorded terrain information.			
(1) Determined trafficability of any major routes.			
(2) Determined cross-country trafficability of all terrain in zone.			
(3) Gathered intervisibility information.			
(4) Located and evaluated all bridges in zone.			
(5) Located suitable fording or crossing sites near all bridges in zone.			
(6) Located and evaluated all overpasses, underpasses, and culverts.			
(7) Located mines, obstacles, and barriers in zone.			
(8) Located a bypass around built-up areas, obstacles, and contaminated areas.			
d. Reported terrain information.			
(1) Submitted route classification overlay (if required).			
(2) Submitted obstacle, bypass, and ford reports.			
e. Identified all enemy forces within zone, including—			
(1) Location.			
(2) Strength.			
(3) Composition.			
(4) Activity.			

PERFORMANCE MEASURES	GO	NO-GO	NA
(5) Supporting weapons and units.			
(6) Possible avenues of approach.			
f. Reported situation to platoon leader or platoon sergeant.			
g. Determined the existence of NBC contamination within zone, if required.			

TASK: Coordinate with an Adjacent Platoon (071-326-5775) (STP 21-24-SMCT).

CONDITIONS: The section is participating in an operation as part of a larger element.

STANDARDS: The section coordinates with adjacent elements for offensive and defensive operations to ensure mutually supporting positions, fires, and signals.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. In the offense, coordinated—			
a. Lateral distance between all attacking elements.	_____	_____	_____
b. Movement routes, to ensure that mutual support by fire and maneuver could be maintained between the lead elements.	_____	_____	_____
c. Visual signals, such as arm-and-hand signals and pyrotechnics.	_____	_____	_____
d. Radio call signs.	_____	_____	_____
2. In the defense, coordinated the following items to ensure there were no gaps and the fires interlocked and were mutually supporting:			
a. Location of positions (primary, alternate, and supplementary).	_____	_____	_____
b. Location of key weapons.	_____	_____	_____
c. Sectors of fire.	_____	_____	_____
d. Dead space between units.	_____	_____	_____
e. Location of observation posts.	_____	_____	_____
f. Signals.	_____	_____	_____
g. Patrols and ambushes (size, type, times of departure and return, and routes).	_____	_____	_____
3. If a final protective fire was allocated to the section, coordinated with the FIST forward observer (FO) and integrated the final protective fire into the fire plan for the larger element.	_____	_____	_____

TASK: Perform an Area Reconnaissance (17-3-1019, 171-121-3008) (FM 17-98, STP 17-19D23-SM, ARTEP 17-57-10-MTP).

CONDITIONS: The element is ordered to conduct an area reconnaissance. Enemy situation is unknown.

STANDARDS: The section collects and reports all information specified in the OPORD or FRAGO, orients on the reconnaissance objective, retains freedom to maneuver, and gains and maintains contact with the threat, if present. The formations and movement techniques are determined by the likelihood of enemy contact. (See STP 17-19D23-SM for the critical tasks.)

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Planned the mission in accordance with troop-leading procedures (section sergeant).			
2. Deployed in appropriate formation and used technique of movement specified in OPORD.			
3. Conducted the reconnaissance.			
a. Retained freedom to maneuver.			
b. Dismounted scouts as necessary to gather information.			
c. Collected and recorded terrain information.			
(1) Determined trafficability of all major routes.			
(2) Determined cross-country trafficability of terrain within the area.			
(3) Located and evaluated all bridges in the area.			
(4) Located suitable fording or crossing sites near all bridges in the area.			
(5) Located and evaluated all overpasses, underpasses, and culverts.			
(6) Located mines, obstacles, and barriers in the area.			
(7) Located bypasses around built-up areas, obstacles, and contaminated areas.			
(8) Located landing or drop zones.			
(9) Reconnoitered terrain dominating the area, if required.			
d. Reported information to higher headquarters.			

PERFORMANCE MEASURES	GO	NO-GO	NA
e. Identified all enemy forces within the area.			
(1) Determined enemy locations.	_____	_____	_____
(2) Determined enemy strength.	_____	_____	_____
(3) Determined enemy composition.	_____	_____	_____
(4) Determined enemy activity.	_____	_____	_____
(5) Located enemy activity.	_____	_____	_____
(6) Identified possible avenues of approach.	_____	_____	_____
(7) Repotted situation to higher headquarters.	_____	_____	_____
f. Determined the existence and extent of NBC contamination in area, if required.	_____	_____	_____

TASK: Perform a Route Reconnaissance (17-3-1017) (FM 17-98, ARTEP 17-57-10-MTP).

CONDITIONS: As part of a platoon, the section is ordered to conduct a route reconnaissance. Enemy situation is unknown.

