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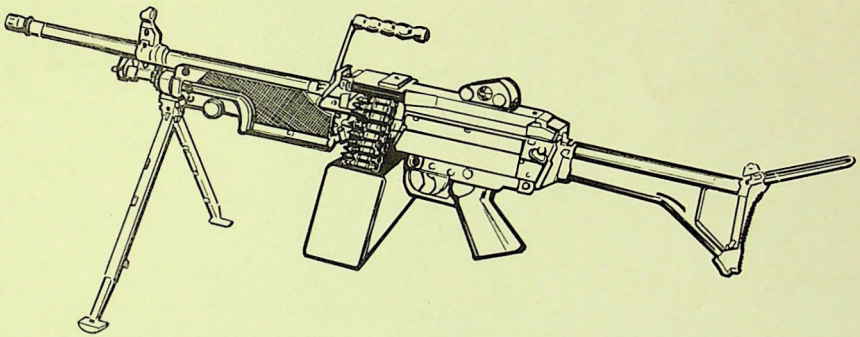
FM 23-14

SQUAD AUTOMATIC WEAPON (SAW), M249



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SQUAD AUTOMATIC WEAPON (SAW), M249

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Preface

This manual is intended to provide technical information, training techniques, and guidance on the squad automatic weapon. Unit leaders and the designated gunners will find this information invaluable in their efforts to successfully integrate this automatic weapon into their combat operations.

The tactical positions shown in this manual are not tactically correct, but were drawn to enhance the reader's understanding of related subject material.

Unless otherwise stated, whenever the masculine gender is used, both men and women are included.

The proponent of this publication is HQ TRADOC. Submit changes for improving this publication on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forward it to Commandant, US Army Infantry School, ATTN: ATSH-IN-2B-C, Fort Benning, GA 31905-5593.

CHAPTER 1

Introduction

1-1. EMPLOYMENT

The squad automatic weapon (SAW) gunner supports the infantry squad in both offense and defense. He is capable of engaging targets with a heavier volume of fire than that of the individual rifleman. The weapon provides the infantry squad with improved suppressive fire and a high volume of close and continuous assault fire. There is no change in movement techniques used by a SAW gunner from those used by M16A1 automatic riflemen. In the defense, the SAW is sited by the squad leader. The SAW gunner's fighting position is the same as that for the automatic rifleman and is represented by the AR symbol on the squad sector sketch. The SAW gunner uses aiming stakes in defining his sector.

1-2. DESCRIPTION

The SAW is an air-cooled, belt-fed, gas-operated automatic weapon which fires from the open-bolt position. It has a regulator for selecting normal (750 rounds per minute) or maximum (1,000 rounds per minute) 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 alternate feeding provision for use in emergencies — the 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.

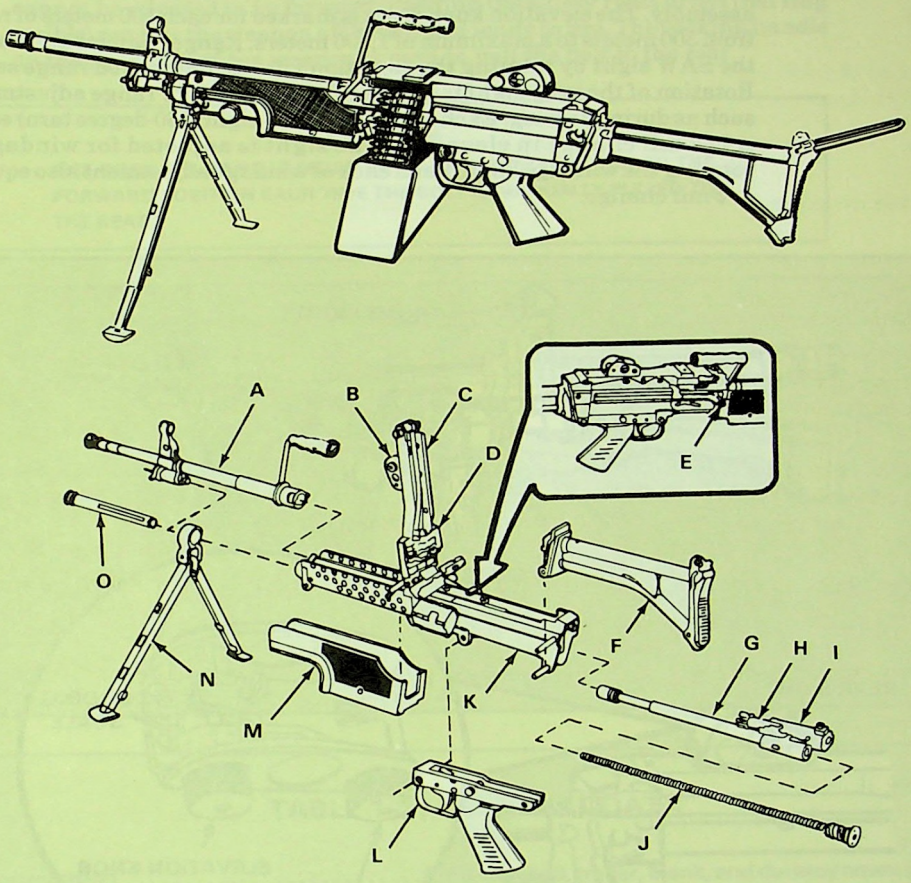
a. **COMPONENTS.** The major components of the SAW and their purposes are shown in Table 1-1.

TABLE 1-1. COMPONENTS AND PURPOSES

COMPONENTS	PURPOSES
Barrel assembly	Houses cartridges for firing, directs projectile, and supports fixed front sight.
Butt group assembly	Serves as a shoulder support for aiming and firing SAW. Contains a folding shoulder rest.
Operating rod assembly	Absorbs recoil from bolt and operating rod assembly at the end of recoil movement.

TABLE 1-1. COMPONENTS AND PURPOSES (CONTINUED)

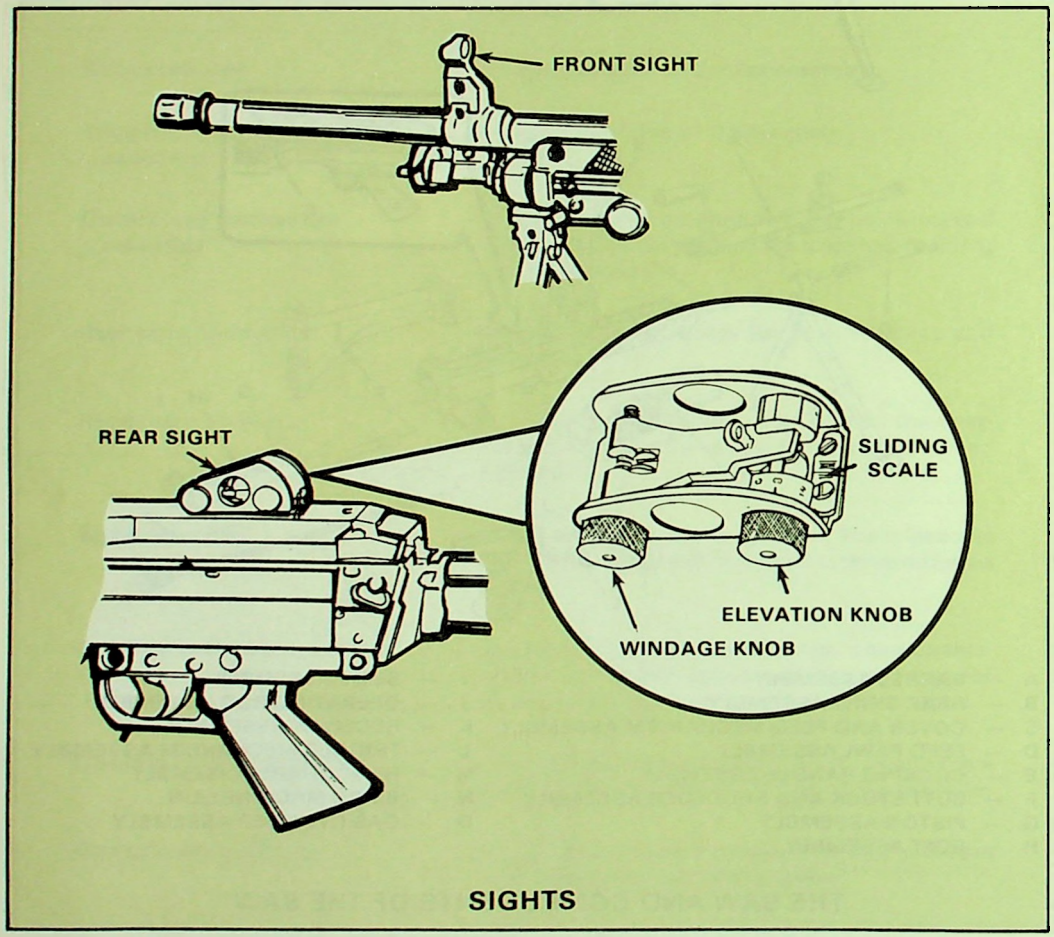
COMPONENTS	PURPOSES
Piston assembly	Transfers power from propelling gases to bolt and slide assemblies in the functioning of the SAW (moves recoiling parts rearward).
Bolt assembly	Provides feeding, stripping, chambering, firing, and extraction, using the propellent gases and recoil spring for power.
Slide assembly	Houses firing pin and roller assembly.
Trigger mechanism assembly	Controls the firing of the weapon.
Cover/feed mechanism assembly	Feeds linked belt ammunition, and positions and holds cartridges in position for stripping, feeding, and chambering.
Rear sight assembly	Rear sight is adjustable for both windage and elevation.
Handguard assembly	Provides thermal insulation to protect the operator's hands from heat, and houses the cleaning equipment.
Bipod assembly	Supports SAW in prone position. The telescopic legs can be individually adjusted to three different lengths.
Receiver assembly	Serves as a support for all major components. Houses action of weapon and, through a series of cam ways, controls functioning of weapon.
Cocking handle assembly	Pulls the moving parts rearward. Moves in a guide rail fixed to the right side of the receiver.
Gas cylinder assembly	Locks bipod in place on receiver and provides passageway for operating gases.



A — BARREL ASSEMBLY
B — REAR SIGHT ASSEMBLY
C — COVER AND FEED MECHANISM ASSEMBLY
D — FEED PAWL ASSEMBLY
E — COCKING HANDLE ASSEMBLY
F — BUTT STOCK AND SHOULDER ASSEMBLY
G — PISTON ASSEMBLY
H — BOLT ASSEMBLY
I — SLIDE ASSEMBLY
J — OPERATING ROD ASSEMBLY
K — RECEIVER ASSEMBLY
L — TRIGGER MECHANISM ASSEMBLY
M — HANDGUARD ASSEMBLY
N — BIPOD MACHINE GUN
O — GAS CYLINDER ASSEMBLY

THE SAW AND COMPONENTS OF THE SAW

b. **SIGHTS.** The SAW has a hooded and semi-fixed front sight. The rear sight is mounted on the top cover of the ammunition feed mechanism assembly. The elevation knob drum is marked for each 100 meters of range, from 300 meters to a maximum of 1,000 meters. Range changes are made on the SAW sight by rotating the elevation knob to the desired range setting Rotation of the peep sight is used for fine elevation or range adjustments, such as during zeroing. Each click of the peep sight (180-degree turn) equals a 1/2-mil change in elevation. The sight is adjusted for windage by rotating the windage knob. Each click of windage adjustment also equals a 1/2-mil change.



SIGHTS

c. **SAFETY.** The safety is on the trigger housing. Pushing the safety from left to right (red ring NOT visible) renders the weapon SAFE, and the bolt cannot be released to go forward. Pushing the safety right to left (red ring visible) renders the weapon off SAFE and ready to fire. The cocking handle on the right side of the weapon is used to pull the bolt to the rear.

CAUTION

THE COCKING HANDLE MUST BE MANUALLY RETURNED TO THE FORWARD POSITION EACH TIME THE BOLT IS MANUALLY PULLED TO THE REAR.

SAW SAFETY

TABLE 1-2. GENERAL DATA

Ammunition	5.56-mm ball, tracer, blank, and dummy ammunition is packaged in 200-round boxes each weighing 6.92 pounds (3.140 kilograms), or 30-round magazines each weighing 1.07 pounds (0.485 kilogram).
Tracer burnout	900 meters (+)
Length of SAW	40.87 inches (1,038 millimeters)

TABLE 1-2. GENERAL DATA (CONT)

Weight of SAW with 200-round box	22.08 pounds (10.015 kilograms)
Maximum range	3,600 meters
Rates of fire:	
Sustained	85 rounds per minute
Rapid	200 rounds per minute
Cyclic	750 rounds per minute
Basic load, ammunition	600 rounds carried by gunner. (Ammunition carried in three 200-round boxes.)
Maximum extent of grazing fire obtainable over uniformly sloping terrain	600 meters

CHAPTER 2

Disassembly and Assembly

2-1. GENERAL DISASSEMBLY

The M249 SAW can be disassembled and assembled without special tools or equipment except for the handguard assembly, the gas regulator, and the gas regulator collar. Detailed disassembly requires special tools.

