CHAPTER 1

INTRODUCTION

The procedures and methods used in Army machine gun marksmanship are based on the concept that soldiers must be skilled gunners who can effectively apply their firing skills in combat. The basic firing skills and exercises outlined in this manual must be a part of every unit's machine gun training program. The soldiers' proficiency depends on proper training and application of basic gunnery fundamental, which are taught in a progressive program to prepare gunners for combat.

1-1. TRAINING STRATEGY

Training strategy is the overall concept for integrating resources into a program to train individual and collective skills needed to perform a unit's wartime mission.

a. Training strategies for marksmanship are implemented in TRADOC institutions (NCOES, basic and advanced officer's courses) and in units. The overall training strategy is multifaceted and is inclusive of the specific strategies used in institution and unit programs. Also included are the supporting strategies that use resources such as publications, ranges, ammunition, training aids, devices, simulators, and simulations. These strategies focus on developing critical soldier skills, and on leader skills that are required for the intended outcome.

b. Two primary components compose the training strategies: initial training and sustainment training. Both may include individual and collective skills. Initial training is critical because a task that is taught correctly and learned well is retained longer. Well-trained skills can be more quickly regained and sustained if an interim of nonuse occurs. The more difficult and complex the task, the harder it is to sustain the skill. Personnel turnover is a main factor in decay of collective skills, since the loss of critical team members requires retraining to regain proficiency. If a long period elapses between initial and sustainment training sessions or training doctrine is altered, retraining maybe required.

c. The training strategy for caliber .50 MG marksmanship begins in selected resident training and continues in the unit. An example of this overall process is illustrated in Figure 1-1 and provides a concept of the

flow of unit sustainment training. The soldiers graduating from selected resident training courses have been trained to maintain their MGs and to hit a variety of targets. They have learned range determination, target detection, application of marksmanship fundamentals, and other skills needed to engage a target. Task training during these courses may lead to qualification.

d. Training continues in units on the basic skills taught in combat arms. Additional skills, such as suppressive fire and supporting fire, are trained and then integrated into collective training exercises, which include platoon and squad live-fire STXs. (A unit-marksmanship training program is explained in Chapter 5.) The strategy for sustaining the basic marksmanship skills taught in combat arms is periodic preliminary instruction, followed by qualification range firing. However, a unit must set up a year-round program to sustain skills. Key elements include training of trainers and refresher training of nonfiring skills.

e. Additional skills trained in the unit include techniques for employment, suppressive fires, night fire, MOPP firing, and moving targets. Related soldier skills of camouflage, cover and concealment, maneuver, and preparation and selection of a fighting position are addressed in STP 21-24-SMCT, which must be integrated into tactical training.

f. In the unit, individual and leader proficiency of marksmanship tasks are integrated into collective training to include squad, section, and platoon drills and STXs. The collective tasks in these exercises, and how they are planned and conducted, are in the MTP and battle drill books for each organization. Based on the type organization, collective tasks are evaluated to standard and discussed during leader and trainer after-action reviews. Objective evaluations of both individual and unit proficiency provide readiness indicators and future training requirements.

g. A critical step in the Army's overall marksmanship training strategy is to train the trainers and leaders first. Leader courses and unit publications develop officer and NCO proficiencies necessary to plan and conduct marksmanship training and to evaluate the effectiveness of unit marksmanship programs. Training support materials are provided by the proponent schools to include field manuals, training aids, devices, simulators, and programs that are doctrinal foundations and guidance for training the force.

h. Once the soldier understands the weapon and has demonstrated skill in zeroing, additional live-fire training and a target acquisition exercise at various ranges are conducted. Target types and scenarios of increasing difficulty must be mastered to develop proficiency.

i. Initial individual training culminates in the soldier's proficiency assessment, which is conducted on a transition/record fire range. This evaluation also provides an overview of unit proficiency and training effectiveness.

j. Unit training programs maintain the soldiers' proficiency level. The ultimate goal of a unit marksmanship program is to maintain well-trained gunners so a unit can survive and win on the battlefield. The trainer must realize that qualification is not an end, but a step toward reaching this combat requirement. (See Figure 1-1.)

(1) To reach this goal, the gunner must be able to position and use his weapon under the following combat conditions:

- Enemy personnel are seldom visible except when assaulting.
- Most combat fire must be directed at an area where the enemy has been detected or where he is suspected of being located but cannot be seen. Area targets consist of objects or outlines of men irregularly spaced along covered and concealed areas (ground folds, hedges, or borders of woods).
- Most combat targets can be detected by smoke, flash, dust, noise, or movement and are visible only for a moment.
- Some combat targets can be engaged by using nearby objects as reference points.
- The nature of the target and irregularities of terrain and vegetation may require a firer to use a variety of positions in addition to the prone or supported position to fire effectively on the target. In a defensive situation, the firer usually fires from a supported position.
- Most combat targets have a low contrast outline and are obscure. Therefore, choosing an aiming point in elevation is difficult.
- Time-stressed fire in combat can be divided into three types: a single, fleeing target that must be engaged quickly; distributed targets engaged within the time they remain available; and a surprise target that must be engaged at once with accurate, instinctive fire.

(2) The unit's program must provide fundamental training to sustain and improve the skills and proficiency the soldier has attained during his basic marksmanship training. Once basic skills have been mastered, these must be improved by conducting new or advanced individual and collective training. The program must develop collective firing skills by incorporating marksmanship into tactical exercises. This training must maintain the soldier's confidence in the weapon and his skills. A soldier's

survival may depend on his ability to defend himself or other members of the unit. Therefore, individual and collective firing skills must support the expected battlefield conditions and the unit's combat mission.