STANDARDS: The section provides the required information rapidly, accurately, and without significant loss of personnel or equipment.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Planned the mission in accordance with troop-leading procedures (section sergeant).			
2. Deployed in appropriate formation and used technique of movement specified in OPORD.			
3. Conducted the reconnaissance.			
a. Retained freedom to maneuver.			
b. Dismounted scouts as necessary to gather information and provide security.			
c. Collected information about the route and adjacent terrain.			
(1) Determined trafficability along the route.			
(2) Reconnoitered terrain dominating route.			
(3) Reconnoitered built-up areas.			
(4) Reconnoitered lateral routes.			
(5) Determined existence and extent of NBC contamination.			
d. Identified all enemy forces that could affect the route.			
(1) Determined enemy location.			
(2) Determined enemy strengths.			
(3) Determined enemy composition.			
(4) Determined enemy activity.			
(5) Located enemy supporting weapons and units.			
(6) Identified possible avenues of approach.			
(7) Reported situation to higher headquarters.			
e. Reported terrain information.			
(1) Submitted route classification overlay.			
(2) Submitted obstacle, bypass, and ford reports.			

TASK: Perform Reconnaissance by Fire (FM 17-95).

CONDITIONS: Given: All vehicles, weapons, and equipment organic to an indirect fire element and scout section.

STANDARDS: The section identifies the suspected enemy position within 200 meters and adjusts fire to suppress the target area.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Reported.	_____	_____	_____
2. Called for fire.	_____	_____	_____
3. Observed enemy movement.	_____	_____	_____
4. Developed the situation using indirect fire.	_____	_____	_____
5. Continued to reconnoiter suspected enemy positions.	_____	_____	_____

TASK: Prepare a Route Reconnaissance Overlay (051-196-3009) (STP 17-19D23-SM).

CONDITIONS: Given: A military map; transparent paper (or similar material); pencils; critical information gathered from reconnaissance of a route, including applicable completed reconnaissance report forms or reconnaissance messages; and references for standard reconnaissance, topographic, and military symbols.

STANDARDS: The section prepares an overlay in accordance with FM 5-36 so all critical characteristics that affect traffic flow and all mission-essential information are depicted. Standard topographic and military symbols from FM 21-31 and FM 101-5-1 are included as required.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Legibly drew the overlay on transparent paper or similar material.			
2. Drew two grid reference points on the overlay.			
3. Drew a north directional arrow on the overlay.			
4. Drew the reconnoitered route to map scale with end points marked with limit-of-sector symbols.			
5. Drew a reconnaissance party information block on the overlay with required data printed in the block.			
6. Prepared the correct route classification formula and printed it directly above the reconnaissance party information block.			
7. Prepared and drew applicable symbols on the overlay for each characteristic affecting traffic flow.			
8. Prepared and drew applicable topographic and military symbols on the overlay for each item required by the reconnaissance mission.			
9. If abbreviated symbols or engineer resource symbols were used, attached applicable report forms and messages to the overlay.			

TASK: Emplace and Retrieve a Hasty Protective Minefield (17-3-1026) (FM 17-98, ARTEP 17-57-10-MTP).