As each part is removed in disassembly, it should be placed on a clean, flat surface such as a table, shelter half, or disassembly mat. This makes it easy to keep track of parts, and it aids in the assembly, since the parts are assembled in reverse order from disassembly.

Disassembly of the SAW beyond that described in this manual must be done by ordnance personnel.

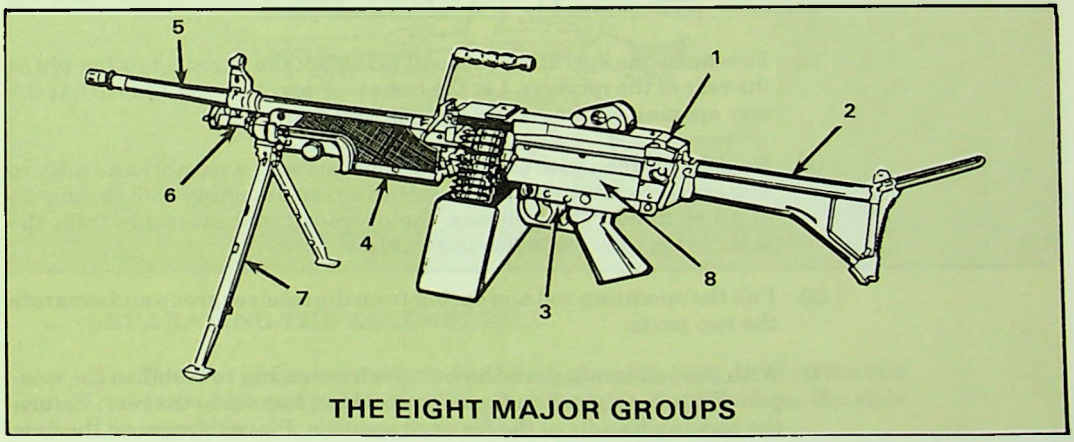
a. TYPES. There are two types of disassembly and assembly:

(1) **General disassembly and assembly** pertain to removing and replacing the eight major groups.

(2) **Detailed disassembly and assembly** pertain to removing and replacing the parts of those major groups.

b. GROUPS. The eight major groups of the SAW are:

(1) Operating rod group
(2) Buttstock and shoulder assembly group
(3) Trigger group
(4) Handguard group
(5) Barrel group
(6) Gas cylinder group
(7) Bipod group
(8) Receiver group



THE EIGHT MAJOR GROUPS

c. **CLEARING.** Clearing is always the first step upon receiving a SAW or when preparing it for disassembly. To clear the SAW:

(1) Cock the weapon.

(2) Put the safety on SAFE and return the cocking handle to its forward position.

(3) If the SAW is belt-fed, raise the cover, inspect the tray, and remove links or ammunition.

(4) If the SAW is magazine-fed, push down on the magazine release tab and remove the magazine. Then raise the cover.

(5) Raise the tray and inspect the chamber to ensure that no rounds are present.

(6) Close the cover, place the safety on FIRE, pull the cocking handle to the rear, and pull the trigger while manually easing the bolt forward.

(7) Raise the cover. (If not disassembling the weapon, keep the cover down.)

CAUTION

THE BOLT MUST BE EASED FORWARD TO PREVENT DAMAGE TO THE FEED TRAY ASSEMBLY AND OPERATING ROD GROUP.

d. **REMOVING THE OPERATING ROD GROUP.** The operating rod group consists of the spring guide rod, operating rod spring, slide assembly, piston assembly, and bolt assembly.

(1) To remove the operating rod, pull to the left the upper retaining pin at the rear of the receiver. Let the buttstock pivot downward so that the rear opening on the receiver is completely free.

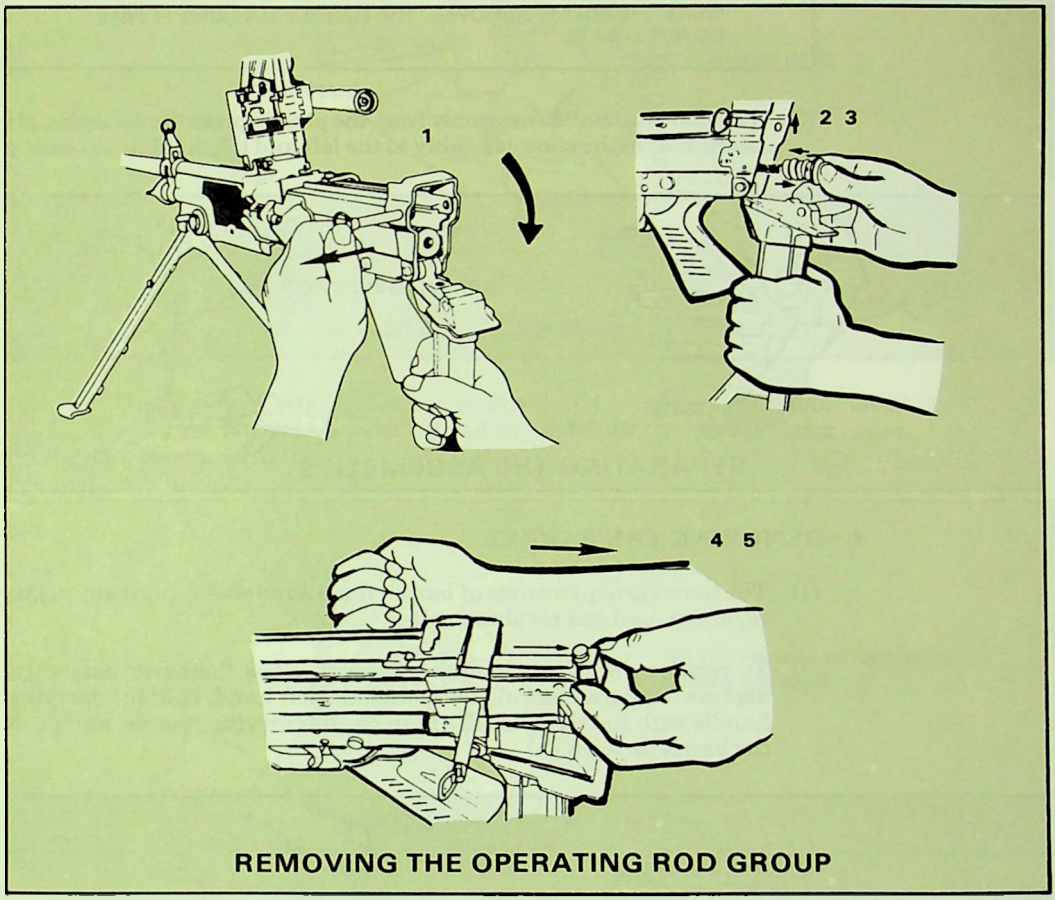
(2) Hold the weapon with one hand on the buttstock assembly and push in and upward on the rear of the operating rod assembly with the thumb of other hand. This releases the operating rod assembly from the positioning grooves inside the receiver.

(3) Pull the operating rod and spring from the receiver group and separate the two parts.

(4) With the left hand, grab the buttstock assembly to stabilize the weapon. With the right hand, pull the cocking handle to the rear. Return the cocking handle to the forward position. Place a finger on the face

of the bolt and push until the finger makes contact with the bridge at the end of the receiver. This leaves the piston, slide, and bolt assemblies exposed.

(5) Grasp the slide assembly and slide the moving parts out the rear of the receiver.



REMOVING THE OPERATING ROD GROUP

e. **SEPARATING THE ASSEMBLIES.**

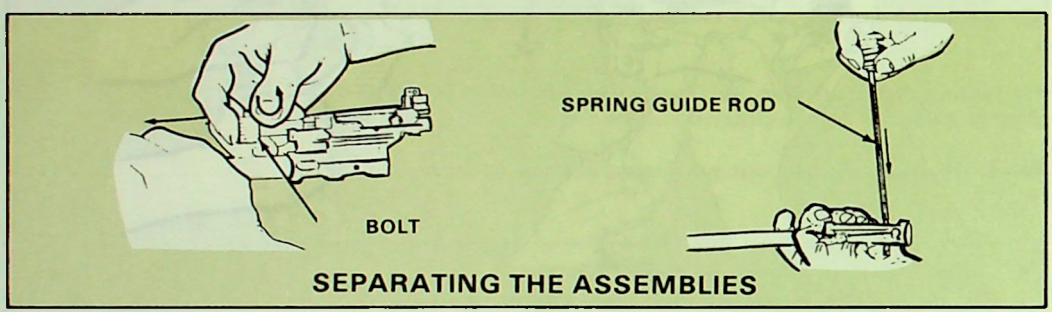
(1) Hold the piston assembly in one hand, place the other hand on the bolt assembly, and rotate the bolt to disengage the bolt from the slide assembly.

(2) Remove the firing pin spring from the firing pin, but be careful not to break the spring. If the spring sticks, a slight gentle rotation left and right should free the spring. The weapon will function without the spring, but it will weaken the firing pin action.

CAUTION

WHEN THE BOLT IS REMOVED, THE FIRING PIN SPRING IS FREE. DO NOT LOSE IT.

(3) To separate the slide assembly from the piston, press the retaining pin at the rear of the slide assembly to the left and lift the slide assembly.

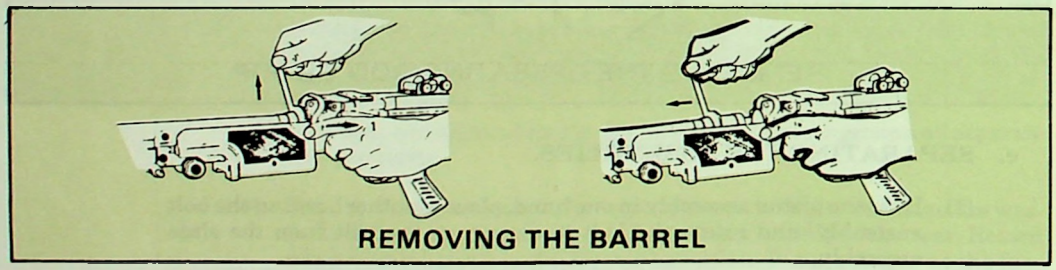


SEPARATING THE ASSEMBLIES

f. REMOVING THE BARREL.

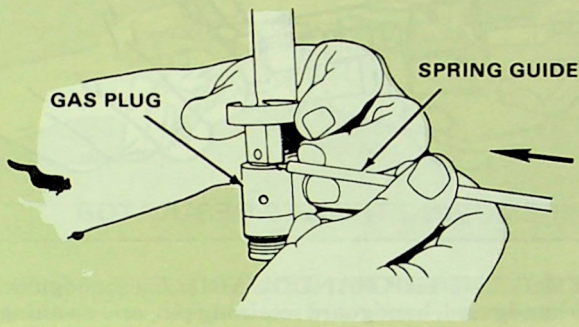
(1) The barrel group consists of barrel, flash suppressor, front sight, gas regulator, and gas regulator collar.

(2) To remove the barrel from the receiver, close the cover assembly, depress the barrel locking lever with the left hand, hold the carrying handle with the right hand, lift up on the carrying handle, and push the barrel forward.



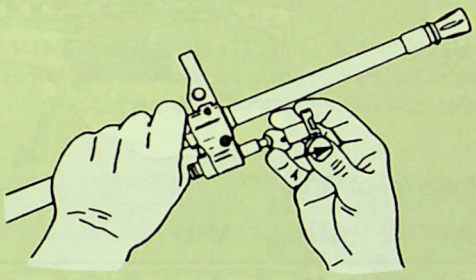
REMOVING THE BARREL

g. **REMOVING THE GAS REGULATOR AND COLLAR.** To remove the gas regulator and gas regulator collar, rotate the gas regulator lever between the normal and maximum positions. Place the tip of the spring guide rod into the notch at the front left of the gas plug (NORMAL position of lever) and hold the guide firmly in the notch.



REMOVING THE GAS COLLAR

Holding the spring guide rod in position, turn the gas regulator lever toward the NORMAL position and beyond until the gas regulator collar can be removed.



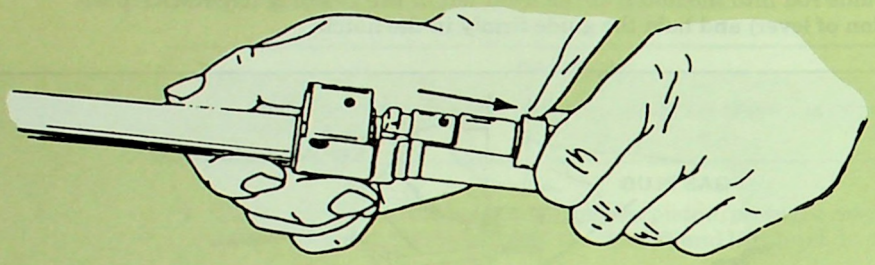
NOTE: Position of hand supporting gas regulator.