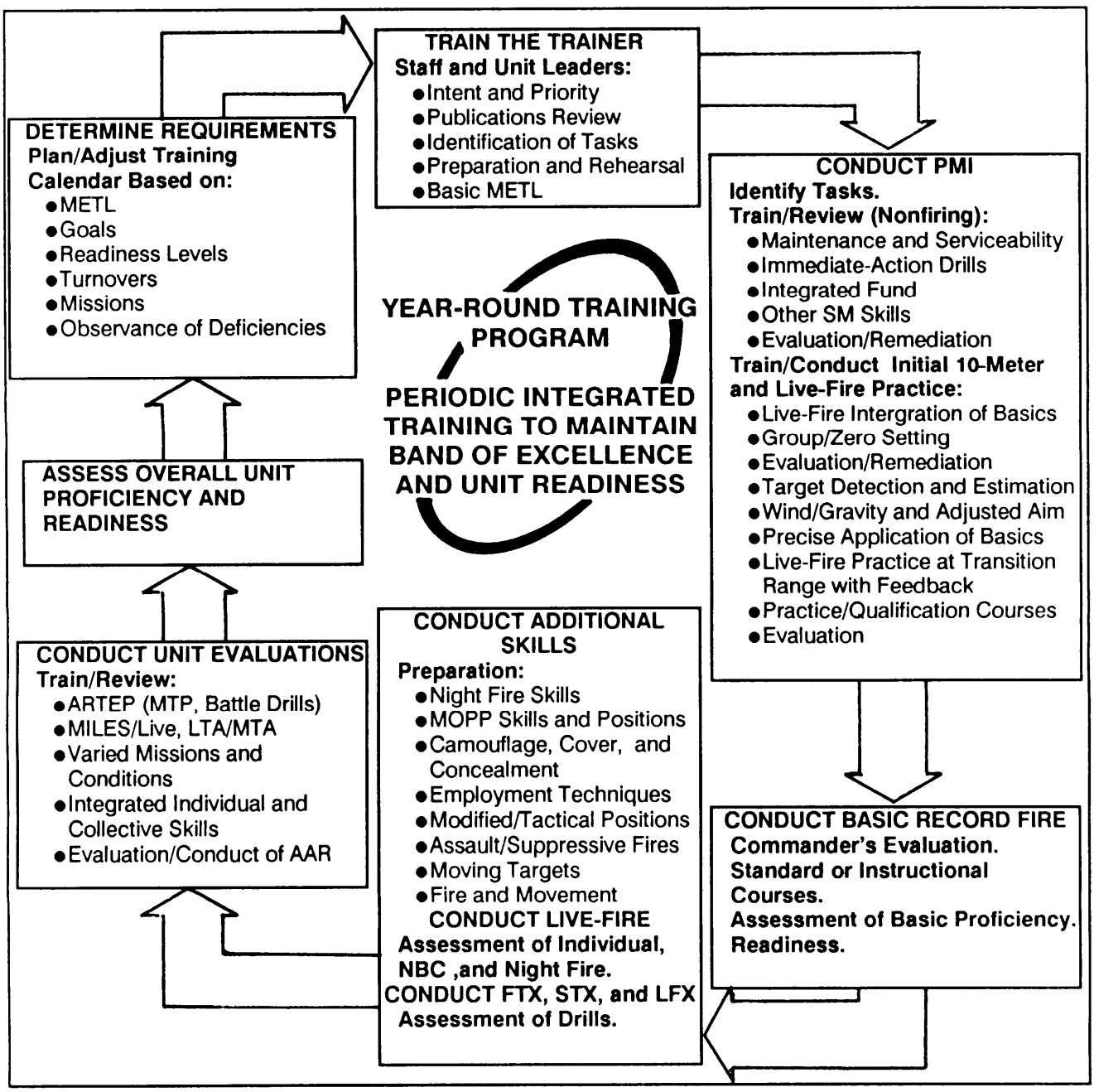

Figure 1-1. Unit marksmanship sustainment strategy.

(3) A unit's marksmanship program must be battlefield oriented. It must be based upon several individual combat tasks as well as organizational, operational, or contingency missions. It must have available resources such as ammunition, time, ranges, and qualified trainers. This manual provides the information a unit commander needs to develop an effective marksmanship program for his unit requirements.

(4) General marksmanship, training knowledge, and accurate firing are acquired skills that perish easily. Skill practice should be conducted for short periods throughout the year. Most units have a readiness requirement that all soldiers must zero their MGs within a certain time after unit assignment. Also, soldiers must confirm the zero of their assigned MGs before conducting a qualification firing.

1-2. DESCRIPTION

The Browning machine gun caliber .50 HB, M2 (Figure 1-2) is a belt-fed, recoil-operated, air-cooled, crew-served machine gun. The gun is capable of single shot, as well as automatic fire, and operates on the short recoil principle.

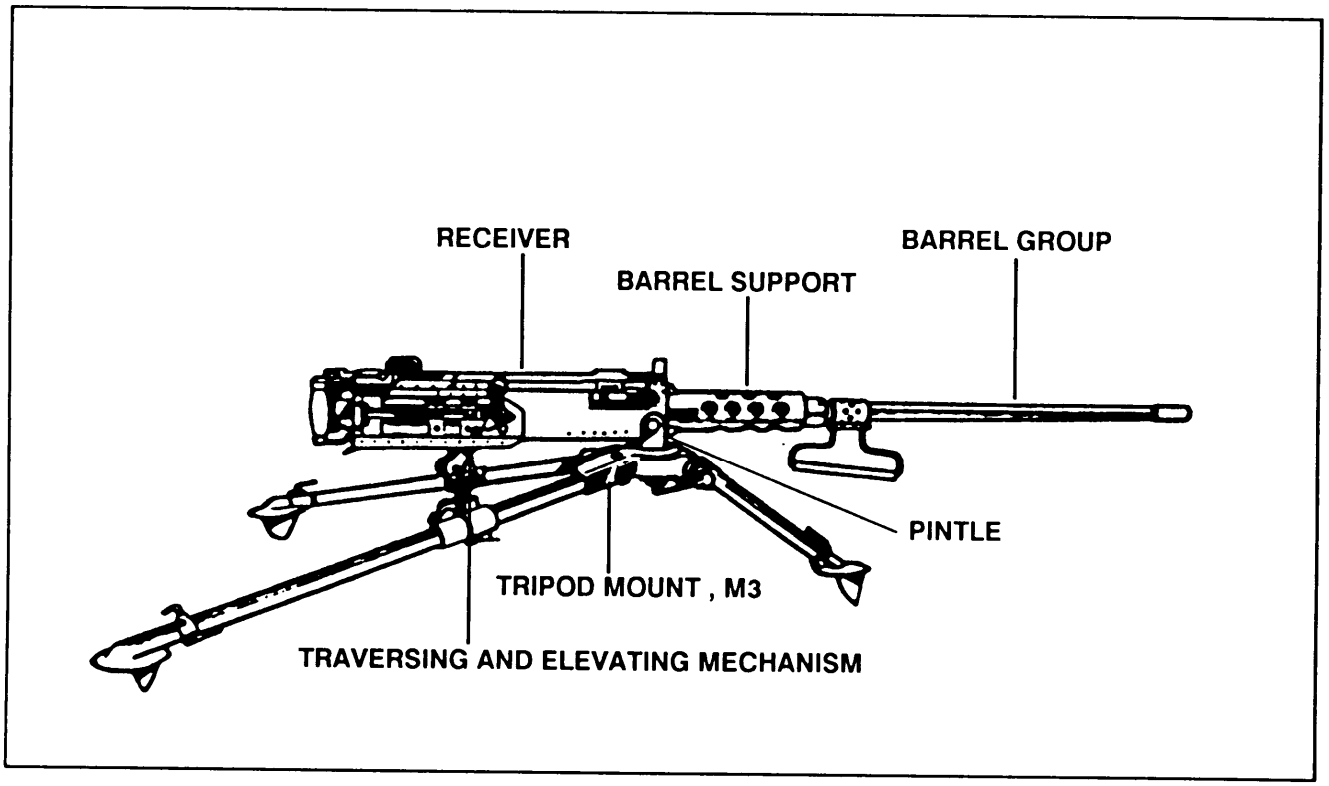

Figure 1-2. Browning machine gun.

a. The machine gun is capable of being fed from either the right or left by repositioning certain parts. The weapon has nonfixed headspace that must be set. Timing must also be adjusted to cause the gun to fire slightly out of battery to prevent damage to moving parts. The force for recoil operation is furnished by expanding powder gases, which are controlled by various springs, cams, and levers. Maximum surface of the barrel and receiver are exposed to permit air cooling. Perforations in the barrel support allow air to circulate around the breach end of the barrel and help in cooling the parts. A heavy barrel is used to retard early overheating.

b. The gun has a leaf-type rear sight (Figure 1-3), graduated in both yards and roils. The scale ranges from 100 to 2,600 in yards, and from 0 to 62 in mils. The windage knob-permits deflection changes to right or left of center. The front sight is a fixed blade type with cover (Figure 1-4).