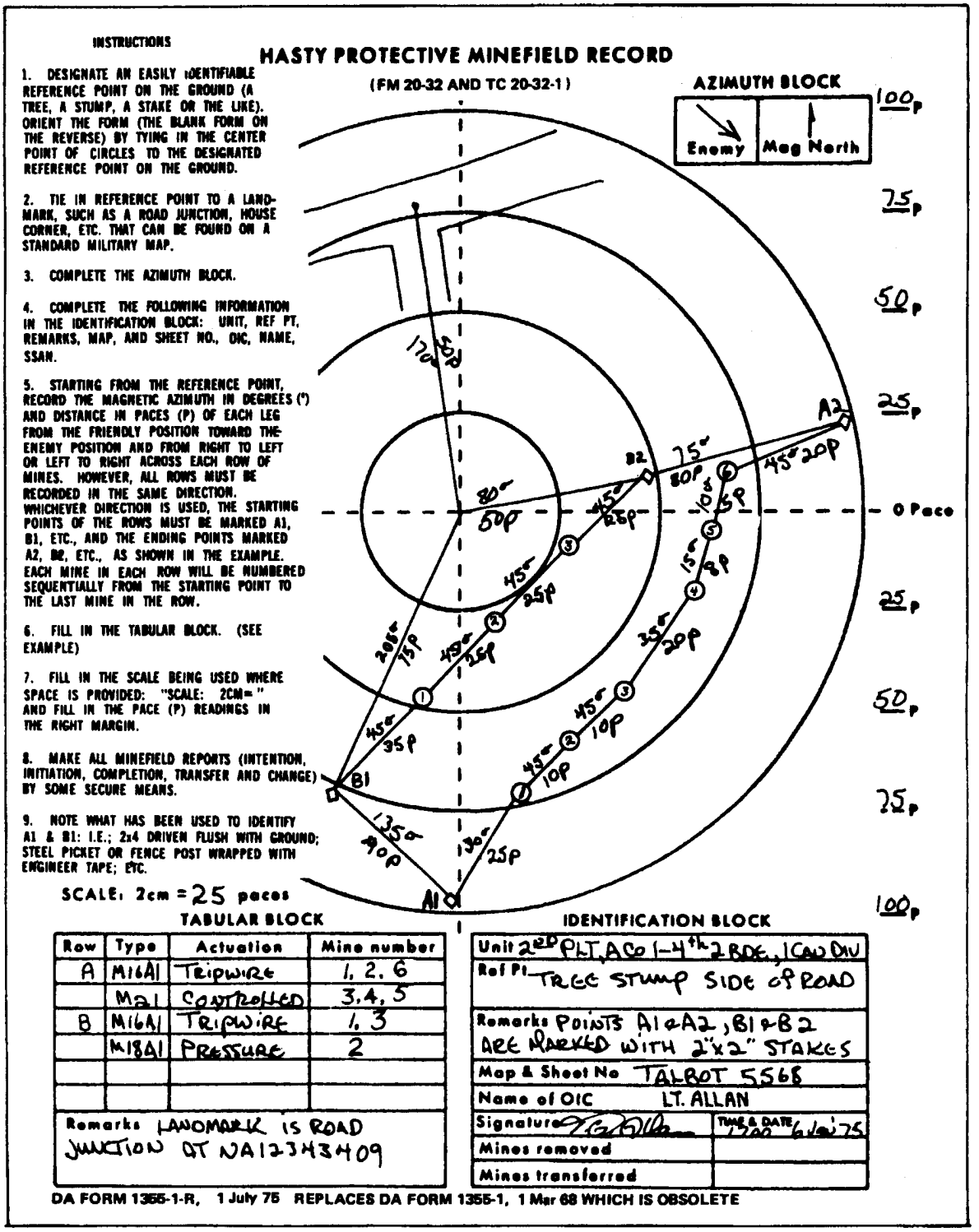
CONDITIONS: The section is in continuous operations. Mines from basic load are available and use of mines is allowed.

STANDARDS: The section plans and emplaces the mines to provide local security or to cover characteristics that affect traffic flow and all mission-essential information (such as dead space), then retrieves all mines prior to departure.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Reported intentions and requested authorization to emplace minefield (section sergeant).			
2. Reconnoitered and selected minefield location.			
a. Selected a location to block most likely avenue of approach.			
b. Ensured site would tie in with natural obstacles and could be covered with direct fires and observation.			
3. Established security.			
a. Designated a security element.			
b. Positioned element to provide local security until mines had been emplaced.			
4. Installed mines.			
a. Received permission to install minefield.			
b. Reported initiation of mine placements.			
c. Selected and marked mine locations.			
d. Emplaced, but did *not* arm, mines.			
e. Recorded the minefield on DA Form 1355-1-R (see Figure B-l).			
f. Armed and camouflaged mines, starting with row nearest the enemy.			
g. Collected and stored safeties and shipping plugs pending recovery of mines. (Storage location must be known by section and platoon.)			
h. Moved minefield, to include safety lanes. (Markings must be visible only from friendly side.)			
i. Recovered security element.			
j. Reported completion to platoon leader or platoon sergeant.			

PERFORMANCE MEASURES	GO	NO-GO	NA
5. Retrieved mines.			
a. Received orders to retrieve minefield.	_____	_____	_____
b. Emplaced security.	_____	_____	_____
c. Brought safeties and shipping plugs for the recovery.	_____	_____	_____
d. Using DA Form 1355-1-R, disarmed mines, starting with row nearest friendly positions.	_____	_____	_____
e. Removed and stored mines for future use.	_____	_____	_____
f. Reported completion of retrieval to platoon leader or platoon sergeant.	_____	_____	_____

Figure B-1. Completed DA Form 1355-1-R.



INSTRUCTIONS

1. DESIGNATE AN EASILY IDENTIFIABLE REFERENCE POINT ON THE GROUND (A TREE, A STUMP, A STAKE OR THE LIKE). ORIENT THE FORM (THE BLANK FORM ON THE REVERSE) BY TYING IN THE CENTER POINT OF CIRCLES TO THE DESIGNATED REFERENCE POINT ON THE GROUND.

2. TIE IN REFERENCE POINT TO A LANDMARK, SUCH AS A ROAD JUNCTION, HOUSE CORNER, ETC. THAT CAN BE FOUND ON A STANDARD MILITARY MAP.

3. COMPLETE THE AZIMUTH BLOCK.

4. COMPLETE THE FOLLOWING INFORMATION IN THE IDENTIFICATION BLOCK: UNIT, REF PT, REMARKS, MAP, AND SHEET NO., OIC, NAME, SSAN.