THE GAS REGULATOR LEVER

CAUTION

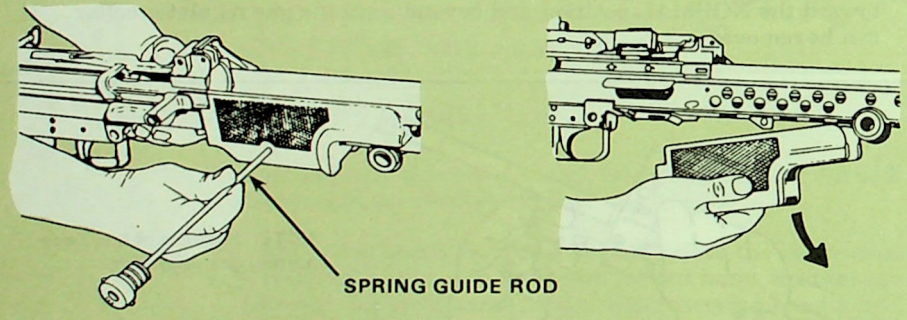
DO NOT ATTEMPT TO PRY THE GAS REGULATOR COLLAR WITH THE TIP OF THE SPRING GUIDE ROD. THIS COULD BREAK OFF THE TIP OF THE SPRING GUIDE ROD.

To remove the gas regulator, grasp it at the bottom and pull it from the gas plug.



REMOVING THE GAS REGULATOR

h. **REMOVING THE HANDGUARD.** The handguard group consists of the handguard, handguard retaining pin, and cleaning equipment retaining clip. Push the handguard retaining pin to the left using a cartridge or the spring guide rod; then pull down on the handguard.



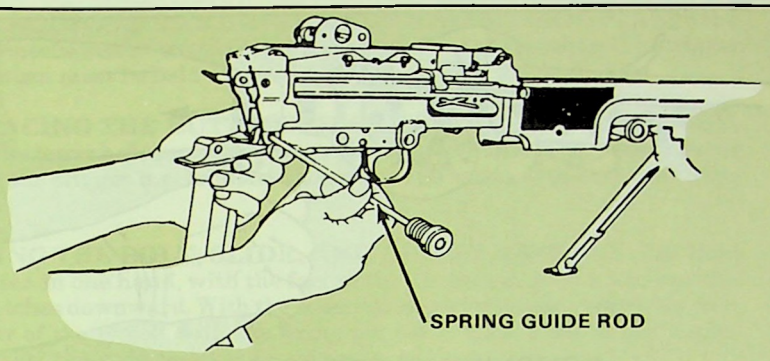
REMOVING THE HANDGUARD

CAUTION

THE HANDGUARD RETAINING PIN IS A CAPTURED PIN. DO NOT ATTEMPT TO REMOVE IT COMPLETELY DURING DISASSEMBLY.

i. **REMOVING THE BUTTSTOCK AND SHOULDER ASSEMBLY.** To remove the buttstock and shoulder assembly, use a cartridge or the spring guide rod to push the lowermost retaining pin on the rear of the

receiver. Remove the buttstock and shoulder assembly by pulling it rearward while supporting the trigger mechanism.



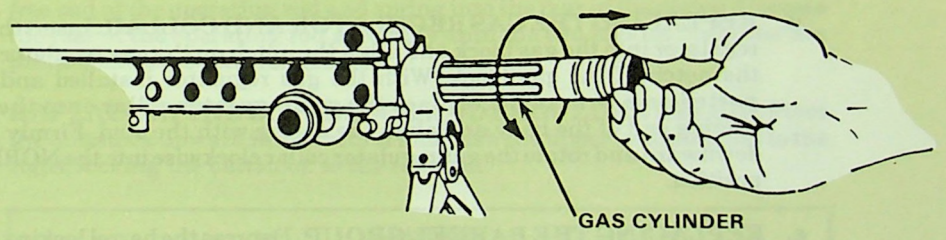
REMOVING THE BUTTSTOCK AND SHOULDER ASSEMBLY

CAUTION

THE UPPER AND LOWER RETAINING PINS IN THE REAR OF THE RECEIVER ARE CAPTURED PINS. DO NOT ATTEMPT TO REMOVE THEM COMPLETELY DURING DISASSEMBLY.

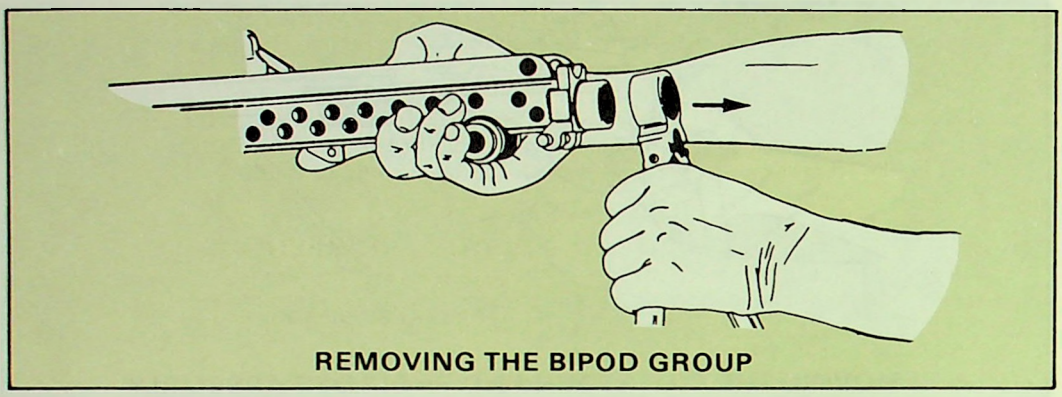
To separate the trigger mechanism from the receiver, pull down on it.

j. **REMOVING THE GAS CYLINDER GROUP.** To remove the gas cylinder from the receiver, grasp the gas cylinder forward of the bipod legs, turn it to the left or right to release the locking spring, and then pull forward on it.



REMOVING THE GAS CYLINDER GROUP

k. **REMOVING THE BIPOD GROUP.** Once the gas cylinder is removed, the bipod group can also be removed from the receiver.



REMOVING THE BIPOD GROUP

2-2. GENERAL ASSEMBLY

a. **REPLACING THE BIPOD GROUP.** Place the bipod group on the receiver with the bipod legs open and pointed downward.

b. **REPLACING THE GAS CYLINDER GROUP.** Push the gas cylinder through the bipod yoke into the receiver and, using the other hand, align the gas cylinder with the receiver. Then rotate the gas cylinder until it locks into position.

c. **REPLACING THE HANDGUARD GROUP.** To replace the handguard, place it on the receiver from the bottom and slide it to the rear until it stops. Using a cartridge, push the handguard retaining pin to the right, which locks the handguard into position. Pull downward on the handguard to make sure it is locked.

d. **REPLACING THE GAS REGULATOR AND COLLAR.** Insert the gas regulator into the gas block and align the notch on the gas regulator with the notch of the gas block. With the gas regulator installed and supported on a firm surface, place the gas regulator collar onto the protruding end of the body and align the spring with the stud. Firmly push downward and rotate the gas regulator collar clockwise into the NORMAL position.

e. **REPLACING THE BARREL GROUP.** Depress the barrel locking lever to the rear with the left hand, while holding the carrying handle with the right hand. Pull the barrel rearward, push downward, align the gas regulator to the gas cylinder, and lock by releasing the barrel locking lever.

Ensure that the barrel is locked onto the receiver by pulling or lifting on the carrying handle.

f. **REPLACING THE TRIGGER MECHANISM GROUP.** Align the trigger mechanism with the slot on the bottom of the receiver. The trigger mechanism must be held in position to accomplish the next step.

g. **REPLACING THE BUTTSTOCK AND SHOULDER ASSEMBLY.** Align the lower hole in the buttstock and shoulder assembly with the rear hole in the trigger mechanism; then push the lower retaining pin to the right.

h. **JOINING THE BOLT, SLIDE, AND PISTON ASSEMBLIES.** Hold the piston in one hand, with the face of the piston away from you and the sear notches downward. With the other hand, place the slide assembly onto the rear of the piston with the firing pin toward the front of the piston. (Make sure the slide assembly retaining pin is out.)

Push the slide assembly retaining pin to the right. This locks the piston assembly and the slide assembly together.

Put the firing pin spring onto the firing pin of the slide assembly. Place the bolt onto the slide assembly, aligning the driving lug of the bolt with the slot of the slide assembly. Apply pressure to the face of the bolt in order to compress the firing pin spring. Then rotate the bolt to hook its driving lug into the slide assembly.

i. **REPLACING THE PISTON, BOLT, AND SLIDE ASSEMBLIES.** Open the cover assembly on the receiver. Insert the face of the piston into the receiver, aligning the bolt lugs onto the receiver rails. Pull the trigger and push the moving parts forward until the bolt is seated into the chamber.

j. **JOINING THE OPERATING ROD AND SPRING ASSEMBLY.** Place the operating rod tip into the operating rod spring. Then insert the free end of the operating rod and spring into the rear of the piston. Depress the rear of the operating rod assembly until the two lugs on the buffer are positioned in the receiver grooves.

k. **REPLACING THE BUTTSTOCK AND SHOULDER GROUP.** Pivot the buttstock upward into position and push the upper retaining pin to the right, locking the buttstock to the receiver.

CAUTION

THE BOLT MUST BE EASED FORWARD TO PREVENT DAMAGE TO THE FEED-TRAY ASSEMBLY AND OPERATING ROD GROUP.

l. **CONDUCTING A FUNCTION CHECK.** A function check must be performed to ensure that the SAW has been assembled correctly. The procedures, in order, are:

(1) Cock the weapon by pulling the cocking handle to the rear.

(2) Move the safety to FIRE.

(3) Return the cocking handle to its forward position.

(4) Place the safety on SAFE.

(5) Pull the trigger. (The weapon should not fire.)

(6) Place the safety on FIRE.

(7) Pull and hold the cocking handle to the rear.

(8) Pull the trigger and allow the bolt to ease forward. If the bolt does not go forward, the SAW must be disassembled and then reassembled. After reassembly, if the SAW continues to fire when the safety is on SAFE, the squad leader must be notified and the weapon must be turned in for maintenance.

NOTE: The cover assembly can be closed with the bolt in either the forward or the backward position.

2-3. DETAILED DISASSEMBLY AND ASSEMBLY (UNIT ARMORER)

a. **LIMITS.** Detailed disassembly at unit level is limited to the barrel group, shoulder rest, operating rod, bolt assembly, trigger mechanism, cover assembly and feed tray, handguard, and receiver group.

b. **DISASSEMBLY OF THE BARREL GROUP.** To disassemble the flash suppressor, secure the barrel in a vise with protective jaws. Using an adjustable wrench, remove the flash suppressor by turning clockwise because it has a *left-handed thread.*

To disassemble the carrying handle grip, use the 10-mm end of a box spanner and a screwdriver or punch. While holding the barrel in a vise with protective jaws, place the wrench on the carrying handle nut and twist.

c. **DISASSEMBLY OF THE SHOULDER REST.** To disassemble the shoulder rest, the buttstock assembly should be placed on the weapon. Grasp the shoulder rest with both hands, and spread and separate the shoulder rest from the buttstock assembly.

d. **DISASSEMBLY OF THE OPERATING ROD.** To disassemble the operating rod and buffer assembly, place it in a vertical position in a vise with protective jaws. Use a punch and a hammer to drive out the straight pin from the ring spacer; then remove the straight rod. Unscrew and separate the spring pin from the ring spacer and buffer spring.

e. **DISASSEMBLY OF THE BOLT ASSEMBLY.** To disassemble the bolt assembly, position it in a protective-jaw vise with the extractor pin in a vertical position. Using a punch and hammer, drive out the extractor pin.

NOTE: The extractor, pin guide, and extractor spring are under spring tension. Care should be taken not to lose the parts when the pin is removed.

f. **DISASSEMBLY OF THE TRIGGER MECHANISM.** To disassemble the trigger mechanism, open the plate assembly at the bottom of the trigger mechanism. Using an 11-mm end of a box spanner tool, and a screwdriver or a punch, loosen the machine bolt. Remove the machine bolt from the pistol grip housing; then remove the trigger guard. Using a punch, remove the plate assembly retaining pin; then remove the plate and closure locking clip.

g. **DISASSEMBLY OF THE COVER/FEED MECHANISM ASSEMBLY.** To disassemble the cover assembly, remove the scope adapter plug with a small screwdriver. Rotate the hooked retaining pin which releases the shoulder retaining pin; then slide the feed tray rearward to remove it. Pivot the cover assembly to the left of the receiver, freeing the torsion spring from the receiver.

h. **DISASSEMBLY OF THE RECEIVER ASSEMBLY.** To remove the ejector from the receiver, compress the retaining clip and lift the ejector out. Remove the retaining clip and cartridge ejector pin from the cartridge ejector.

To remove the retaining clips from the headed groove pins, use a sharp-pointed object to pry the retaining clip upward and pull it free. Once the retaining clips are free, remove the grooved pins and retaining clips.

NOTE: This applies to both upper- and lower-headed groove pins.

i. **DISASSEMBLY OF THE HANDGUARD ASSEMBLY.** To remove the retaining clips from handguard assembly, remove the retaining clip on the grooved pin; then remove the grooved pin. Then, using a hammer and a 1/8-inch punch, drive out the retaining pins and remove the retaining clips.