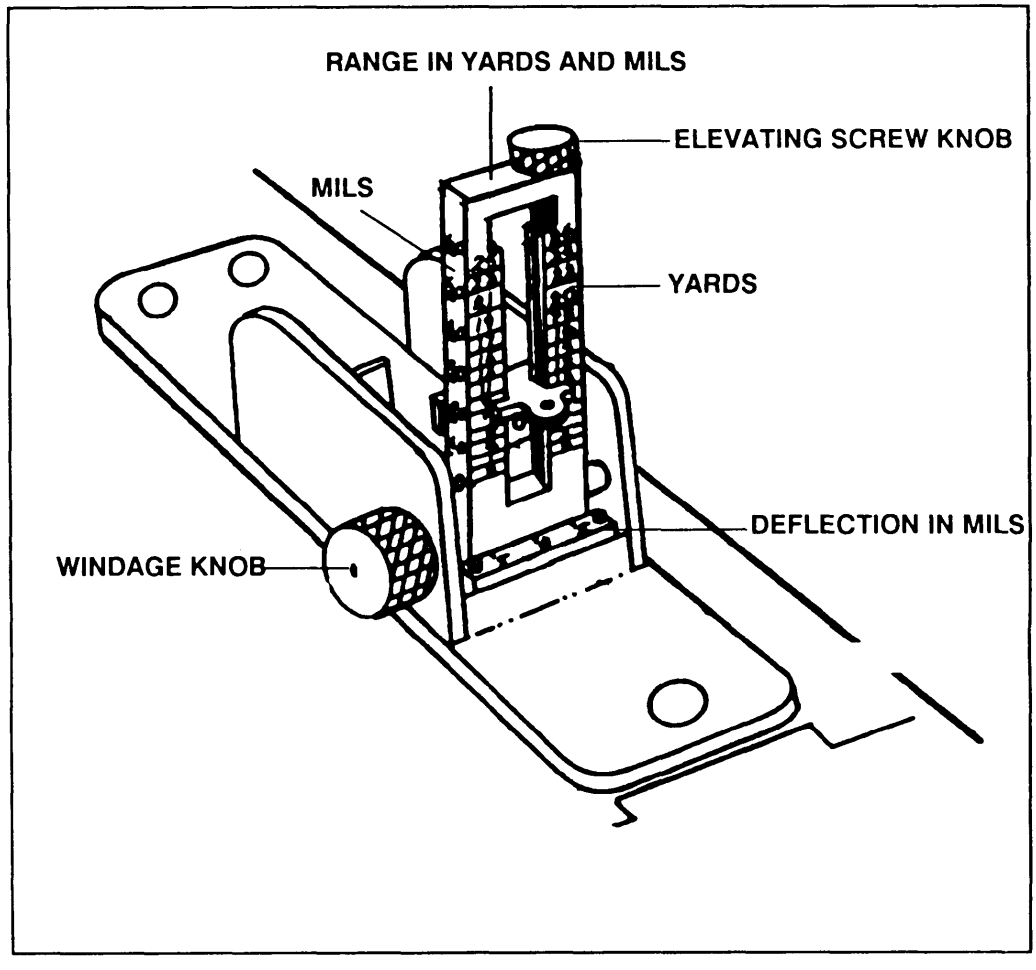

Figure 1-3. Leaf type rear sight.

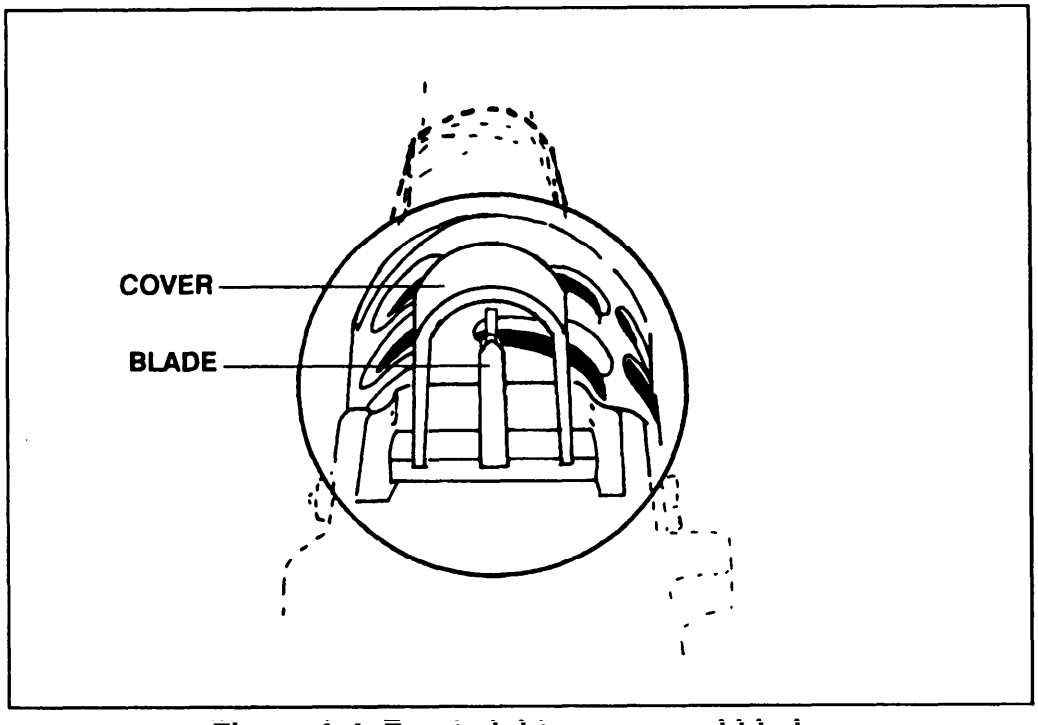

Figure 1-4. Front sight, cover, and blade.

c. Table 1-1 provides the general data on the caliber .50 MG.

Weight (approx)	84 pounds
Weight of barrel	24 pounds
Length of gun	65.13 inches
Length of barrel	45 inches
Length of rifling (approx)	41.88 inches
Number of lands and grooves	8
Twist, right-hand	one turn in 15 inches
Feed	link-belt
Operation	recoil
Cooling	air
Muzzle velocity (approx)	3,050 feet per second
Rate of fire (cyclic)	450-550 rounds per minute
Maximum range (approx)	7,440 yards or 6,764 meters
Maximum effective range (approx)	2,000 yards or 1,830 meters
Area targets	1,830 meters
Point targets	
Single shot	1,500 meters

Table 1-1. General data.

1-3. COMPONENTS

The major components of the caliber .50 MG and their purposes are shown in Figure 1-5 and Table 1-2.