5. STARTING FROM THE REFERENCE POINT, RECORD THE MAGNETIC AZIMUTH IN DEGREES (°) AND DISTANCE IN PACES (P) OF EACH LEG FROM THE FRIENDLY POSITION TOWARD THE ENEMY POSITION AND FROM RIGHT TO LEFT OR LEFT TO RIGHT ACROSS EACH ROW OF MINES. HOWEVER, ALL ROWS MUST BE RECORDED IN THE SAME DIRECTION. WHICHEVER DIRECTION IS USED, THE STARTING POINTS OF THE ROWS MUST BE MARKED A1, B1, ETC., AND THE ENDING POINTS MARKED A2, B2, ETC., AS SHOWN IN THE EXAMPLE. EACH MINE IN EACH ROW WILL BE NUMBERED SEQUENTIALLY FROM THE STARTING POINT TO THE LAST MINE IN THE ROW.

6. FILL IN THE TABULAR BLOCK. (SEE EXAMPLE)

7. FILL IN THE SCALE BEING USED WHERE SPACE IS PROVIDED: "SCALE: 2CM= " AND FILL IN THE PACE (P) READINGS IN THE RIGHT MARGIN.

8. MAKE ALL MINEFIELD REPORTS (INTENTION, INITIATION, COMPLETION, TRANSFER AND CHANGE) BY SOME SECURE MEANS.

9. NOTE WHAT HAS BEEN USED TO IDENTIFY A1 & B1: I.E.; 2x4 DRIVEN FLUSH WITH GROUND; STEEL PICKET OR FENCE POST WRAPPED WITH ENGINEER TAPE; ETC.

HASTY PROTECTIVE MINEFIELD RECORD

(FM 20-32 AND TC 20-32-1)

AZIMUTH BLOCK

Enemy | Mag North

100P
75P
50P
25P
0 Paces
25P
50P
75P
100P

SCALE: 2cm = 25 paces

TABULAR BLOCK

Row	Type	Actuation	Mine number
A	M16A1	TRIPWIRE	1, 2, 6
	M21	CONTROLLED	3, 4, 5
B	M16A1	TRIPWIRE	1, 3
	M18A1	PRESSURE	2

Remarks LANDMARK IS ROAD JUNCTION AT NA123434O9

IDENTIFICATION BLOCK

Unit 2ED PLT, A Co 1-4th 2 BDE, 1 CAV DIV	
Ref Pt TREE STUMP SIDE OF ROAD	
Remarks POINTS A1 & A2, B1 & B2 ARE MARKED WITH 2"x2" STAKES	
Map & Sheet No TALBOT 5568	
Name of OIC LT. ALLAN	
Signature	TIME & DATE 1500 6/10/75
Mines removed	
Mines transferred	

DA FORM 1355-1-R, 1 July 75 REPLACES DA FORM 1355-1, 1 Mar 68 WHICH IS OBSOLETE

AG 6425-O-Army-Knox-Jul 76-1M

TASK: Execute a Dismounted Patrol (17-3-1024) (FM 17-98, ARTEP 17-57-10-MTP).

CONDITIONS: The section is ordered to execute a dismounted patrol with its organic personnel and equipment. Enemy contact is possible.

STANDARDS: The section gathers the necessary information without significant loss of personnel or equipment.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Prepared for the mission (section sergeant).			
a. Planned patrol using troop-leading procedures with specific attention to—			
(1) Organization of patrol.	_____	_____	_____
(2) Equipment necessary to accomplish the mission.	_____	_____	_____
(3) Required coordination, to include—			
(a) Special equipment.	_____	_____	_____
(b) Resupply.	_____	_____	_____
(c) Transportation.	_____	_____	_____
(d) Departure or reentry of friendly lines.	_____	_____	_____
(e) Fire plan.	_____	_____	_____
(4) Primary and alternate routes.	_____	_____	_____
(5) Rally points (initial rally point [IRP], objective rally point [ORP], reentry rally point [RERP]).	_____	_____	_____
(6) Signals: visual or audio.	_____	_____	_____
b. Issued the order, to include—			
(1) New challenge or password for use beyond forward edge of the bathe area (FEBA).	_____	_____	_____
(2) Signals.	_____	_____	_____
(3) Tasks to be conducted at the objective.	_____	_____	_____
(4) Location of control measures.	_____	_____	_____
2. Conducted the patrol.			
a. Departed friendly lines.			
(1) Halted at IRP.	_____	_____	_____
(2) Linked up with guide(s), as necessary.	_____	_____	_____
(3) Moved through friendly unit without incident.	_____	_____	_____