NOTE: It is not necessary to remove the retaining pins unless the retaining clips are broken.

j. **ASSEMBLY OF THE BARREL GROUP.** To install the flash suppressor, secure the barrel in a vise with protective jaws. Use an adjustable wrench

and turn counterclockwise (left-hand thread). Tighten securely and then remove barrel assembly from vise.

To install the carrying handle grip, place it onto the carrying handle; then secure it with the washer and nut using the 10-mm end of a box spanner and a screwdriver or punch.

k. **ASSEMBLY OF THE HANDGUARD.** Align the retaining pins and insert them part way into the handguard. Add the retaining clips and secure the handguard by seating the retaining pins. Install the grooved pin with tapered end from left to right until the front portion of the grooved pin is flush with the slot that mates with the receiver. Secure with the retaining clip for the grooved pin.

l. **ASSEMBLY OF THE SHOULDER REST.** To assemble the shoulder rest, the buttstock assembly should be placed on the weapon. Grasp the shoulder rest with both hands, spread and separate the shoulder rest, and place it into position on the buttstock assembly.

m. **ASSEMBLY OF THE OPERATING ROD.** To assemble the operating rod, place the operating rod into a protective-jaw vise; install the buffer spring over the spring pin; then install the ring spacer with beveled side out and insert the rod. Screw the spring pin in until it is flush with or just below the pin hole in the spacer. Align the slot in the spring pin with the holes in the spacer. Using a hammer, drive the pin into the operating rod until equal lengths are exposed on each side of the spacer ring.

n. **ASSEMBLY OF THE BOLT ASSEMBLY.** To assemble the bolt assembly, position the bolt body horizontally in the protective-jaw vise. Install the pin guide, extractor spring, and extractor into the extractor hole. Align the slot on the extractor with the hole for the extractor pin. Insert a punch to hold the extractor, extractor spring, and pin guide in place. Drive in the extractor pin until it is slightly below flush on each side.

o. **ASSEMBLY OF THE TRIGGER MECHANISM.** To assemble the trigger mechanism, hold it facing upward; then hook the trigger guard behind the spring pin. Insert the machine bolt into the pistol grip housing and place this onto the trigger housing. Secure the rear portion of the trigger guard. Using the 11-mm end of a box spanner tool and a screwdriver or punch, tighten the machine bolt. Align the holes of the plate and spring clip on the pistol grip housing; insert the retaining pin; then close the plate assembly.

p. **ASSEMBLY OF THE COVER/FEED MECHANISM ASSEMBLY.** To assemble the cover/feed assembly, pivot the cover assembly from the left of the receiver, guiding the tang of the torsion spring into the hole of the receiver. Place the feed tray onto the receiver and slide it forward into position. Push the shoulder retaining pin through the receiver feed tray

and cover assembly. Pivot the hooked retaining pin over the end of the shoulder retaining pin.

q. **ASSEMBLY OF THE RECEIVER GROUP.** Install a retaining clip and grooved pin on the lower portion of the receiver. Install a retaining clip between the outside of the flange on the lower left-hand side of the receiver and a retaining clip into the groove on the headed pin. Install the grooved pin assembly into the receiver and insert a retaining clip.

To install the ejector, place the ejector on the pin and snap a retaining clip over the groove of the ejector pin with the curved end overlapping the front part of the ejector. Install the ejector pin, ejector, and a retaining clip onto the receiver. Compress the retaining clip and install the ejector assembly into the recess of the receiver. Check for spring tension.

CHAPTER 3

Operation and Cycle of Functioning

3-1. OPERATION

The SAW is loaded, fired, unloaded, and cleared from the open-bolt position. The safety must be in the FIRE position before the bolt can be pulled to the rear.

a. Before using belted ammunition, ensure that:

(1) It is properly linked.

(2) It is free of dirt and corrosion.

(3) The double link is at the opening end of the box.

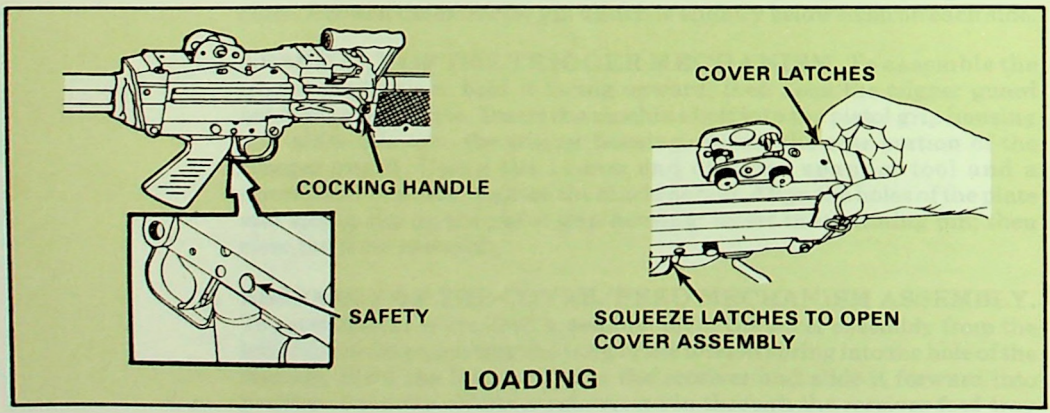
b. Before using magazine ammunition, ensure that:

(1) It is properly loaded into the magazine.

(2) It is free of dirt and corrosion.

3-2. LOADING

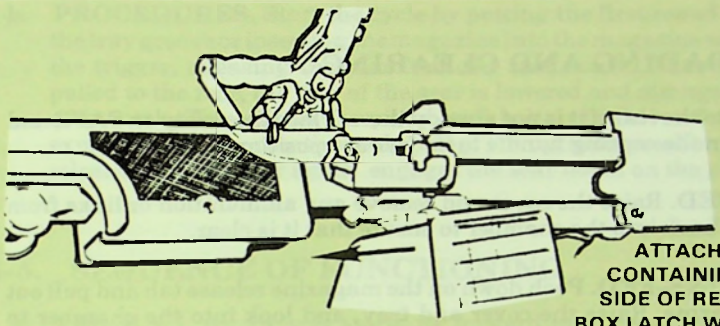
Place the safety on FIRE. Pull the bolt to the rear by the cocking handle with the palm facing up. When the bolt is held to the rear by the sear, manually return the cocking handle to the forward position and place the safety on SAFE. Raise the cover assembly and ensure that the tray, receiver group, and chamber are clear.



LOADING

a. **BOX-FED.** Place the front round of the belt in the tray groove with the extension of the belt clipped to the feed tray and the open side of the links down. Close the cover.

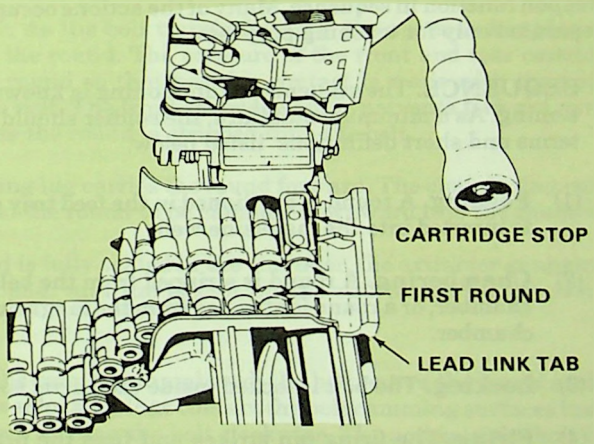
NOTE: The extension on the belt of ammunition from the box will hold the first round in the tray groove.



ATTACH 200-ROUND AMMO BOX CONTAINING LINK BELT TO UNDERSIDE OF RECEIVER AFTER ALIGNING BOX LATCH WITH RECEIVER DOVETAIL.

BOX-FED

b. **BELT-FED.** Place the first round of the belt in the tray groove with the double link first and the open side of the links down. Ensure that the round remains in the tray groove, and close the cover. Hold the belt up, approximately six rounds from the loading end, while closing the cover.



BELT-FED

c. **MAGAZINE-FED.** The 30-round magazine may be loaded by inserting it into the magazine well on the left side of the receiver and pushing it firmly to the right until it seats and the release tab clicks into the recess on the magazine.

NOTE: Use of the 30-round magazine is only for emergencies such as when linked ammunition is not available.

3-3. UNLOADING AND CLEARING

Pull the bolt to the rear if it is not already there. Place the safety on SAFE and manually return the cocking handle to its forward position.

a. **BELT-FED.** Raise the cover and remove any ammunition or links from the tray. Look into the chamber to ensure that it is clear.

b. **MAGAZINE-FED.** Push down on the magazine release tab and pull out the magazine. Raise the cover and tray, and look into the chamber to ensure that it is clear. Clearing procedures are covered in Chapters 2 and 4.

3-4. CYCLE OF FUNCTIONING

SAW gunners can recognize and correct stoppages when they know how the weapon functions. The weapon functions automatically as long as ammunition is fed into it and the trigger is held to the rear. Each time a round fires, the parts of the weapon function in sequence. Many of the actions occur at the same time and are separated only for teaching purposes.

a. **SEQUENCE.** The sequence of functioning is known as the cycle of functioning. As a minimum standard, the soldier should know the eight basic terms and short definitions listed below:

(1) **Feeding.** A round is positioned in the feed tray groove or a magazine is inserted into the magazine well.

(2) **Chambering.** A round is stripped from the belt and placed into the chamber, or a round is stripped from the magazine and placed into the chamber.

(3) **Locking.** The bolt is locked inside the barrel socket.

(4) **Firing.** The firing pin strikes and fires the primer, which fires the cartridge.

(5) **Unlocking.** The bolt is unlocked from the barrel socket.

(6) **Extracting.** The empty cartridge case is pulled from the chamber.

(7) **Ejecting.** The empty cartridge case is thrown from the receiver.

(8) **Cocking.** The sear engages the sear notch on the piston.

b. **PROCEDURES.** Start the cycle by putting the first round of the belt in the tray groove or inserting the magazine into the magazine well. Then pull the trigger, releasing the sear from the sear notch. When the trigger is pulled to the rear, the rear of the sear is lowered and disengaged from the sear notch. This allows the piston and bolt to be driven forward by the expansion of the operating rod spring. The cycle stops when the trigger is released and the sear again engages the sear notch on the piston.

3-5. SEQUENCE OF FUNCTIONING

a. **FEEDING.** As the bolt starts its forward movement, the feed lever is forced to the right, causing the feed-pawl assembly to turn in the opposite direction. This forces the feed-pawl assembly over the next round in the bolt, and it is ready to place the next round into the tray groove when the rearward action occurs again.

As the bolt moves to the rear after firing, the feed roller forces the feed lever to the left. The feed lever is forced to turn, moving the feed pawl to the right, and this movement places a round in the tray groove.

b. **CHAMBERING.** As the bolt travels forward, the upper locking lug engages the rim of the round. The pressure of the front and rear cartridge guides holds the round so that positive contact is made with the upper locking lug of the bolt. The front cartridge guide prevents forward movement of the link as the round is stripped from the belt.

The upper locking lug carries the round forward. The chambering ramp causes the nose of the round to be cammed downward into the chamber.

When the round is fully seated in the chamber, the extractor snaps over the rim of the round, and the ejector on the rail inside the receiver is depressed.

c. **LOCKING.** As the round is chambered, the bolt enters the barrel socket. The upper and lower locking lugs contact the bolt camming surfaces inside the barrel and start turning the bolt clockwise. The action of the bolt into the slide assembly, as the piston continues forward, turns the bolt to

complete its 90-degree (one-quarter turn) clockwise rotation. Locking is now complete.

d. **FIRING.** After the bolt is fully forward and locked, the piston continues to go forward, independent of the bolt, for a short distance. The slide assembly carries the firing pin through the face of the bolt. The firing pin strikes the primer of the round, and the primer fires the round.

e. **UNLOCKING.** After the round is fired and the bullet passes the gas plug, part of the expanding gases go into the gas regulator through the gas plug. The rapidly expanding gases enter into the gas cylinder from the gas regulator, forcing the piston to the rear.

As the piston continues to the rear, the slide assembly, also moving to the rear, causes the bolt to begin its counterclockwise rotation. The upper and lower locking lugs of the bolt contact the bolt camming surfaces inside the barrel socket, and, as the bolt continues toward the rear, it completes a one-quarter turn counterclockwise. The rotation and movement to the rear unlocks the bolt from the barrel socket.

f. **EXTRACTING.** Extracting begins during the unlocking cycle. The rotation of the bolt loosens the cartridge case in the chamber. As the piston and bolt move to the rear, the extractor pulls the cartridge case from the chamber.

g. **EJECTING.** As the cartridge case is pulled from the chamber, the bolt passes by the ejector. This causes the ejector clip to expand, forcing the ejector to push the expended cartridge. The extractor grips the right side of the cartridge and causes it to spin from the weapon as it reaches the ejection port. The empty belt links are forced out the link ejection port as the rearward movement of the bolt causes the next round to be positioned in the tray groove.

h. **COCKING.** As the expanding gases force the piston to the rear, it moves independently of the bolt. The piston assembly acts against the firing pin, pulling the firing pin from the primer of the spent cartridge case. The action of the piston assembly, continuing to the rear with the firing pin, releases the compression of the firing pin spring.