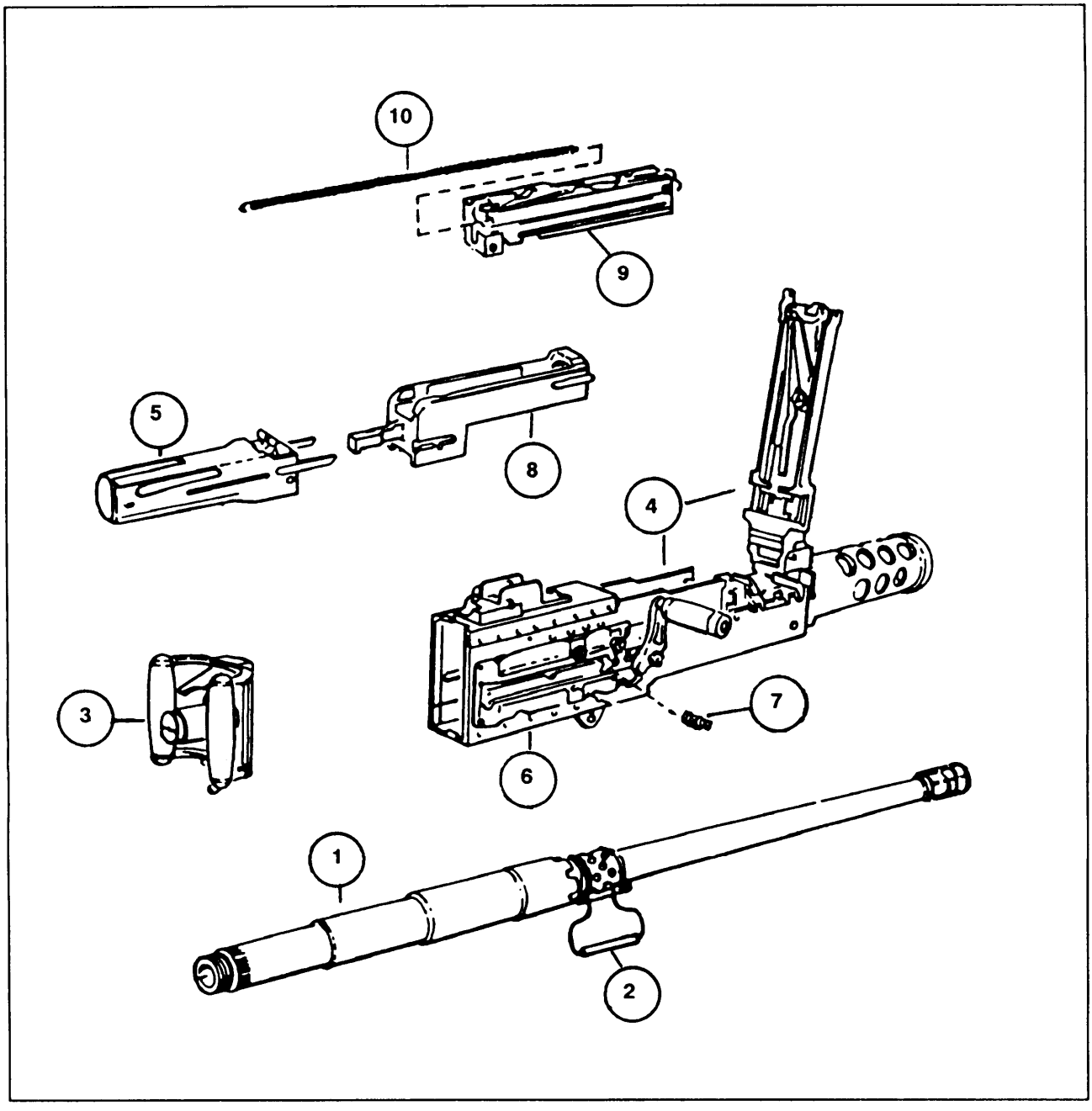

Figure 1-5. Components of the caliber .50 MG.

COMPONENTS	PURPOSES
1. Barrel Group	Houses cartridges for firing; directs projectile.
2.Carrier Assembly	Provides handle to carry barrel and to remove the barrel from the receiver.
3. Backplate Group	Houses the trigger, bolt latch release, buffer tube sleeve, and the left and right spade grips.
4. Receiver Group	Serves as a support for all major components; houses action of weapon, which controls functioning of weapon.
5. Bolt Group	Provides feeding, chambering, firing, and extracting, using the propellant gases and recoil spring for power.
6. Cover Group	Feeds linked belt ammunition; positions and holds cartridges in position for extracting, feeding, and chambering.
7. Bolt Stud	Provides a means to move the bolt to the rear with the retracting slide handle.
8. Barrel Extension Group	Secures the barrel to the recoiling parts.
9. Barrel Buffer Body	Assists in recoil and counterrecoil of the bolt group.
10. Driving Spring Rod Assembly	Drives the bolt forward when the bolt latch release is depressed.

Table 1-2. Components and their purposes.

1-4. GROUND MOUNTS

The two principal ground mounts used with the caliber .50 machine gun are the tripod mount, M3, and the antiaircraft mount, M63. The tripod mount, M3, is a ground mount designed for use against ground targets. The antiaircraft mount, M63, is a ground mount principally designed for use against aerial targets. Its use against ground targets is limited because the mount tends to be unstable when the gun is fired at low angles.

a. **Tripod Mount, M3.** The M3 mount is the standard ground mount of the caliber .50 machine gun (Figure 1-6). It is a folding tripod with three, telescopic, tubular legs connected at the tripod head. Each leg ends in a

metal shoe that can be stamped into the ground for greater stability. The two trail legs are joined together by the traversing bar. The traversing bar serves as a support for the traversing and elevating mechanism, which in turn supports the rear of the gun. The tripod head furnishes a front support for the mounted gun that is further supported by the short front leg. When the tripod is emplaced on flat terrain with all extensions closed, the adjustable front leg should form an angle of about 60 degrees with the ground. This places the gun on a low mount about 12 inches above the ground. To raise the tripod farther off the ground, extend the telescopic front and trail legs enough to keep the tripod level and maintain the stability of the mount.

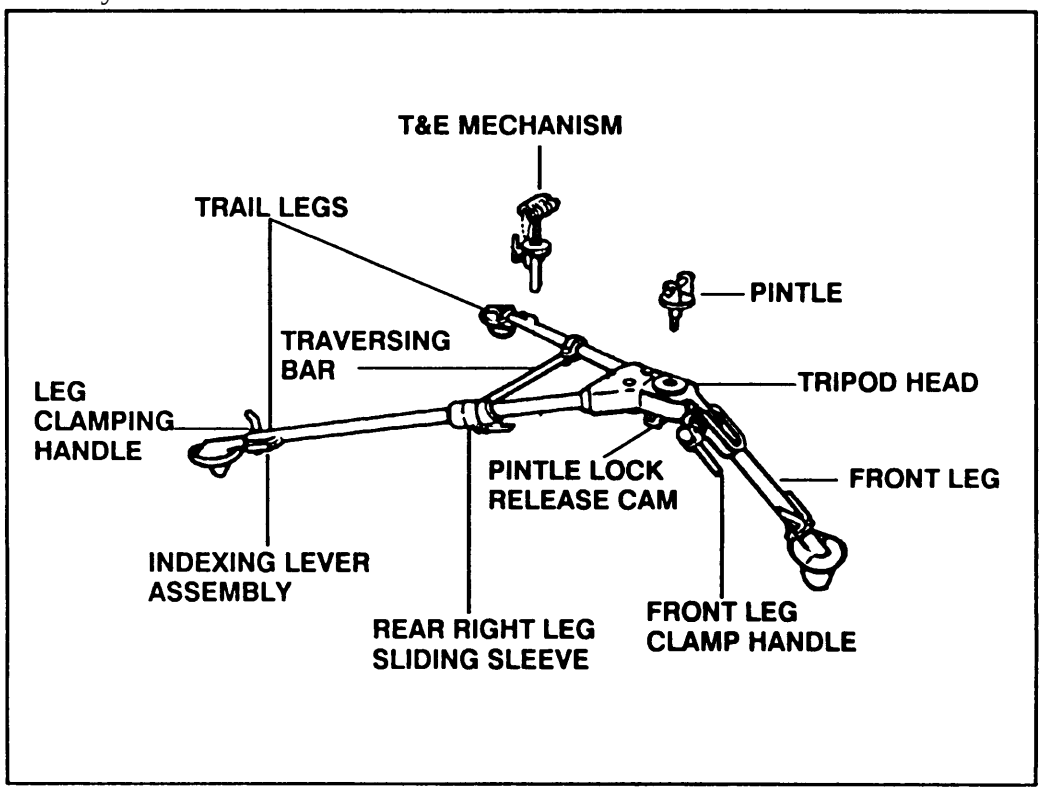

Figure 1-6. M3 tripod mount.

(1) *To set the tripod trail legs –*

(a) Unscrew the leg-clamping handle, press down on the indexing lever, and extend the leg to the desired length.

(b) Align the indexing lever stud with one of the holes in the tripod leg extension.

(c) Release the pressure on the indexing lever, allowing the stud to fit the desired hole. Tighten the leg-clamping handle.

(2) *To set the front leg of the tripod-*

(a) Turn the front leg clamp handle counterclockwise to loosen the front leg.

(b) Adjust the leg to the desired angle and tighten the front leg clamp.

(3) To secure the tripod legs, stamp the metal shoe on each tripod leg into the ground. Sandbag each leg to stabilize the M2 for firing.

b. **Antiaircraft Mount, M63.** The antiaircraft mount (Figure 1-7) is a four-legged, low silhouette, portable mount used for antiaircraft fire. Table 1-3 lists the general data pertaining to the M63.