PERFORMANCE MEASURES	GO	NO-GO	NA
b. Conducted mission.			
(1) Controlled movement through use of graphic control measures.			
(2) Maintained all-around security.			
(3) Collected and recorded information about areas or zones including—			
(a) Location of enemy.			
(b) All lateral and axial routes.			
(c) Proposed and actual obstacle locations.			
(d) Specific information required by OPORD.			
c. Conducted actions on contact including—			
(1) Freeze.			
(2) Hasty ambush.			
(3) Immediate assault.			
(4) Dispersal, using clock system.			
d. Conducted actions at rally points, to include—			
(1) Rallied at last rally point, if dispersed en route.			
(2) Assembled until predetermined number of patrol members arrived, then continued mission under senior man present.			
(3) Established 360-degree security at the rally point.			
e. Returned to friendly lines.			
(1) Coordinated prior to departure.			
(2) Halted at RERP.			
(3) Contacted friendly unit.			
(4) Linked up with guide.			
(5) Moved through friendly unit without incident.			
3. The element debriefed patrol members.			
a. Prepared patrol report.			
b. Reviewed patrol report with patrol members to ensure accuracy and completeness.			
c. Submitted patrol report to platoon leader or platoon sergeant.			

TASK: Conduct a Defense by a Squad (071-430-0002) (STP 21-24-SMCT).

CONDITIONS: Given: A priority of work and locations for crew-served weapons designated by the section leader in his OPORD or FRAGO. The section must prepare an assigned sector for the defense.

STANDARDS: Within the time specified in the section leader's order, the section completes preparation for the defense while maintaining security, camouflage, and concealment.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Followed priority of work by unit SOP.			
2. Maintained security.			
a. Established OPs.			
b. Organized patrols.			
c. Planned for use of STANO devices.			
3. Ensured position offered cover and concealment.			
4. Maintained noise, light, and litter discipline.			
5. Supervised construction of fighting positions.			
6. Ensured fighting positions were mutually supporting.			

TASK: Reorganize a Squad Following Enemy Contact While in the Defense (071-430-0004) (STP 21-24-SMCT).

CONDITIONS: The section is defending as part of a larger unit that has just repelled an enemy assault.

STANDARDS: After enemy contact, the section reorganizes and consolidates in the defense.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Reorganized.			
a. Replaced key personnel and ensured all members knew chain of command.	_____	_____	_____
b. Ensured key weapons were manned.	_____	_____	_____
c. Moved casualties to a covered and concealed location	_____	_____	_____
d. Redistributed ammunition within the section.	_____	_____	_____
e. Collected and reported captured enemy material and information.	_____	_____	_____
f. Ensured turret weapons ready racks were reloaded.	_____	_____	_____
2. Consolidated in the defense.			
a. Reestablished security (OPs).	_____	_____	_____
b. Replaced camouflage.	_____	_____	_____
c. Replaced obstacles.	_____	_____	_____
d. Reassigned sectors of fire.	_____	_____	_____

TASK: Conduct Unmasking Procedures (031-503-3002) (STP 21-24-SMCT).

CONDITIONS: The section soldiers are wearing protective masks. Chemical agents have been used. A chemical agent detector may or may not be available.

STANDARDS: The section conducts unmasking procedures without incurring casualties by following the proper sequence with and without the M256 or M256A chemical agent detector kit.

1. Initiated unmasking (chemical agent detector kit available).			
a. Used chemical agent detector kit.	_____	_____	_____
b. Determined chemical agent was *not* present.	_____	_____	_____
c. Had two or three soldiers unmask for 5 minutes and then remask for 10 minutes.	_____	_____	_____
d. Checked soldiers for chemical symptoms.	_____	_____	_____
e. Determined if agent was present.	_____	_____	_____
f. Unmasked or remained masked (as appropriate).	_____	_____	_____
g. Continued to be alert for symptoms.	_____	_____	_____
2. Initiated unmasking (chemical agent detector kit *not* available).			
a. Had two or three soldiers keep eyes wide open, break the seal of their mask, and hold their breath for 15 seconds.	_____	_____	_____
b. Had soldiers reseal, clear, and check their masks; waited 10 minutes (preferably in the shade).	_____	_____	_____
c. Checked soldiers for symptoms.	_____	_____	_____
d. If they had no symptoms, had them unmask for 10 minutes.	_____	_____	_____
e. Checked soldiers for chemical symptoms.	_____	_____	_____
f. If they had no symptoms, told the rest of the soldiers to unmask.	_____	_____	_____
g. Continued to be alert for symptoms.	_____	_____	_____

TASK: Cross a Chemically Contaminated Area (03-3-C034) (FM 17-98, ARTEP 17-57-10-MTP).

CONDITIONS: The section is in continuous operations and is directed to cross a known, chemically contaminated area.