As long as the trigger is held to the rear, the SAW will continue to complete the right steps of functioning automatically. When the trigger is released and the sear again engages the sear notch, the cycle of functioning is stopped and the weapon is locked. To prevent undue wear to the sear and sear notch, the gunner must hold the trigger firmly to the rear during firing.

CHAPTER 4

Performance Problems, Maintenance, and Destruction

4-1. MALFUNCTIONS

A malfunctioning SAW is a weapon that is not firing properly. Defective ammunition or improper operation by the firer is not a malfunction. Two of the more common malfunctions of the SAW are sluggish operation and uncontrolled fire (runaway gun). Table 4-1 shows these malfunctions, their probable causes, and corrective actions.

a. **SLUGGISH OPERATIONS.** Sluggish operation of the SAW usually is due to excessive friction caused by carbon buildup, by lack of proper lubrication, or by burred parts; or to excessive loss of gas caused by a loose gas cylinder or gas regulator.

A temporary solution to sluggish operations due to carbon buildup is to set the gas regulator to the MAXIMUM position, fire approximately 50 rounds, and then reset the gas regulator back to the NORMAL position.

b. **UNCONTROLLED FIRE (RUNAWAY GUN).** Uncontrolled fire (the weapon continues to fire after the trigger is released) is usually caused by the firer not pulling and holding the trigger all the way to the rear. This results in the sear not clearing the sear notch, which causes wear to both parts. The following are immediate actions for uncontrolled fire:

(1) The firer holds the weapon on target and fires the remaining ammunition if weapon is near the end of the link bolt or magazine capacity.

(2) The firer stops the weapon from firing by breaking the ammunition belt (twist quickly in either direction).

(3) The firer releases the magazine.

(4) When the weapon has stopped firing, the firer clears the weapon and checks it to find the cause of the malfunction.

WARNING

NEVER RELOAD A RUNAWAY WEAPON UNTIL IT HAS BEEN REPAIRED.

TABLE 4-1. MALFUNCTIONS

MALFUNCTION	PROBABLE CAUSE	CORRECTIVE ACTION
Sluggish operation	Dirty receiver.	Clean and lubricate.
	Lack of lubricant.	Lubricate.
	Carbon buildup in gas system.	Clean gas regulator, piston, and cylinder.
Failure to cock or runaway weapon	Broken, worn, or burred sear.	Notify organizational maintenance.
	Piston assembly sear notch worn.	Notify organizational maintenance.
	Sear stuck in trigger housing.	Notify organizational maintenance.
	Short recoil.	Clean and lubricate bolt and slide assembly.
	Carbon buildup in gas system.	Clean gas regulator, piston, and cylinder.

4-2. STOPPAGES

A stoppage is any interruption in the cycle of functioning caused by faulty action of the weapon or faulty ammunition. Stoppages are classified by their relationship to the cycle of functioning. Table 4-2 shows types of interruptions or stoppages and their probable causes and corrective actions.

TABLE 4-2. STOPPAGES

STOPPAGE	PROBABLE CAUSE	CORRECTIVE ACTION
Failure to feed	Insufficient lubrication.	Lubricate as required.
	Defective ammunition link.	Remove and replace ammunition.
	Obstruction in receiver.	Remove obstruction.
	Insufficient gas pressure.	Clean gas regulator, piston, and cylinder.
	Unlatch cover.	Latch cover.
	Long/short rounds.	Align rounds in link belt.
	Inverted link belt.	Reinstall link belt with open end of link facing down.
	Damaged, weak, or worn operating parts.	Notify organizational maintenance.
Failure to chamber	Dirty ammunition.	Clean ammunition.
	Carbon buildup in gas cylinder.	Clean gas cylinder.
	Carbon buildup in receiver	Clean receiver.
	Damaged round.	Remove round and recharge weapon.
	Damaged or weak driving spring.	Notify organizational maintenance.
	Dirty chamber.	Clean chamber.
	Damaged gas regulator.	Notify organizational maintenance.
Failure to fire	Safety on.	Push safety to left, exposing red ring.
	Link belt improperly loaded.	Remove and reinstall link belt properly.
	Defective ammunition.	Eject round.
	Faulty ammunition.	Replace ammunition.
	Broken or damaged firing pin.	Notify organizational maintenance.
	Broken or weak driving spring.	Notify organizational maintenance.

TABLE 4-2. STOPPAGES (CONTINUED)		
STOPPAGE	PROBABLE CAUSE	CORRECTIVE ACTION
Failure to extract	Dirty chamber/bolt and slide assembly.	Clear chamber/bolt and slide assembly. If problem continues, notify organizational maintenance.
	Carbon buildup in gas system. Damaged extractor/spring.	Clean gas regulator, cylinder, and piston. Notify organizational maintenance.
Failure to eject	Short recoil.	Clean and lubricate bolt and slide assembly. If problem still exists, notify organizational maintenance.
	Damaged ejector/spring.	Notify organizational maintenance.
	Carbon buildup in gas system.	Clean gas regulator, piston, and cylinder.

4-3. IMMEDIATE ACTION

Immediate action is action taken to reduce a malfunction or stoppage without looking for the cause. Immediate action should be taken in the event of either a misfire or a cookoff.

a. A MISFIRE is the failure of a chambered round to fire. Such failure can be due to an ammunition defect or faulty firing mechanism.

b. A COOKOFF is the firing of a round by the heat of a very hot barrel, and not by the firing mechanism.

c. If the SAW stops firing, the following immediate actions are taken within 10 seconds:

(1) Cock the weapon, and watch the ejection port to see if a cartridge case, belt link, or round is ejected. Ensure that the bolt remains to the rear to prevent double feeding if a round or cartridge case is not ejected.

(2) If a cartridge case, belt link, or a round is ejected, return the cocking handle to its forward position, take aim on the target, and try to fire. If the weapon still does not fire, clear it and inspect the ammunition and the weapon to determine the cause of the stoppage.

(3) If a cartridge case, belt link, or round is not ejected, take remedial action as outlined in the following paragraphs.

4-4. REMEDIAL ACTION

Remedial action is also taken immediately in the case of a stoppage, but it includes an attempt to determine the cause.

a. COLD WEAPON

(1) If the stoppage occurs with a cold weapon, place the weapon on SAFE, raise the cover assembly, and remove the belt of ammunition. Raise the feed tray and inspect the chamber. If the weapon is magazine-fed, place the weapon on SAFE, push down on the magazine release tab, remove the magazine, raise the cover assembly and feed tray, and inspect the chamber.

(2) If there is no round in the chamber, reload and try to fire. If the weapon fires, continue firing. If it does not fire, reapply immediate and remedial action as necessary. Inspect the weapon and ammunition.

(3) If there is a round in the chamber, close the cover assembly and try to fire. If the weapon fires, reload and continue firing. If it does not fire, clear the weapon and inspect the weapon and ammunition.

b. HOT WEAPON

(1) If the stoppage occurs with a hot weapon (200 rounds fired within a 2-minute time period), move the safety to SAFE, let the weapon cool for 15 minutes, raise the cover, and remove the belt of ammunition. Raise the feed tray and inspect the chamber. If the weapon is magazine-fed, place the weapon on SAFE, push down on the magazine release tab, remove the magazine, raise the cover assembly and feed tray, and inspect the chamber.

(2) If there is no round in the chamber, reload and try to fire. If the weapon fires, continue firing. If it does not fire, reapply immediate and remedial action as necessary. Inspect the weapon and the ammunition.

(3) If there is a round in the chamber, close the cover assembly and try to fire. If the weapon fires, reload and continue firing. If it does not fire

during training, wait 15 minutes, clear the weapon, and inspect it for cause.

c. **JAMMED COCKING HANDLE**

(1) If a stoppage occurs and the cocking handle cannot be pulled to the rear by hand (the bolt may be fully forward and locked or partially forward), the following steps should be taken:

(a) Try once again to work the cocking handle by hand. Do not try to force the cocking handle to the rear with your foot or a heavy object. This could damage the weapon.

(b) If the weapon is hot enough to cause a cookoff, move all soldiers a safe distance from the weapon and keep them away for 15 minutes.

(c) After the weapon has cooled, open the cover and disassemble it, keeping rearward pressure on the cocking handle until the buttstock and operating rod are removed. (Two soldiers are required for this.)

(d) Remove the round or fired cartridge. A cleaning rod or ruptured-cartridge extractor should be used if necessary.

(2) In a training situation, after completing the remedial action procedures, the weapon should not be fired until it has been inspected by an ordnance specialist.

4-5. MAINTENANCE AND INSPECTION

Maintenance of the SAW includes inspection, cleaning, and replacement of parts. A complete operators and organizational maintenance guide is found in TM 9-1005-201-10.

Inspection begins with the weapon dissassembled in its major groups or assemblies. Note that shiny surfaces on parts do not mean the parts are unserviceable. Inspect the following parts of the weapon and related equipment for the conditions indicated:

a. **BARREL GROUP.** Make sure the flash suppressor is not cracked and that it is fastened securely. Check the front sight post and front sight base; they must not be bent, cracked, or broken. Check the gas regulator and collar for cracks or burrs. Check the barrel for bulges, cracks, bends, obstructions, or pits in the chamber or bore. Check the gas plug for obstructions, cracks, and bulges. Make sure the carrying handle is not cracked, broken, or missing.

b. **BUTTSTOCK AND SHOULDER ASSEMBLY GROUP.** Check the buttstock for cracks, bends, or breaks, and check for missing components. Make sure the shoulder piece is not bent or broken and that it locks in both positions.

c. **OPERATING ROD GROUP**

(1) The operating rod should not be bent, broken, or cracked. Check for a missing tip. Check the buffer spring for breaks. Ensure that lug pins protrude equally on both sides of the buffer spacer. The operating rod spring should not have kinks or separated strands. Check for broken strands. It can have a maximum of one break on any one strand.

(2) The bolt assembly should be checked for visible damage. The cartridge extractor should not be cracked or have a broken spring.

(3) The slide assembly should be checked for visible damage. Check the feed roller for spring tension when compressed, and see that the pivot slide is locked onto the slide assembly.

(4) The firing pin should be checked for straightness and cracks, and the tip should be completely rounded. Ensure that the firing pin spring is not damaged.

(5) The sear notch on the piston assembly should not show excessive wear or burring. Slight rotation of the piston on its housing is normal and is not cause for rejection.

d. **TRIGGER GROUP.** The shoulder of the sear should not show excessive wear. The safety should function properly. (The sear should move only slightly when the safety is on SAFE, and freely when the safety is on FIRE.)

e. **HANDGUARD GROUP.** The handguard should not be cracked or broken. Make sure the retaining clip is attached to the handguard retaining pin.

f. **GAS CYLINDER GROUP.** The gas cylinder should not be cracked, bent, or broken.

g. **BIPOD GROUP.** The bipod group should not be cracked, bent, or broken. The bipod legs should extend and collapse easily.

h. **RECEIVER GROUP**

(1) The latch cover should work properly.

(2) All parts inside the cover assembly should move under spring tension. The cover assembly should remain open without support.

(3) The belt-holding pawl must be under spring tension.

(4) The receiver should not be bent or cracked.

(5) The cocking handle should slide freely within its guide and lock in its forward position.

(6) The windage and elevation knobs on the rear sight should be movable and legible. The windage scale screw should not be worn or burred.

4-6. CLEANING AND LUBRICATION

The SAW should be cleaned immediately after firing. It should be disassembled into its major groups or assemblies for cleaning.

a. All metal components and surfaces that have been exposed to powder fouling should be cleaned using cleaner, lubricant, preservative (CLP) on a bore-cleaning patch. Use the same procedure to clean the receiver.

> **CAUTION**
>
> TAKE CARE TO AVOID GETTING CLP ON THE GAS REGULATOR AND PISTON.

b. The gas regulator and piston are cleaned after each firing. To clean the gas regulator and piston, use the scraper tool and solvent. Make sure the gas regulator and piston are dry before assembly.

NOTE: Use a cloth highly saturated in CLP on exterior surfaces to prevent corrosion.

c. After the SAW is cleaned and wiped dry, apply a thin coat of CLP by rubbing with a cloth. This will lubricate and preserve the exposed metal parts under all normal temperature ranges.

d. Lubricate moving parts, as described below, with CLP:

(1) **Barrel Group.** On the camming surfaces of the bolt-locking lugs.

(2) **Operating Rod Group.** On the operating rod and spring, the slide assembly, the feed roller, and the bolt-locking lug.

(3) **Receiver Group.** On all moving parts on the cover assembly and the receiver rails. After lubricating, cycle the components by hand to spread the CLP.

e. Weapons fired infrequently or stored for prolonged periods should have a light film of CLP applied to the interior of the gas plug and the gas regulator and piston immediately after cleaning or after inspection. Preventive maintenance will be performed every 90 days, unless inspection reveals more frequent servicing is necessary. The use of the lubricant will not eliminate the requirement for cleaning and inspecting to ensure that corrosion has not formed. Before using, the gas regulator, gas plug, and piston must be clean and free of oil and lubricants. The following procedures apply to cleaning and lubricating the SAW under unusual conditions:

NOTE: CLP is the only lubricant to use on the SAW.