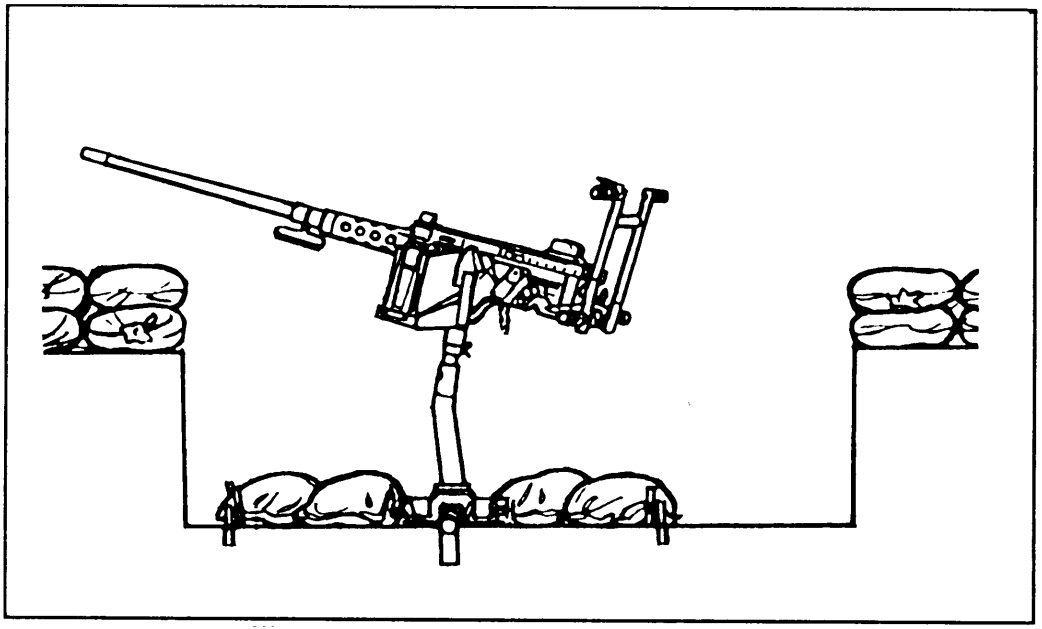

Figure 1-7. Antiaircraft mount, M63.

WEIGHTS:	
Overall	144 pounds
Four legs	24 pounds
Base assembly	54 pounds
Elevator assembly	12 pounds
Cradle assembly	44 pounds
Ammunition box-tray assembly	10 pounds
HEIGHT OVERALL	42 inches
LENGTH OF LEG	24 inches
DIAMETER OF BASE (WITH LEG ASSEMBLED)	52 inches
MAXIMUM ELEVATION	85 degrees
MAXIMUM DEPRESSION	29 degrees
MAXIMUM TRAVERSE	360 degrees

Table 1-3. M63 general data.

1-5. ACCESSORIES FOR GROUND MOUNTS

The following paragraph explains the functions of the traversing and elevating mechanism and pintle used in the mounting of the machine gun when used in the ground configuration.

a. **Traversing and Elevating Mechanism.** The T&E mechanism (Figure 1-8) is used to engage preselected target areas at night or during limited visibility conditions. Record direction and elevation readings from the traversing bar and T&E mechanism. Record all readings in mils.

(1) The traversing mechanism consists of a traversing bar, slide, and screw assembly.

(a) The traversing bar, graduated in 5-roil increments, fits between the trail legs of the tripod. The traversing slide and screw assembly are clamped in place on the traversing bar by the traversing slide lock lever. When the traversing slide is locked to the traversing bar, the traversing handwheel should be centered. The traversing slide is properly mounted when the lock lever is to the rear and the traversing handwheel is positioned to the left.

(b) To make changes in direction, loosen the traversing slide lock lever and move the slide along the traversing bar. This permits traverse of 400 mils left or right of the zero index in the center of the traversing bar. Readings on the traversing bar are taken from the left side of the traversing slide. For changes of 50 mils or less in deflection, turn the traversing handwheel of the screw assembly. This allows a traverse of 50 mils left or right of center. One click in the traversing handwheel signifies 1 mil change in direction.

(2) The elevating mechanism consists of an upper and lower elevating screw.

(a) It is connected to the gun by inserting the quick release pin assembly through the holes in the upper elevating screw yoke and the rear mounting lugs of the receiver. A scale, graduated in mils, is fitted to the upper screw to indicate elevation. This scale is marked to show 250 mils in depression and 100 mils in elevation from the zero setting.

(b) The elevating handwheel is graduated in l-mil increments up to 50 mils, and is fastened to the elevating screw by a screw lock. This synchronizes the handwheel graduations with those on the upper elevating screw. A spring-actuated index device produces a clicking sound when the handwheel is turned. Each click equals 1 mil change in elevation. The handwheel is turned clockwise to depress the barrel and counterclockwise to elevate.

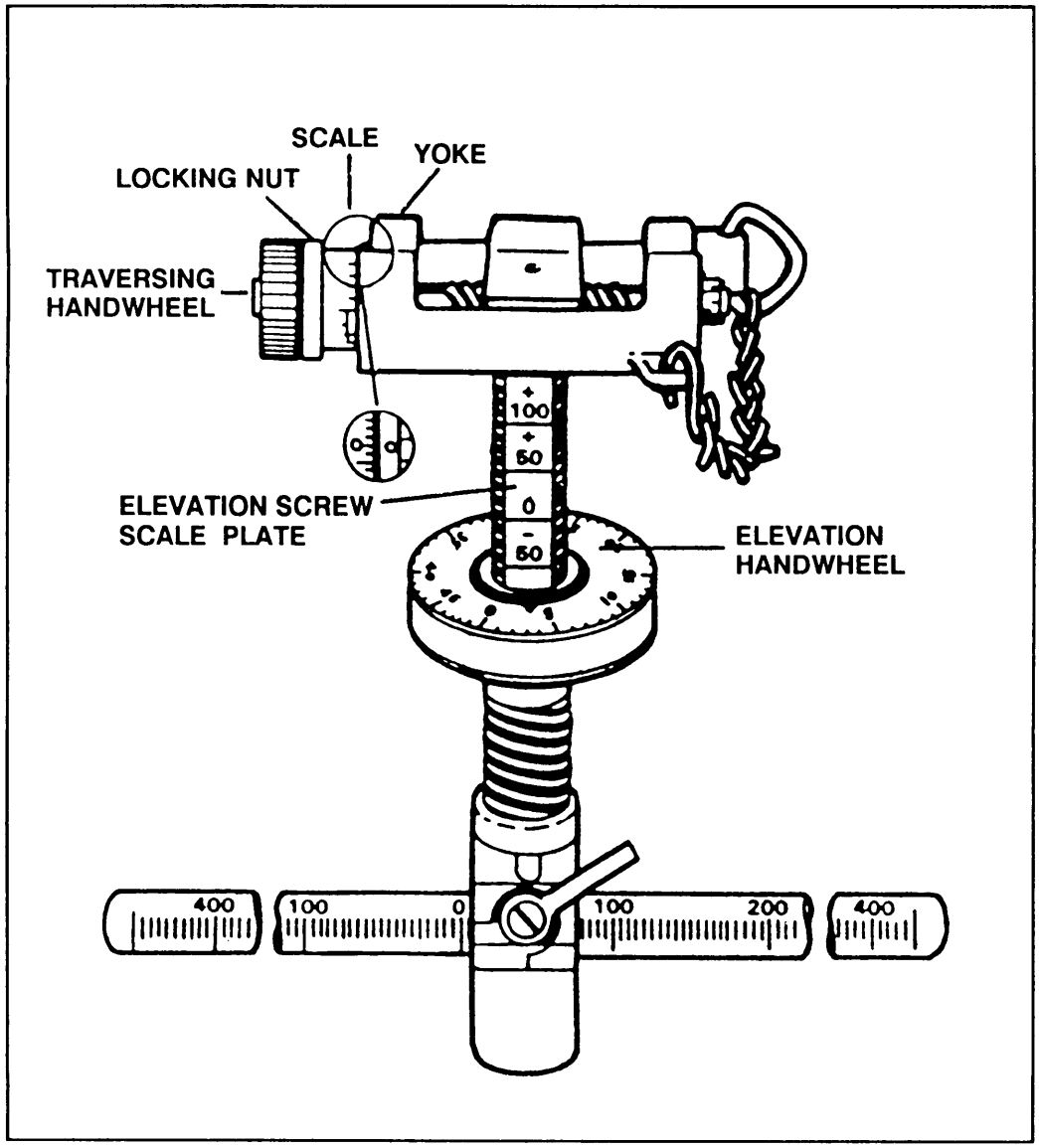

Figure 1-8. Traversing and elevating mechanism.

b. **Pintle.** The gun is connected to the tripod mount, M3, by a pintle (Figure 1-9, page 1-14). This pintle is semipermanently attached to the machine gun by a pintle bolt through the front mounting hole in the receiver. The tapered stem of the pintle seats in the tripod head. It is held secure by a pintle lock and spring. To release the pintle, raise the pintle lock, releasing the cam. The weight of the pintle and traversing and elevating mechanism are considered as part of the total weight of the tripod mount, M3 (44 pounds).