STANDARDS: The section remains capable of continuing operations and does not suffer significant loss of personnel or equipment.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Prepared for crossing the area.			
a. Placed externally stored equipment inside or covered it with available material.	_____	_____	_____
b. Directed appropriate mission-oriented protective posture (MOPP) level for crossing, depending on type of agent and protection available.	_____	_____	_____
c. Positioned detector paper to provide warning.	_____	_____	_____
d. Ensured all drivers, vehicle commanders, and leaders knew route of march or had strip maps.	_____	_____	_____
e. Ensured all vehicles were closed appropriately for the situation.	_____	_____	_____
2. Crossed the area.			
a. Avoided low ground, overhanging branches, and heavy brush to the extent allowed by the tactical situation.	_____	_____	_____
b. Dropped expendable contaminated covering at edge of the contaminated area.	_____	_____	_____
c. Conducted dismounted movement as rapidly as possible.	_____	_____	_____
3. Exited the contaminated area.			
a. Checked for contamination.	_____	_____	_____
b. If mission permitted, completed chemical decontamination.	_____	_____	_____
c. If mission did not permit decontamination, arranged for decontamination as soon as possible.	_____	_____	_____

TASK: Prepare and Submit NBC 4 Reports (031-503-4004) (STP 21-24-SMCT).

CONDITIONS: Given: The time of day, your location (6-digit coordinate), and the reading from an IM- 174 radiacmeter taken at your location.

STANDARDS: The section prepares an NBC 4 report in the correct format and submits it to the platoon leader.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Prepared an NBC 4 report.			
a. Wrote the location of reading (universal transverse Mercator [UTM]) as line Q.	_____	_____	_____
b. Wrote the IM-174 radiacmeter reading as line R.	_____	_____	_____
c. Wrote the date and time or reading (state whether local or Zulu) as line S.	_____	_____	_____
2. Submitted NBC 4 report.	_____	_____	_____

TASK: Prepare and Submit NBC 1 Reports (031-503-3005) (STP 21-24-SMCT).

CONDITIONS: Given: A watch, compass, map, paper, pencil, and format for NBC 1 report. An NBC attack has just occurred.

STANDARDS: The section submits an NBC **1** report (reporting as a minimum, lines B, D, H, and either C or F) within five minutes.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Prepared and submitted initial NBC 1 (nuclear) report.			
a. Measured the time from "flash" to "bang." Used a watch or counted slowly ("One Thousand and One, One Thousand and Two").	_____	_____	_____
b. Wrote the number of seconds as line J.	_____	_____	_____
c. Wrote the time shown on the watch as line D. (Notes whether it is local or Zulu time.)	_____	_____	_____
d. Wrote the type of burst (surface, air, or unknown) as line H.			
(1) Surface-If a crater or a thick, dense stem from the cloud to the earth was seen.	_____	_____	_____
(2) Air—If the stem is not connected to the mushroom part of the cloud.	_____	_____	_____
(3) Unknown—if the cloud is unclear.	_____	_____	_____
e. If the crater could be seen, used compass to determine the azimuth to the center of the mushroom cloud. Wrote the azimuth as line C.	_____	_____	_____
f. Wrote down the section location as line B.	_____	_____	_____
g. Gave or sent the report to his supervisor. (If the report must be transmitted, gave it a "flash" precedence.)	_____	_____	_____
2. Prepared and submitted subsequent NBC 1 (nuclear) report.			
a. Measured the angular cloud within five minutes after the burst. Wrote the angle as line L. Used one of the following items to measure the angular cloud within five minutes after the burst:			
(1) Aiming circle.	_____	_____	_____
(2) Battery commander's (BC) scope.	_____	_____	_____
(3) Theodolite.	_____	_____	_____
(4) Compass.	_____	_____	_____

PERFORMANCE MEASURES	GO	NO-GO	NA
b. Wrote the angles as line L.			
c. Measured the vertical angle from the ground to the top or bottom of the cloud 10 minutes after the burst. Wrote down the vertical angle as line M. Also wrote which was measured, top or bottom.			
d. Added line L or line M to initial NBC 1 report. Sent or gave the entire message to supervisor. If the report had to be transmitted, gave it an "immediate" precedence.			
3. Prepared and submitted initial NBC 1 (chemical or biological) report.			
a. Wrote the time the attack started as line D.			
b. Wrote the time attack stopped as line E.			
c. Wrote the type of attack, biological or chemical, as line H.			
d. Wrote location as line B.			
e. If the place attacked was *not* his position, wrote the location of attack as line F.			
f. If type of attack could be identified as artillery, aircraft, or other means, wrote type of attack as line G.			
g. Gave or sent the report to the platoon leader. (If the report had to be transmitted, gave it a "flash" precedence.)			
4. Prepared and submitted subsequent NBC 1 (chemical) report. Used the M256 kit to identify type of chemical. Within five minutes, sent message to platoon leader. (If the report had to be transmitted, gave it an "immediate" precedence.)			

TASK: Calculate and Designate Placement of Steel-Cutting Charges (051-193-3051) (STP 17-19D23-SM).

CONDITIONS: Given: A steel target, explosives, and instructions on desired demolition results.