(1) Extremely hot. Use CLP, grade 2.

(2) Damp or salty air. Use CLP, grade 2. Clean and apply frequently.

(3) Sandy or dusty areas. Use CLP, grade 2. Clean and apply frequently. Remove excess with a rag after each application.

(4) Below -18 degrees Celsius (0 degrees Fahrenheit). Use CLP, grade 2, generously. Lubricate heavily enough so that it can be spread with finger.

NOTE: Although CLP will provide required lubrication at temperatures between 0 degrees Fahrenheit and -35 degrees Fahrenheit, it will not flow from a 1/2-ounce bottle at temperatures below 0 degrees Fahrenheit.

4-7. PROCEDURES

There are certain actions that must be taken before, during, and after firing to properly maintain the SAW. They are:

a. BEFORE FIRING

(1) Wipe the bore dry.

(2) Inspect the weapon as outlined in the individual drill.

(3) Ensure that the weapon is properly lubricated.

b. DURING FIRING

(1) Periodically inspect the weapon to ensure that it is properly lubricated.

(2) When malfunctions or stoppages occur, follow the procedures previously given.

c. **AFTER FIRING**

(1) Clear and clean the weapon immediately.

(2) During periods of inactivity, clean and lubricate every 90 days unless inspection reveals more frequent servicing is necessary (Reference TM 9-1005-201-10).

4-8. MAINTENANCE UNDER NBC CONDITIONS

If contamination is anticipated, apply oil to all outer metal surfaces of the weapon. DO NOT OIL AMMUNITION. Keep the weapon covered as much as possible.

If the weapon is contaminated, decontaminate it as prescribed by FM 21-40 and TM 3-22, and then clean and lubricate.

4-9. DESTRUCTION

The weapon will be destroyed only on the authority of the unit commander. Report the destruction through command channels.

a. Disassemble the weapon as completely as time permits. Use the barrel to destroy the parts in the order listed below:

(1) Bolt

(2) Operating rod group

(3) Barrel

(4) Sights, rear and front

(5) Bipod.

b. To destroy the weapon by burning, place an incendiary grenade on the receiver group over the bolt (with the cover resting on the grenade) and fire the grenade.

c. Bury the disassembled weapon or dump the parts into streams, mud, snow, sumps, or latrines.

CHAPTER 5

Techniques of Fire During Good Visibility

Section I.

FUNDAMENTALS AND FIRING TECHNIQUES

Each SAW gunner must be trained in standard methods of applying fire with the weapon.

The easiest and quickest means of delivering fire with the SAW mounted on the bipod is by aligning the sights of the weapon on the target and properly applying fire. This technique is called DIRECT LAY.

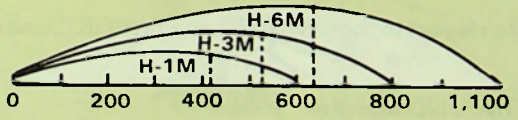
At times, techniques of fire other than direct lay are more effective. When delivering fire in the assault, overhead fire, and fire from position defilade, the gunner must use the techniques described in this chapter.

To teach the gunner to employ the SAW to the best advantage, this chapter provides guidance in the fundamentals of characteristics of fire, classes of fire, range determination, and lateral distance measurements.

5-1. CHARACTERISTICS OF FIRE

Trajectory is the path of the bullet in flight. An understanding of the SAW's trajectory, or curved flight path, is required in order to apply effective fire throughout the full effective range of the weapon. The path of the bullet is almost flat at ranges of 300 meters or less. At ranges beyond 300 meters, the trajectory is curved, and the curve becomes greater as the range increases.

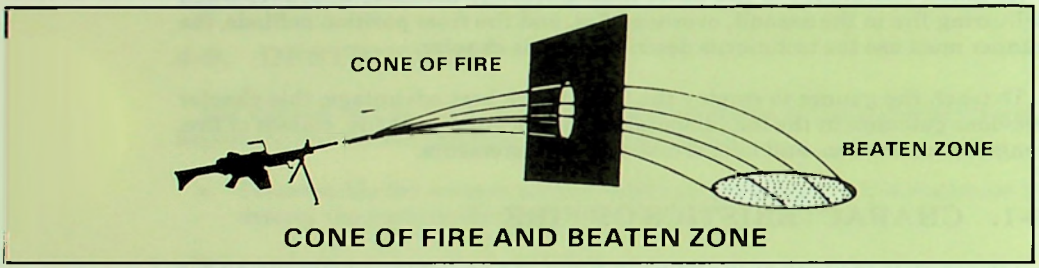
a. **MAXIMUM ORDINATE.** This is the highest point the trajectory reaches between the muzzle of the weapon and the base of the target. It always occurs at a point approximately two-thirds of the distance from the weapon to the target. The maximum ordinate increases as the range increases.



TRAJECTORY AND MAXIMUM ORDINATE

b. **CONE OF FIRE.** This is the pattern formed by the different trajectories in each burst as they travel downrange. When several rounds are fired in a burst from a SAW, each round takes a slightly different trajectory. This is caused primarily by the vibration of the weapon. Variations in ammunition and atmospheric conditions also contribute to the different trajectories.

c. **BEATEN ZONE.** This is the pattern formed by the rounds within the cone of fire striking the ground or the target. The size and shape of the beaten zone changes when the range to the target changes or when the weapon is fired into different types of terrain. On uniformly sloping or level terrain, the beaten zone is long and narrow. As the range to the target increases, the beaten zone becomes shorter and wider. When fire is delivered into terrain sloping down and away from the weapon, the beaten zone becomes longer. When fire is delivered into rising terrain, the beaten zone becomes shorter. The terrain has no great effect on the width of the beaten zone.



CONE OF FIRE AND BEATEN ZONE

d. **DANGER SPACE.** This is the space between the weapon and the target where the trajectory does not rise above 1.8 meters (the average height of a standing soldier). This includes the area of the beaten zone. When the SAW (on its bipod) is fired over level or uniformly sloping terrain at a target less than 700 meters away, the trajectory will not rise above the average height of a standing soldier. When targets are engaged over level or uniformly sloping terrain at ranges greater than 700 meters, the trajectory will rise above the average height of a standing soldier. Therefore, not all the distance between the weapon and the target is danger space.

5-2. CLASSES OF FIRE

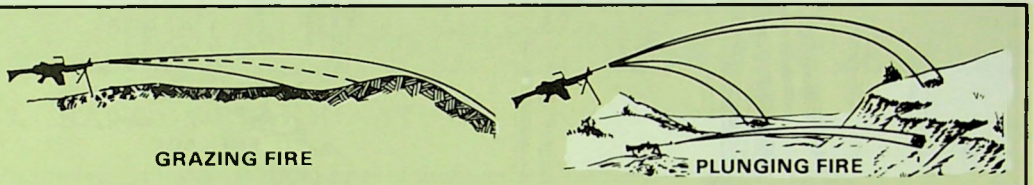
The SAW fire is classified with respect to the GROUND, the TARGET, and the WEAPON.

a. Fire with respect to the GROUND includes:

(1) **Grazing Fire.** When the center of the cone of fire does not rise more than 1 meter above the ground. When firing over level or uniformly

sloping terrain, a maximum of 600 meters of grazing fire can be obtained.

(2) **Plunging Fire.** When danger space is practically confined to the beaten zone. Plunging fire occurs when firing at long ranges, when firing from high ground to low ground, when firing into abruptly rising ground, or when firing across uneven terrain, resulting in a loss of grazing fire at any point along the trajectory.

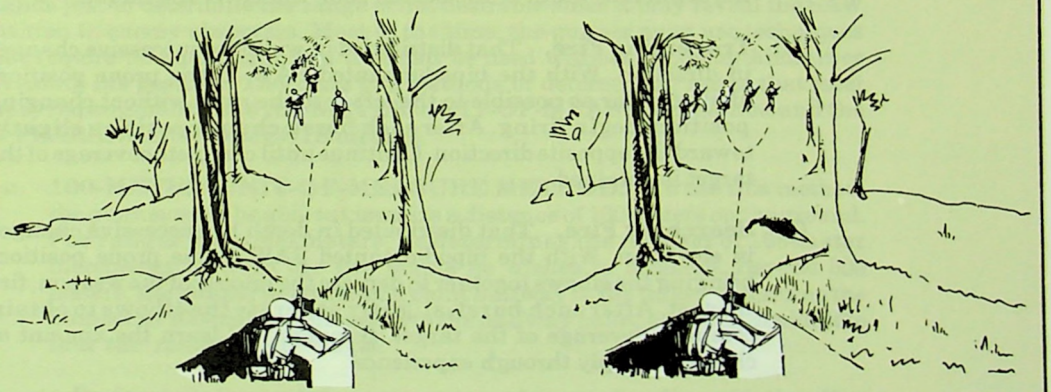


CLASSES OF FIRE WITH RESPECT TO THE GROUND

b. Fire with respect to the TARGET includes:

(1) **Frontal Fire.** When the long axis of the beaten zone is at a right angle to the front of the target. Simply stated, that means when firing directly into the front of a target.

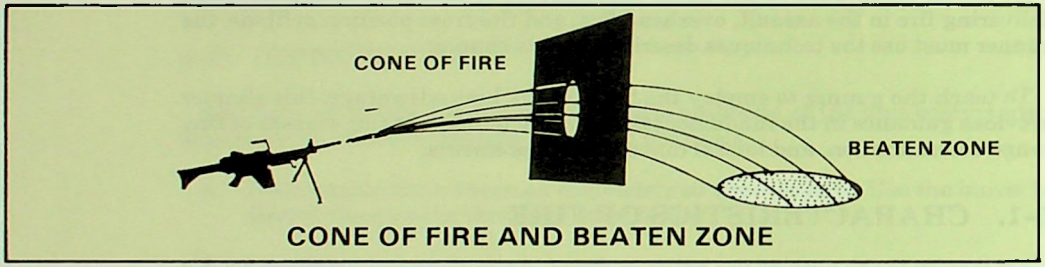
(2) **Flanking Fire.** When delivered directly against the flank of a target.



CLASSES OF FIRE WITH RESPECT TO THE TARGET

b. **CONE OF FIRE.** This is the pattern formed by the different trajectories in each burst as they travel downrange. When several rounds are fired in a burst from a SAW, each round takes a slightly different trajectory. This is caused primarily by the vibration of the weapon. Variations in ammunition and atmospheric conditions also contribute to the different trajectories.

c. **BEATEN ZONE.** This is the pattern formed by the rounds within the cone of fire striking the ground or the target. The size and shape of the beaten zone changes when the range to the target changes or when the weapon is fired into different types of terrain. On uniformly sloping or level terrain, the beaten zone is long and narrow. As the range to the target increases, the beaten zone becomes shorter and wider. When fire is delivered into terrain sloping down and away from the weapon, the beaten zone becomes longer. When fire is delivered into rising terrain, the beaten zone becomes shorter. The terrain has no great effect on the width of the beaten zone.



CONE OF FIRE AND BEATEN ZONE

d. **DANGER SPACE.** This is the space between the weapon and the target where the trajectory does not rise above 1.8 meters (the average height of a standing soldier). This includes the area of the beaten zone. When the SAW (on its bipod) is fired over level or uniformly sloping terrain at a target less than 700 meters away, the trajectory will not rise above the average height of a standing soldier. When targets are engaged over level or uniformly sloping terrain at ranges greater than 700 meters, the trajectory will rise above the average height of a standing soldier. Therefore, not all the distance between the weapon and the target is danger space.

5-2. CLASSES OF FIRE

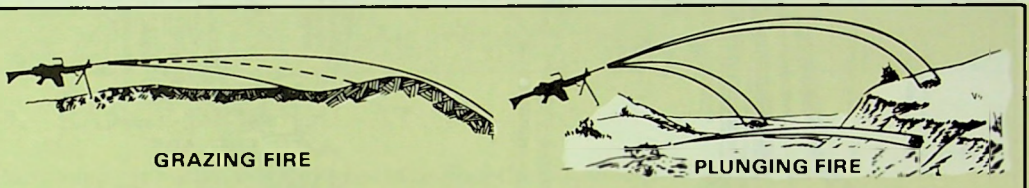
The SAW fire is classified with respect to the GROUND, the TARGET, and the WEAPON.

a. Fire with respect to the GROUND includes:

(1) **Grazing Fire.** When the center of the cone of fire does not rise more than 1 meter above the ground. When firing over level or uniformly

sloping terrain, a maximum of 600 meters of grazing fire can be obtained.

(2) **Plunging Fire.** When danger space is practically confined to the beaten zone. Plunging fire occurs when firing at long ranges, when firing from high ground to low ground, when firing into abruptly rising ground, or when firing across uneven terrain, resulting in a loss of grazing fire at any point along the trajectory.