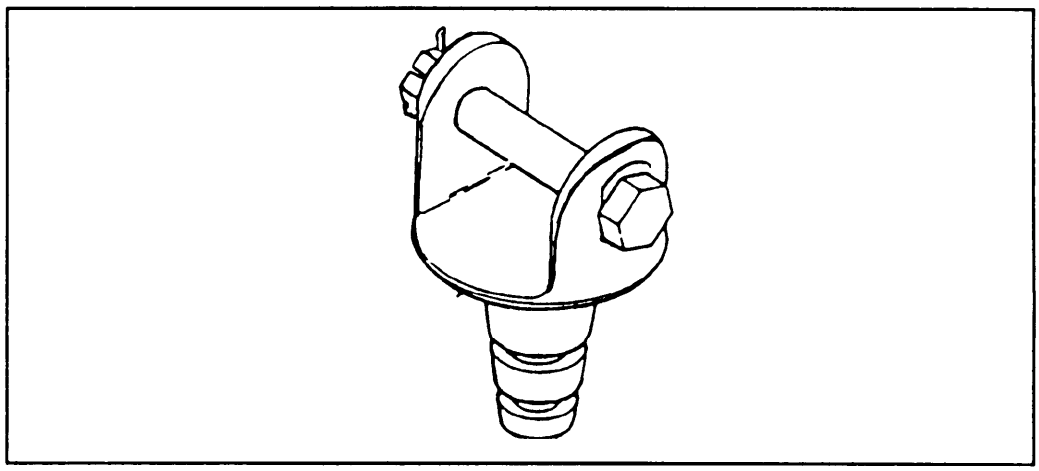

Figure 1-9. Pintle.

1-6. VEHICULAR MOUNTS

The four principal vehicular mounts used with the caliber .50 machine gun are the truck mount, M36; the pedestal truck mount, M31C and M24A2; the commander's cupola, Ml13 armored personnel carrier; and the MK64 gun cradle.

a. **Truck Mount, M36.** This mount consists of a cradle with a roller carriage on a circular track (Figure 1-10). The cradle can be rotated in the pintle sleeve of the carriage and can be adjusted for elevation. The carriage is guided on the track by rollers. The track is secured to the vehicle by supports.

(1) To move the gun in elevation on the M36 mount, remove the cradle locking pin and place it in the carriage handle; grasp the spade grips and elevate or depress as desired. The gun is also moved in traverse by pressure on the spade grips.

(2) To move the gun on the track, raise the brake handle lever until it is retained by the brake detent plungers. The cradle may then be moved on the track by applying pressure on the carriage handle.

b. **Pedestal Truck Mount, M31C.** Pedestal mounts are component assemblies designed for installation on the 1/4-ton vehicles to support a machine gun mount. They are composed of a pintle socket, pintle clamping screw column, and braces (Figure 1-11).

c. **Armored Vehicle Cupola Mount.** A caliber .50 machine gun and mount are installed in the gun support on the commander's cupola of an Ml 13 armored personnel carrier. The machine gun can be traversed 360 degrees, elevated 53 degrees, and depressed 21 degrees maximum (Figure 1-12).

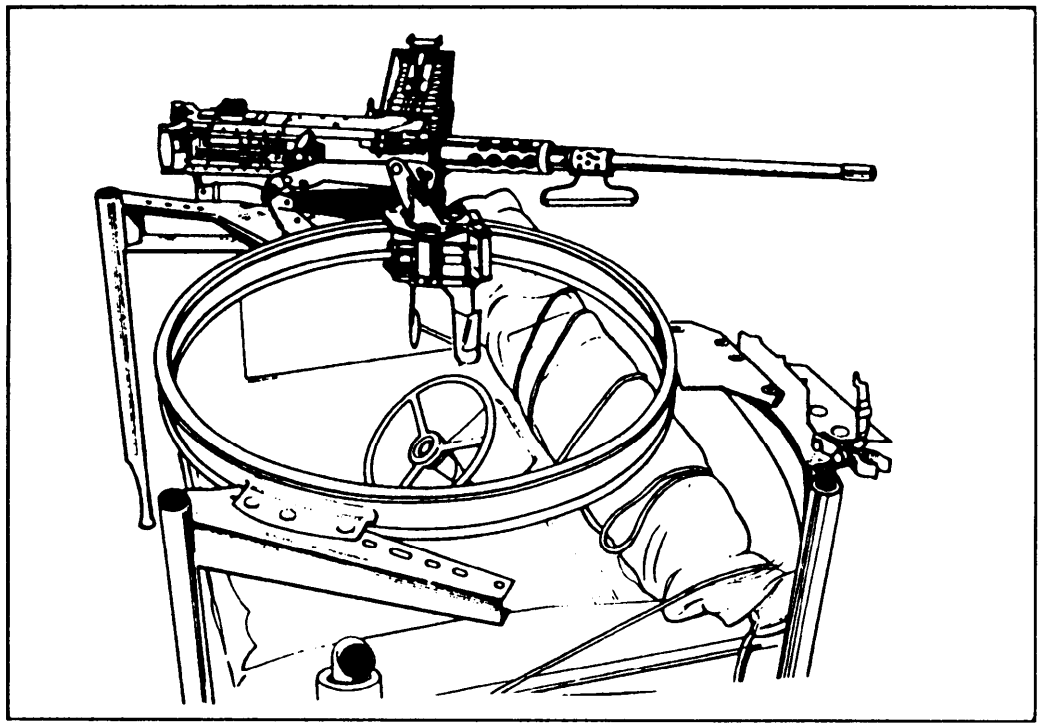

Figure 1-10. Truck mount, M36.

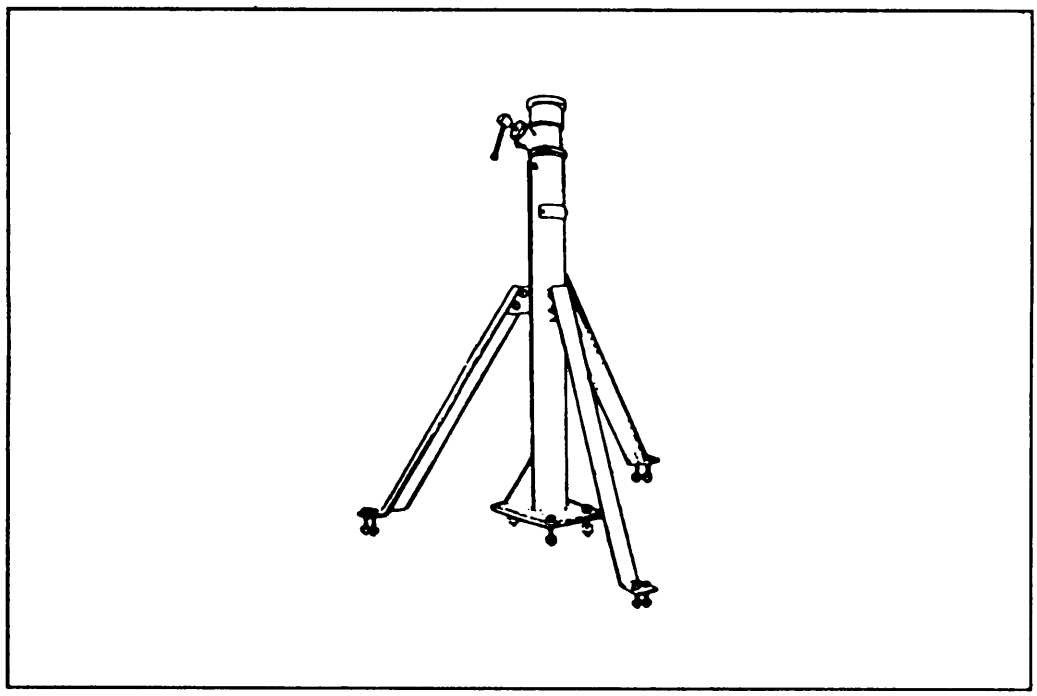

Figure 1-11. Pedestal truck mount, M31 C.