STANDARDS: The section determines type of explosives needed, calculates the minimum required accurately, and places the charge on the target.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Used Table 1, Characteristics of Explosives and Problem-Solving Format. (See STP 17-19D23-SM.)	_____	_____	_____
2. Determined correct calculation.	_____	_____	_____
3. Placed the charge on the proper location.	_____	_____	_____

TASK: Calculate and Designate Placement of Timber-Cutting Charges (051-193-3052) (STP 17-19D23-SM).

CONDITIONS: Given: A timber target, explosives, and instructions on desired demolition results.

STANDARDS: The section determines the type of explosives needed, calculates the minimum required, and places the charge on the target.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Used Table 1, Characteristics of Explosives and Problem-Solving Format. (See STP 17-19D23-SM.)	_____	_____	_____
2. Determined correct calculation.	_____	_____	_____
3. Placed the charge on the proper location.	_____	_____	_____

TASK: React to Indirect Fire (FM 71-1, FM 17-12-1-1).

CONDITIONS: The section is operating in a tactical environment where enemy contact is possible or expected (the section maybe either stationary or moving). The section observes artillery or smoke impacting near or on top of its position.

STANDARDS: The section reacts to indirect fire and is prepared to continue the mission.

PERFORMANCE MEASURES	GO	NO-GO	NA
1. Reacted to indirect fire while on the move.			
a. Executed evasive action to avoid impact area.	_____	_____	_____
b. Crew dropped down inside the vehicle, and closed hatches.	_____	_____	_____
c. Based on the enemy's expected use of chemical weapons and the type of rounds impacting, all personnel stopped breathing and masked.	_____	_____	_____
d. Continued to move out or away from the impact area.	_____	_____	_____
2. Reacted to indirect fires while stationary.			
a. Crew remained inside the vehicle.	_____	_____	_____
b. Based on the enemy's expected use of chemical weapons and the type of rounds impacting, all personnel stopped breathing and masked.	_____	_____	_____
c. If indirect fire effectively suppressed the section's position and the section mission allowed, the section moved out of the impact area to adequate cover.	_____	_____	_____

GLOSSARY

AAR	after-action review
AC	alternating current
AI	assistant instructor
ammo	ammunition
API	armor-piercing incendiary
APC	armored personnel carrier
API-T	armor-piercing incendiary tracer
AR	Army regulation
ARNG	Army National Guard
asst	assistant
ARTEP	Army Training and Evaluation Program
ATGM	antitank guided missile
ATWESS	antitank weapons effect simulator system
Attn	attention
BC	battery commander
bde	brigade
BFV	Bradley fighting vehicle
BGM	basic guided missile
BMD	amphibious Soviet air-droppable vehicle
BMP	Soviet tracked armored personnel carrier
BOT	burst on target
BRDM	Soviet wheeled reconnaissance vehicle
BTR	Soviet APC and command vehicle
cal	caliber
cav	cavalry
CEV	combat engineer vehicle
cm	centimeters
CO EXEVAL	company exercise evaluation
CPL	corporal
DA	Department of the Army
div	division
DH/DX	change in height for 100 meters change in range
DX/DSE	change in range for a one mil change in superelevation

ea	each
exc	exercise
etc	et cetera (on form)
F	fire
FEBA	forward edge of the battle area
FIST	fire support team
FKSM	Fort Knox supplemental material
FM	field manual, frequency modulated
FO	forward observer
FPF	final protective fire
FPL	final protective line
FPS	feet per second
FSN	Federal stock number
FRAGO	fragmentary order
FSO	fire support officer
FT	firing table
FTT	field tactical trainer (TOW)
FTX	field training exercise
FY	fiscal year
GST	Gunnery Skills Test
GT	gunnery trainer (TOW)
GTA	graphic training aid
HB	heavy barrel
HE	high explosive
HEAT	high-explosive antitank
HIND-D	Soviet helicopter
HIP	Soviet helicopter
HMMWV	high mobility multipurpose wheeled vehicle
HQ	headquarters
hr	hour
IAW	in accordance with
IFFN	identify friend, foe or neutral
illum	illumination
IRETS	infantry remoted target system
IRP	initial rally point
ITV	improved TOW vehicle

Jan	January
kph	kilometers per hour
L	left
LH	left hand
ln	lane
LOS	line of sight
LP	listening post
lt	lieutenant (on form)
LTID	laser target interface device
m	meters
mil	mil
mag	magnification (on form)
Mar	March
MEL	maximum engagement line
METL	mission-essential task list
METT-T	mission, enemy, terrain, troops, and time available
MGS	missile guidance set
MILES	multiple integrated laser engagement system
min	minutes
MK	Mark
mm	millimeter
mod	model
MOPP	mission-oriented protective posture
mph	miles per hour
MPRC	multipurpose range complex
MQS	military qualification standards
MRL	multiple rocket launcher
MRLS	multiple launch rocket system
MSR	missile simulation round
MT-LB	amphibious Soviet vehicle
MTOE	mission table(s) of organization and equipment
MTP	mission training plan
NA	not applicable
NATO	North Atlantic Treaty Organization
NBC	nuclear, biological, chemical
NCO	noncommissioned officer