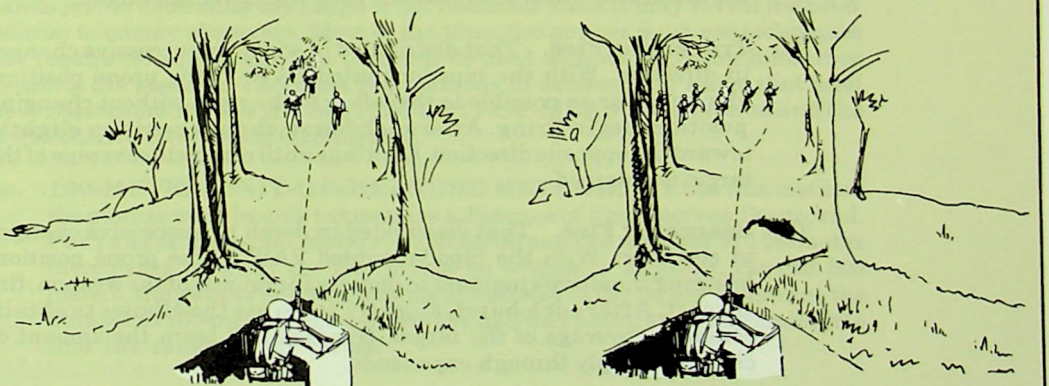


CLASSES OF FIRE WITH RESPECT TO THE GROUND

b. Fire with respect to the TARGET includes:

(1) **Frontal Fire.** When the long axis of the beaten zone is at a right angle to the front of the target. Simply stated, that means when firing directly into the front of a target.

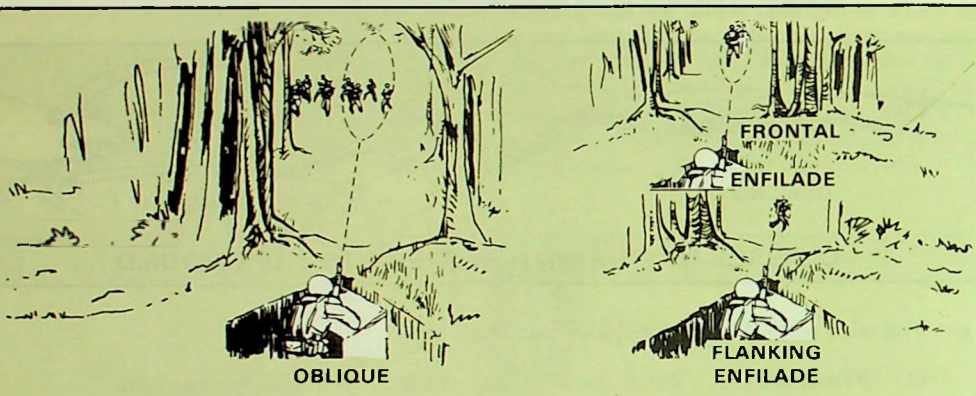
(2) **Flanking Fire.** When delivered directly against the flank of a target.



CLASSES OF FIRE WITH RESPECT TO THE TARGET

(3) **Oblique Fire.** When the long axis of the beaten zone is at an angle other than a right angle to the front of the target.

(4) **Enfilade Fire.** When the long axis of the beaten zone coincides or nearly coincides with the long axis of the target. This type of fire is either frontal or flanking. It is the most desirable type of fire with respect to a target because it makes maximum use of the beaten zone.



CLASSES OF FIRE WITH RESPECT TO THE TARGET

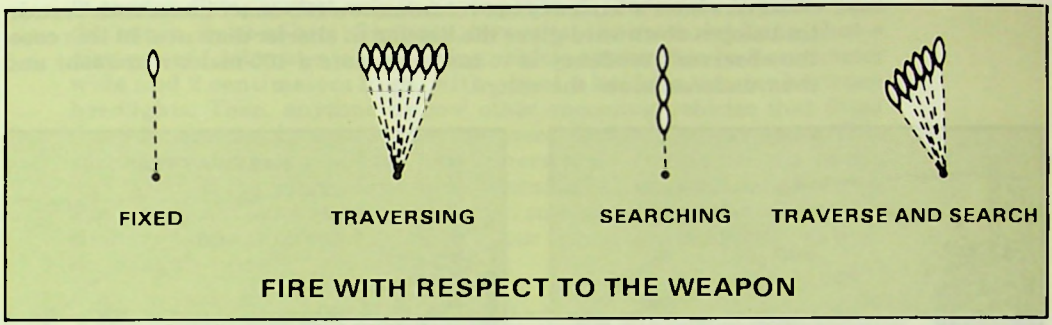
c. Fire with respect to the WEAPON includes:

(1) **Fixed Fire.** That delivered against a stationary point target when the depth and width of the beaten zone will cover the target.

(2) **Traversing Fire.** That distributed in width by successive changes in direction. With the bipod-mounted SAW in the prone position, aiming as far as possible to the left or to the right without changing position, begin firing. After each burst, change position slightly toward the opposite direction. Continue until complete coverage of the target is obtained.

(3) **Searching Fire.** That distributed in depth by successive changes in elevation. With the bipod-mounted SAW in the prone position, bringing the elbows together to depress the muzzle of the weapon, fire a burst. After each burst, slightly separate the elbows to obtain complete coverage of the target. Gunners will learn the amount of change to apply through experience.

(4) **Traversing and Searching Fire.** That distributed in width and depth by successive changes in direction and elevation. Combine traversing and searching fires to get good coverage of the target.



5-3. RANGE DETERMINATION

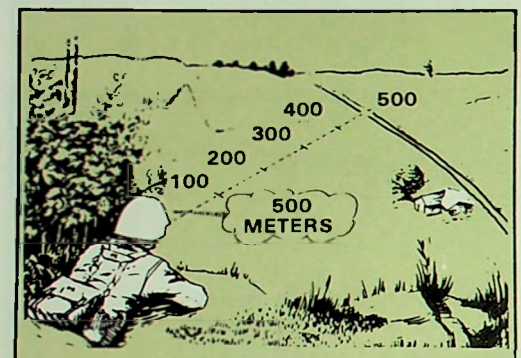
Range determination is the process of finding the distance between two points. In most situations, one of these points will be the observer's own position. The other point may be a target or prominent terrain feature. THE ABILITY TO DETERMINE RANGE ACCURATELY IS A KEY SKILL NEEDED BY THE GUNNER TO ACCOMPLISH HIS MISSION. Not only does the accurate determination of range affect his marksmanship, but it is also required in the reporting of information and the adjustment of artillery and mortar fire. (See Table 5-1.)

There are several methods of determining range, including measuring distance on a map, pacing the distance between two points, estimating range, using an optical rangefinder, and using registration fire. However, the gunner does not usually have a map, and he rarely has access to an optical rangefinder. He can pace the distance between two points if the enemy is not within range. Firing rounds just to determine the range is not desirable since it may reveal the SAW position to enemy observers. Most of the time, the gunner must use techniques that require no equipment and that can be used without exposing himself or revealing his position. There are two methods of determining range that meet these requirements: the 100-METER-UNIT-OF-MEASURE method and the APPEARANCE-OF-OBJECTS method.

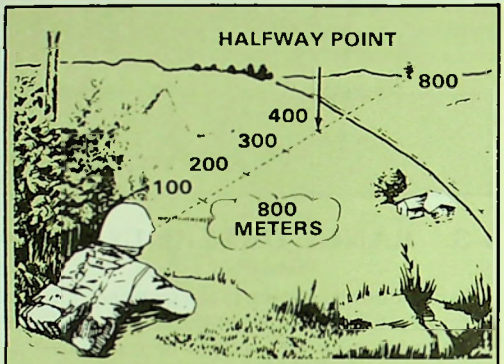
a. **100-METER-UNIT-OF-MEASURE METHOD.** To use this method, the gunner must be able to visualize a distance of 100 meters on the ground. For ranges up to 500 meters, he determines the number of 100-meter increments between the two points he wishes to measure. Beyond 500 meters, the gunner must select a point halfway to the target, determine the number of 100-meter increments to the halfway point, and then double it to find the range to the target.

During training periods, gunners must become familiar with the effect that sloping terrain has on the appearance of a 100-meter increment. Terrain that slopes upward gives the illusion of longer distance, and

observers have a tendency to overestimate a 100-meter increment. Terrain that slopes downward gives the illusion of shorter distance. In this case, the observer's tendency is to underestimate a 100-meter increment and thus underestimate the range.



APPLYING THE 100-METER-UNIT-OF-MEASURE METHOD FOR RANGES UP TO 500 METERS



APPLYING THE 100-METER-UNIT-OF-MEASURE METHOD FOR RANGES UP TO 800 METERS

Proficiency in the 100-meter-unit-of-measure method requires constant practice. Throughout the training in this technique, comparisons should be frequently made between the range as determined by the gunner and the actual range as determined by pacing or other, more accurate means of measurement. The best training technique is to require the gunner to pace the range after he has visually determined it. In this way, he discovers the actual range for himself, which makes a much greater impression than if he is simply told the correct range.

A limitation of the 100-meter-unit-of-measure method is that its accuracy is directly related to the amount of terrain visible to the observer. This is particularly true at the greater ranges. If a target appears at a range of 500 meters or more, and the observer can only see a portion of the ground between himself and the target, it becomes difficult to use the 100-meter-unit-of-measure method of range determination with any degree of accuracy.

b. APPEARANCE-OF-OBJECTS METHOD. This method is a means of determining range by the size and other characteristic details of the object. This is a common method of determining distances and is used by most people. For example, a motorist trying to pass another car must judge the distance of oncoming vehicles based on his knowledge of how vehicles appear at various distances. In this example, the motorist is not interested

in precise distances but only in having enough road space to safely pass the car in front of him. Suppose, however, the motorist knew that a distance of 1 kilometer, an oncoming vehicle appeared to be 1 centimeter wide and 2 centimeters high, with about a half centimeter between headlights. Then, anytime he saw other oncoming vehicles that fitted these dimensions, he would know they were about 1 kilometer away. This same technique can be used by gunners to determine ranges on the battlefield. If the gunner knows the characteristic size and detail of men and equipment at known ranges, he can compare these characteristics to similar objects at unknown ranges. When characteristics match, so does the range.

To use the appearance-of-objects method with any degree of accuracy, the gunner must be familiar with the characteristic details of objects as they appear at various ranges. For example, the gunner should study the appearance of a man standing at a range of 100 meters. He fixes the man's appearance firmly in his mind, carefully noting details of size and the characteristics of uniform and equipment. Next, he studies the same man in a kneeling position and then in a prone position. By comparing the appearance of the man at known ranges from 100 to 500 meters, the gunner can establish a series of mental images that will help determine range on unfamiliar terrain. Training should also be conducted in the appearance of other familiar objects such as weapons or vehicles. Because the successful use of this method depends upon visibility, anything that limits visibility (such as weather, smoke, or darkness) will also limit the effectiveness of this method.

c. **COMBINATION OF METHODS.** Under ideal conditions, either the 100-meter-unit-of-measure or the appearance-of-objects method is an effective method of determining range. However, ideal conditions rarely exist on the battlefield, so the gunner must use a combination of methods. The terrain might limit the use of the appearance-of-objects method. For example, a gunner may not be able to see all the terrain out to the target; however, he may see enough to get a general idea of the distance. A slight haze may obscure many of the target details, but the gunner should still be able to judge its size. By carefully considering the ranges estimated by both methods, an experienced gunner should arrive at a figure close to the true range. The best way to reduce ranging errors using these two methods is to train frequently.

5-4. LATERAL DISTANCE MEASUREMENT

In addition to being able to determine range accurately, the gunner needs a quick method of measuring lateral distance (right or left) from a reference point to a target.

The fingers can be used to measure the lateral distance between a reference point and a target. Extend the arm with the palm outward, lower the fingers, and

lock the elbow. Close one eye, raise the index finger, and sight along its edge, placing the edge of the finger along the flank of the target or reference point. Note the space remaining between the points, and then fill this space by raising fingers until the space is covered. The measurement from the reference point to the target is then stated as being one or more fingers, depending upon how many fingers are raised to cover this distance.

TABLE 5-1. FACTORS OF RANGE ESTIMATION

FACTORS OF RANGE ESTIMATION		
FACTORS AFFECTING RANGE ESTIMATION	**FACTORS CAUSING UNDERESTIMATION OF RANGE**	**FACTORS CAUSING OVERESTIMATION OF RANGE**
The clearness of outline and details of the target.	When most of the target is visible and offers a clear outline.	When only a small part of the target can be seen or the target is small in relation to its surroundings.
Nature of terrain or position of the observer.	When looking across a depression that is mostly hidden from view.	When looking across a depression that is totally visible.
	When looking downward from high ground.	When looking from low ground toward high ground
	When looking down a straight, open road or along a railroad.	When vision is narrowly confined as in streets, draws, or forest trails.
	When looking over uniform surfaces like water, snow, desert, or grain fields.	
Light and atmosphere.	In bright light or when the sun is shining from behind the observer.	In poor light such as dawn and dusk; in rain, snow, fog, or when the sun is in the observer's eyes.
	When the target is in sharp contrast with the background or is silhouetted because of its size, shape, or color.	When target blends into the background or terrain.
	When seen in the clear air of high altitudes.	

Section II.

FIRE CONTROL REQUIREMENTS

Fire control includes all actions of the leader and squad members in planning, preparing, and actually applying fire on a target. It is the ability to select and designate targets, open fire at the instant desired, adjust fire, regulate the rate of fire, shift from one target to another, and cease fire.