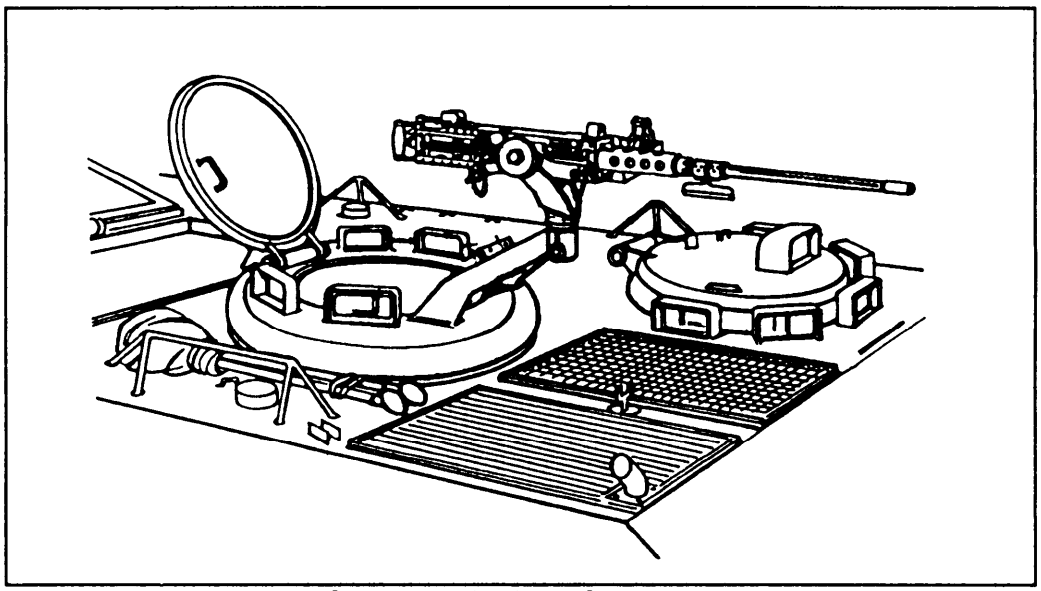

Figure 1-12. Cupola mount.

d. **MK64 Gun Cradle Mount.** This vehicle mount was primarily designed for the M2. However, because of its versatility, the MK64 will accept the MK 19 also (using the M2 mounting adapter assembly). The MK64 can be mounted on the following vehicles – M151 series, M966 HMMWV armament carrier, and the M113 series (Figure 1-13).

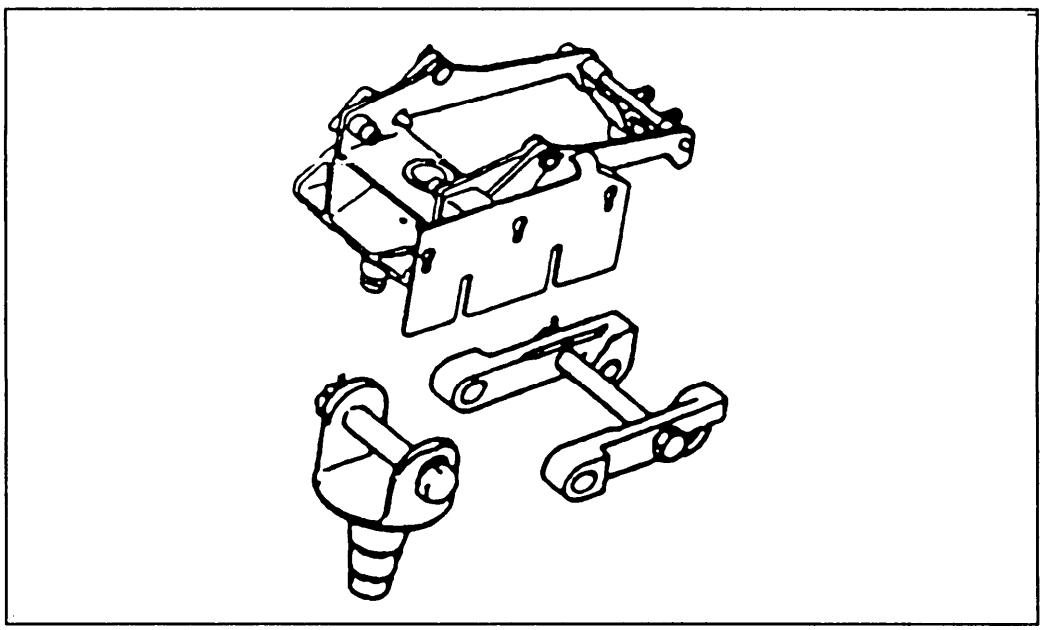

Figure 1-13. MK64 gun cradle.

1-7. AMMUNITION

This paragraph describes the ammunition used in caliber .50 machine guns (Figure 1-14). Soldiers should be able to recognize the types of ammunition available and know how to care for it. The caliber .50 cartridge consists of a cartridge case, primer, propelling charge, and the bullet. See TM 9-1300-200. The term bullet refers only to the small-arms projectile. There are eight types of ammunition issued for use in the caliber .50 machine gun. The tips of the various rounds are color-coded to indicate their type. The ammunition is linked with the M2 or M9 metallic links for use in the machine gun (Figure 1-15, page 1-18).