NCOIC	noncommissioned officer in charge
no	number
NSN	National stock number
OIC	officer in charge
OP	observation post
OPFOR	opposing forces
OPORD	operation order
ORP	objective rally point
OSS	optical sight sensor
OT	Czechoslovakian personnel carrier
P	pace (on form)
pam	pamphlet
PC	personnel carrier (in commands and orders)
PD	primer detonating
PDF	principle direction of fire
PGTS	precision gunnery training system
PI	primary instructor
PIBD	point initiating, base detonating
plt	platoon
POL	petroleum, oils, and lubricants
pts	points
Q	qualified
R	range, right
RCLR	recoilless rifle
rds	rounds
ref pt	reference point (on form)
RERP	reentry rally point
RH	right hand
RP	reference point
RPG	rocket-propelled grenade
rpm	rounds per minute
RSO	range safety officer

s	safe
S2	Intelligence Officer (US Army)
SALUTE	size, activity, location, unit, time, equipment
SAT	satisfactory
SAW	squad automatic weapon
sec	seconds
SITREP	situation report
SM	soldier's manual
SMCT	soldier's manual of common tasks
SOI	Signal Operation Instructions
SOP	standing operating procedure
SP	self-propelled
SSN	Social Security number
SSAN	Social Security Number (on form)
STANO	surveillance, target acquisition, and night observation
STP	soldier's training publication
STRAC	Standards in Training Commission
STX	situational training exercise
TB	technical bulletin
TC	training circular
TM	technical manual
TOE	table(s) of organization and equipment
TOF	time of flight
TOT	tracer on target
TOW	tube-launched, optically tracked, wire-guided
TP	target practice
TPT	target practice tracer
TRADOC	United States Army Training and Doctrine Command
TRC	training readiness condition
TRP	target reference point
tsk	task (on form)
TVPC	TOW vehicle power cable
TWS	thermal weapon sight (illustration)

U	unqualified
UNSAT	unsatisfactory
USAR	United States Army Reserve
UTM	universal transverse Mercator (grid)
VC	vehicle commander
VISMODS	visual modification set
vs	versus
W	width
WRP	weapon reference point
x	power
ZSU	Soviet antiaircraft vehicle

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TM 9-1005-224-10. *Operator's Manual for Machine Gun 7.62-mm, M60...* (3O Jul 85)

TM 9-1010-230-10. *Operator's Manual for Machine Gun, 40-mm, MK MOD 3...* (7 Jun 91)

TM 9-1265-375-10. *Operator's Manual for Multiple Integrated Laser Engagement System (MILES)...* (12 Aug 88)

TM 9-1300-200. *Ammunition, General* (3 Oct 69)

TM 9-1425-450-12. *Operator and Organizational Maintenance Manual for TO W 2 Weapon System...* (25 May 83)

TM 9-1425-472-12. *Operator's and Organizational Maintenance Manual for TO W Weapon System...* (l Jan 80)

TM 9-2320-280-10. *Operator's for Truck Utility...* (18 Jun 91)

TM 9-2350-252-10-2. *Operator's Manual for Fighting Vehicle, Infantry, M2, M2A1 and Fighting Cavalry M3, M3A1 Turret* (22 Sep 86)

TM 9-6920-452-10 (FD). *Operator's Manual, Trainer, Gunnery, Antitank: AN/TWQ-T1* (TOW Gunnery Trainer) (Final Draft)

TM 9-6920-453-10 (FD). *Operator's Manual, Trainer, Guided Missile* (TOW Field Tactical Trainer) (Final Draft)

TM 43-0001-27. *Army Ammunition Data Sheets: Small Caliber Ammunition* (FSC 1305) (29 Jun 81)

READINGS RECOMMENDED

These readings contain relevant supplemental information.

Defense Intelligence Agency Publications

DDB 1100-241-80. *Warsaw Pact Ground Forces Equipment Handbook: Armed Fighting Vehicles* (Microfiche)

DDB 1100-255-80. *Warsaw Pact Ground Forces Equipment Identification Guide: Armored Fighting Vehicles*

DDI 1120-129-76. *Soviet Tank Company Tactics*

Field Manuals (FM)

FM 23-14. *Squad Automatic Weapon (SAW)* (10 Dec 85)

Graphic Training Aids (GTA)

GTA 3-6-3. *NBC Warning and Reporting System*

GTA 17-2-13. *Armored Vehicle Recognition (Study Cards 1-52)*

GTA 30-3-14. *Warsaw Pact and NATO Tank Recognition Guide (Charts/Slides)*

GTA 30-3-20. *Warsaw Pact Tanks (Vulnerable Points) (Charts/Slides)*

GTA 44-2-10. *Aircraft Recognition Playing Cards (Deck of Cards)*

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