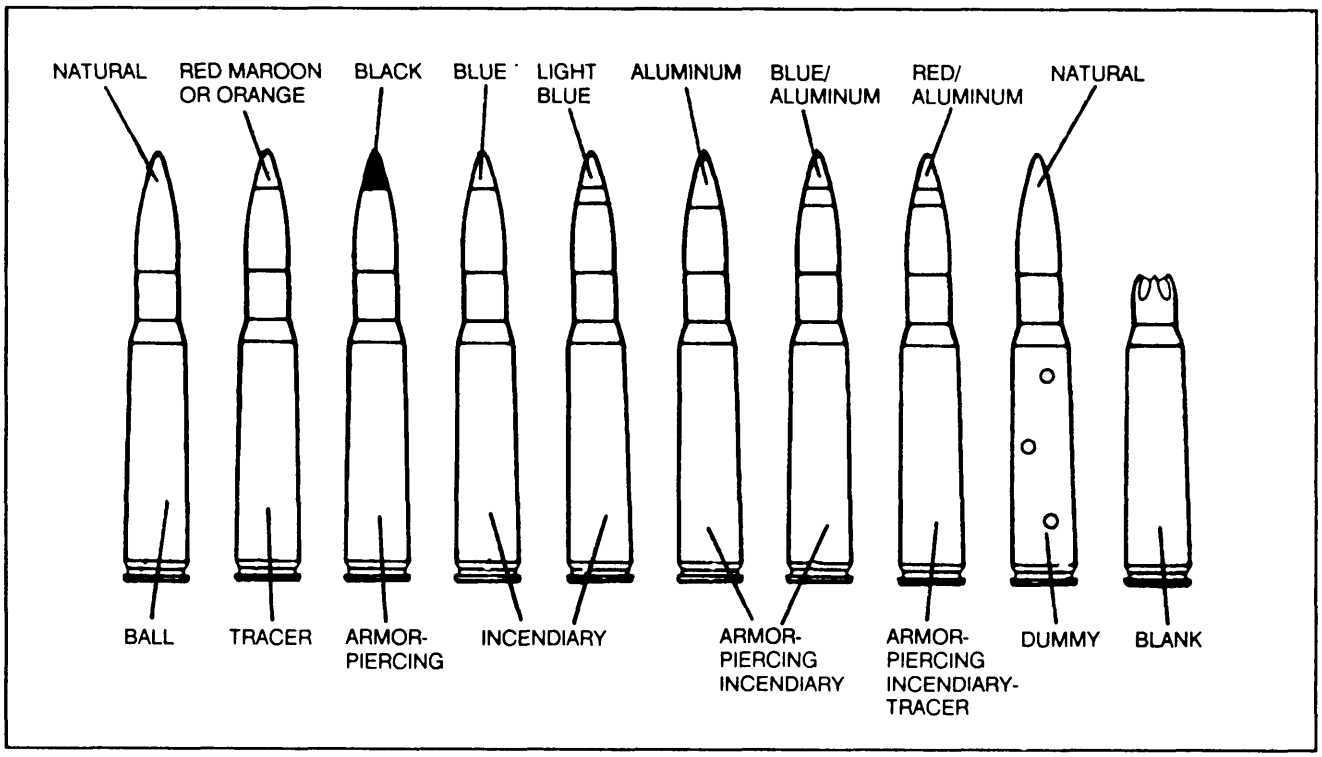

Figure 1-14. Ammunition for the M2.

a. **Classification.** The eight types of ammunition are used for the following purposes.

(1) *Ball.* For use in marksmanship training, and against personnel and light material targets.

(2) *Tracer.* To aid in observing fire. Secondary purposes are for incendiary effect and for signaling.

(3) *Armor-piercing.* For use against armored aircraft and lightly armored vehicles, concrete shelters, and other bullet-resisting targets.

(4) *Incendiary.* For incendiary effect, especially against aircraft.

(5) *Armor-piercing-incendiary.* For combined armor-piercing and incendiary effect.

(6) *Armor-piercing-incendiary-tracer.* For combined armor-piercing and incendiary effect, with the additional tracer feature.

(7) *Blank.* For simulated fire (contains no bullet).

(8) *High-pressure test.* For use only in proof firing of weapons and barrels.

(9) *Dummy.* For training (completely inert).

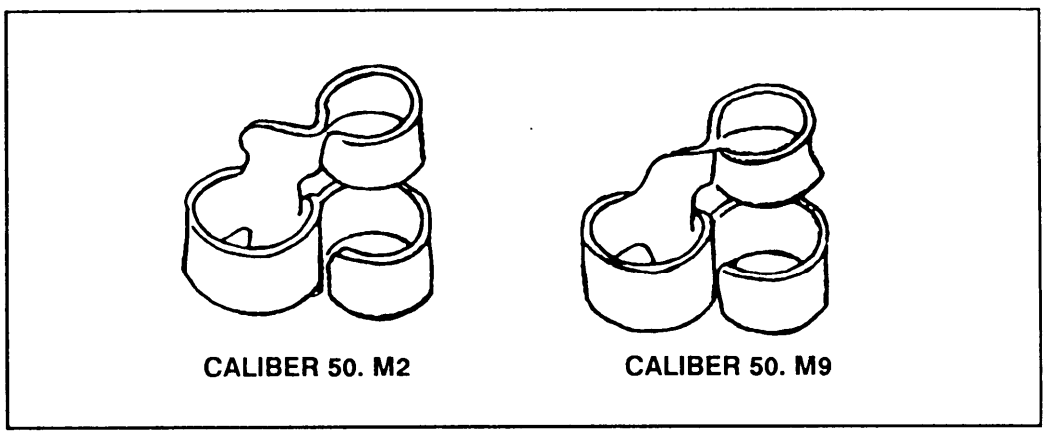

Figure 1-15. M2 and M9 links (closed loop).

b. **Ballistic Data.** The approximate maximum range and average muzzle velocity of some of the different types of caliber .50 ammunition authorized for use in the machine gun are noted in Table 1-4.

CARTRIDGE	MAXIMUM RANGE (meters)	METER TRACE	AVERAGE MUZZLE VELOCITY (feet per second)
Ball, M2	7,400	—	2,930
Tracer, M1 (with gilding metal jacket)	5,575	1,800	2,860
Tracer, M1 (with clad steel jacket)	5,450	1,800	3,030
Tracer, M17	5,450	2,450	3,030
Incendiary, M1	6,050	—	3,090
Armor-piercing, M2	7,400	—	2,930
Armor-piercing-incendiary,M8	6,470	—	3,050
Armor-piercing-incendiary-tracer, M20	6,470	*300-1,750	3,050

* This tracer is dim at near ranges but increases to bright as it moves farther from the gun.

Table 1-4. Ballistic data.

c. **Care, Handling, and Preservation**. Exercise care to prevent ammunition boxes from becoming broken or damaged. If they do, repair them immediately. Transfer all original markings to the new parts of the box. Do not open ammunition boxes until the ammunition is to be used. Ammunition removed from the airtight container, particularly in damp climates, is likely to corrode. Protect the ammunition from mud, sand, and water. If the ammunition gets wet or dirty, wipe it off at once with a clean, dry cloth. Wipe off light corrosion as soon as it is discovered. Turn in heavily corroded cartridges. Do not expose ammunition to the direct rays of the sun. If the powder is hot, excessive pressure may be developed when the weapon is fired. Do not oil or grease ammunition. Dust and other abrasives that collect on greasy ammunition are injurious to the operating parts of the gun. Moreover, oiled cartridges produce excessive chamber pressure. Do not fire dented cartridges, cartridges with loose bullets, or otherwise defective rounds.

d. **Storage**. Small-arms ammunition is not an explosive hazard, but under poor storage conditions it may become a fire hazard. Store ammunition of all classes away from radiators, hot water pipes, and other sources of heat. Whenever possible, store ammunition under cover. If it is necessary to leave ammunition in the open, keep it at least 6 inches off the ground and covered with a double thickness of tarpaulin. Place the tarpaulin so that it gives maximum protection and allows free circulation of air. Dig suitable trenches to prevent water from flowing under the ammunition pile.

e. **Miscellaneous Data**. Table 1-5 lists the maximum penetration in inches for an armor-piercing cartridge fired from the 45-inch barrel (muzzle velocity, 2,935 feet per second), which in some cases may enhance the leader's selection of targets to engage.

	INCHES AT:		
MATERIAL	**200 METERS**	**600 METERS**	**1,500 METERS**
Armor plate (homogeneous)	1.0	0.7	0.3
Armor plate (face-hardened)	0.9	0.5	0.2
Sand (100 pounds dry weight/cubic feet)	14.0	12.0	16.0
Clay (100 pounds dry weight/cubic feet)	28.0	27.0	21.0

Table 1-5. Maximum penetration for armor-piercing cartridge.

Table 1-6 lists the maximum penetration in inches for a ball cartridge fired from the 45-inch barrel (muzzle velocity, 2,935 feet per second):

	INCHES AT:		
MATERIAL	**200 METERS**	**600 METERS**	**1,500 METERS**
Sand (100 pounds dry weight/cubic feet)	14.0	12.0	6.0
Clay (100 pounds dry weight/cubic feet)	28.0	27.0	21.0
Concrete	2.0	1.0	1.0

Table 1-6. Maximum penetration for ball cartridge.