Fire control depends upon the ability of the leader and the discipline and training of the squad members. Failure to exercise fire control results in ineffective employment of the weapons and can result in danger to friendly troops, loss of surprise, premature disclosure of positions, fire on unimportant targets, loss of time in adjusting fire, and wasted ammunition.

5-5. METHODS OF FIRE CONTROL

The noise and confusion of battle may limit the use of some of these methods; therefore, the leader must select a method or combination of methods that will best accomplish the mission.

a. **ORAL.** This is an effective method of control, but at times the leader may be too far away from the gunner, or the noise of the battle may make it impossible for the gunner to hear him.

b. **ARM-AND-HAND SIGNALS.** This is an effective method when the gunners can see the leader. All gunners must understand the standard arm-and-hand signals.

c. **PREARRANGED SIGNALS.** These are either visual or sound signals such as pyrotechnics or blasts on a whistle. These signals should be included in standing operating procedures (SOPs) and must be understood by all squad members.

d. **PERSONAL CONTACT.** In many situations, the leader must move to individual squad members to issue orders. This method of control is used more than any other by small-unit leaders. The leader must use maximum cover and concealment to keep from disclosing the position.

e. **STANDING OPERATING PROCEDURES.** SOPs are actions to be executed without command that are developed during the training of the squad members. Their use eliminates many commands and simplifies the leader's job of fire control.

5-6. PURPOSE OF FIRE COMMANDS

A fire command is given to deliver effective fire on a target quickly and without confusion. When the leader decides to engage a target that is not obvious to the squad members, he must provide them with the information they need to effectively engage the target. He must alert the squad members; give a target direction, description, and range; name the method of fire; and give the command to fire.

There are initial fire commands and subsequent fire commands. Initial fire commands are given to begin firing at a target, and subsequent fire commands are given to adjust onto the target, change the rate of fire after a fire mission is in progress, interrupt fire, or terminate the alert.

a. **ELEMENTS OF THE FIRE COMMANDS.** Fire commands for all direct fire weapons follow a pattern that includes similar elements. There are six elements in the fire command for the SAW: ALERT, DIRECTION, DESCRIPTION, RANGE, METHOD OF FIRE, and COMMAND TO OPEN FIRE. The gunners repeat each element of fire command as it is given.

(1) **Alert.** This element gets the gunners ready to receive further instructions. The leader may alert both guns in the squad or only one, depending upon the situation. To alert and fire both guns, the leader announces, FIRE MISSION. If the leader desires to alert and fire only one gun, he will announce, GUNNER NUMBER ONE (TWO), FIRE MISSION. If he desires to alert both gunners but fire only one, he will announce, FIRE MISSION, GUNNER NUMBER ONE (TWO).

(2) **Direction.** This element indicates the general direction to the target and may be given in one or a combination of the following methods:

(a) ***Orally.*** The leader gives the direction to the target in relation to the position of the gunner.

(b) ***Pointing.*** The leader can designate a small or obscure target by pointing with his arm or aiming with a weapon. When he points with his arm, a man 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 weapon has been aimed at a target, a soldier looking through the sights should be able to see the target.

(c) ***Using Tracer Ammunition.*** Tracer ammunition is a quick and sure method of designating a target which is not clearly visible. When using this method, the leader should first give the general direction in order to direct the gunner's attention to the target area.

To prevent the loss of surprise when using tracer ammunition, the leader does not fire until he has given all of the elements of the fire command except the command to fire. The leader may fire his individual weapon or fire one or more bursts from a machine gun. The firing of the tracer(s) then becomes the last element of the fire command and is the signal to open fire.

Example:

FIRE MISSION

FRONT

500

WATCH MY TRACER(S)

(d) ***Using Reference Points.*** Another method of designating obscure targets is to use easy-to-recognize reference points. All leaders and gunners must be familiar with terrain features and the terminology used to describe them (FM 21-26). When using a reference point, the word "reference" precedes its description. This is done to avoid confusion. The general direction to the reference point should be given. An example of the use of a reference point is as shown below.

FIRE MISSION, GUNNER NUMBER ONE

FRONT

REFERENCE: LONE PINE TREE

Sometimes a target must be designated by using successive reference points.

Example:

GUNNER NUMBER TWO, FIRE MISSION

RIGHT FRONT

REFERENCE: RED-ROOFED HOUSE, LEFT TO HAYSTACK, LEFT TO BARN

Finger measurements can be used to direct the gunners' attention to the right or left of reference points.

Example:

FIRE MISSION

LEFT FRONT

REFERENCE: CROSSROADS, RIGHT FOUR FINGERS

(3) **Description.** The target description is used to create a picture of the target in the minds of the gunners. To properly apply their fire, the gunners must know the type of target they are to engage. The leader should describe it briefly. The word "target" precedes the target description, as in TARGET: TROOPS; TARGET: TANK; TARGET: AIRCRAFT. If the target is obvious, no description is necessary.

(4) **Range.** The leader will always announce the estimated range to the target. The range is given so the gunners know how far to look for the target and what range setting to put on the rear sight. Range is announced in meters; however, since the meter is the standard unit of range measurement, the word "meters" is not used. With SAWs, the range is determined and announced to the nearest hundred or thousand (in other words, THREE HUNDRED, or ONE THOUSAND, or ONE ONE HUNDRED).

Example:

FIRE MISSION

FRONT

REFERENCE: KNOCKED-OUT TANK, LEFT FOUR ZERO

TARGET: TROOPS

300

(5) **Method of Fire.** This element includes manipulation and rate of fire. Manipulation is used to prescribe the class of fire with respect to the weapon. It is announced as FIXED, TRAVERSE, SEARCH, or TRAVERSE AND SEARCH. Rate is used to control the amount of fire. There are three rates which may be announced: sustained, rapid, and cyclic. The rate of fire may be omitted from the fire command; however, when a rate is omitted, the rapid rate is implied.

Example:

FIRE MISSION

FRONT

REFERENCE: KNOCKED-OUT TANK, LEFT FOUR ZERO

TARGET: TROOPS

300

TRAVERSE

RAPID

(6) **Command to Open Fire.** It is often important that fire be withheld so that surprise fire can be delivered on a target, or to ensure that both gunners open fire at the same time. The leader may preface the command to commence firing with, AT MY COMMAND, or AT MY SIGNAL. When the gunners are ready to engage the target, they report, READY, to the leader. The leader then gives the command, FIRE, at the specific time desired.

Example:

FIRE MISSION

FRONT

TROOPS

400

AT MY COMMAND or AT MY SIGNAL (Pause until gunners are ready and fire is desired.)

FIRE (or prearranged signal)

If immediate fire is required, the command, FIRE, is given without pause and the gunners fire as soon as they are ready.

b. SUBSEQUENT FIRE COMMANDS

(1) Subsequent fire commands are used to make adjustments in direction and elevation, change rates of fire after a fire mission is in progress, interrupt fires, or terminate the alert. If the gunner fails to properly engage a target, the leader must promptly correct him by announcing or signaling the desired changes. When these changes are given, the gunner makes the corrections and resumes firing without further command.

(2) Adjustment for direction is given first. (Examples: RIGHT ONE ZERO; LEFT FIVE.) Adjustment for elevation is given next. (Examples: ADD FIVE; DROP ONE FIVE.) These may be given orally or with arm-and-hand signals. Adjustments in direction and elevation with the bipod are always given in meters by using one finger to indicate 1 meter.

(3) Changes in the rate of fire are given orally or by arm-and-hand signals.

(4) To interrupt firing, the leader announces, CEASE FIRE, or signals to cease fire. The gunners remain on the alert. They resume firing when given the command, FIRE.

(5) To terminate the alert, the leader announces CEASE FIRE, END OF MISSION.

c. DOUBTFUL ELEMENTS AND CORRECTIONS

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

(2) When the leader makes an error in the initial fire command, he corrects it by announcing, CORRECTION, and then gives the corrected element.

Example:

FIRE MISSION

FRONT

TROOPS

500

CORRECTION

600

TRAVERSE

AT MY COMMAND

(3) When the leader makes an error in the subsequent fire command, he may correct it by announcing, CORRECTION, and then repeating the entire subsequent fire command.

Example:

LEFT FIVE, DROP ONE

CORRECTION

LEFT FIVE, DROP ONE ZERO

d. ABBREVIATED FIRE COMMANDS. Fire commands need not be complete to be effective. In combat, the leader's fire command will give only the elements necessary to place fire on a target quickly and without confusion. During training, however, he should use all of the elements to get gunners in the habit of thinking and reacting properly when a target is to be engaged. After the gunners' initial training in fire commands, they should be taught to react to abbreviated fire commands, using one of the following methods of control:

(1) Oral. The leader may want to place the fire of one SAW on an enemy machine gun he has located.

Example:

FIRE MISSION, GUNNER NUMBER ONE

MACHINE GUN

600

FIRE

(2) Abbreviated Arm-and-Hand Signals. The leader gets the gunner's attention and then points to the target. When the gunner returns the READY signal, the leader commands, FIRE.

(3) Prearranged Signals. If the leader wants to shift fire at a certain time, he gives a prearranged signal, such as smoke or pyrotechnics. Upon seeing the signal, the gunners shift their fire to a prearranged point.

(4) Personal Contact. The leader may also move to the gunner whose fire he wants to shift, get his attention, point out the new target, and command, FIRE.

e. **STANDING OPERATING PROCEDURES.** SOPs for certain actions and commands can be developed to make gunners more effective. Some examples follow:

(1) **Observation.** The gunners continuously observe their sector.

(2) **Fire.** Gunners open fire without command on appropriate targets that appear within their sector.

(3) **Check.** While the gunner is firing, he will periodically check with the leader for instructions.

(4) **Return Fire.** The gunners return enemy fire, concentrating on enemy automatic weapons, without order.

(5) **Shift Fire.** Gunners shift their fire without command when more dangerous targets appear.

(6) **Rate of Fire.** When gunners engage a target, they initially fire at the rate necessary to gain and maintain fire superiority.

(7) **Mutual Support.** When two or more gunners are engaging the same target and one gunner stops firing, the other gunner(s) increases the rate of fire and covers the entire target. When only one gunner is required to engage a target and the leader has alerted two or more gunners, the gunner not firing lays on the target and follows the movements of the target so that he can fire instantly should the other SAW malfunction or cease fire before the target has been eliminated.

f. **ARM-AND-HAND SIGNALS.** Battlefield noise and the distance between the gunner and the leader often make it necessary to use arm-and-hand signals to control fire. When an action or movement is to be executed by only one of the gunners, a preliminary signal is given to that gunner only. The following are commonly used signals for fire control.

(1) **Ready.** The gunner signals that he is ready to fire by raising his right hand and arm above his head toward the leader.

(2) **Commence Firing, or Change Rate of Firing.** The leader brings his hand, palm down, to the front of his body, about waist level, and moves it horizontally in front of his body. To signal faster fire, he increases the speed of the hand movement; to fire slower, he decreases the speed of the hand movement.

(3) **Change Direction/Elevation (Bipod-SAW).** The leader extends his arm and hand in the new direction and indicates, by the number of fingers extended, the amount of change necessary. The fingers must be spread so the gunner can easily see the number of fingers extended.

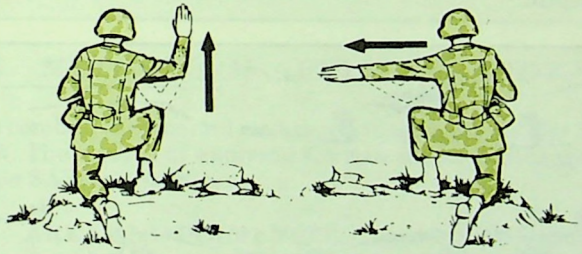
Each finger indicates 1 meter of change for the bipod-mounted weapon. If the desired change is more than 5 meters, the leader extends his hand the number of times necessary to indicate the total amount of change. For example, RIGHT NINE would be indicated by extending the hand once with five fingers showing and a second time with four fingers showing for a total of nine fingers.

(4) **Interrupt or Cease Firing.** The leader raises his arm and hand, palm outward, in front of his forehead and brings it downward sharply.

(5) **Other Signals.** The leader can devise other signals to control his weapons. A detailed description of arm-and-hand signals is given in FM 21-60.

READY

COMMENCE FIRING, OR CHANGE RATE OF FIRING



CHANGE DIRECTION/ELEVATION (BIPOD-SAW)

INTERRUPT OR CEASE FIRING

ARM-AND-HAND SIGNALS

Section III.

PRINCIPLES OF APPLICATION OF FIRE

Application of fire consists of the methods gunners use to get complete and effective coverage of a target area. Training in the methods of applying fire can be accomplished only after the gunners have learned to recognize the different types of targets they may find in combat, how to properly distribute and concentrate their fire, and how to maintain the proper rate of fire.

5-7. TYPES OF TARGETS

Targets for SAW gunners in combat will in most cases be enemy troops. Different troop formations will make it necessary to use different classes of fire distribution. These targets have width and depth, and the fire must thoroughly cover the area in which the enemy is known or suspected to be. The targets may be easy to find or hard to see or find.

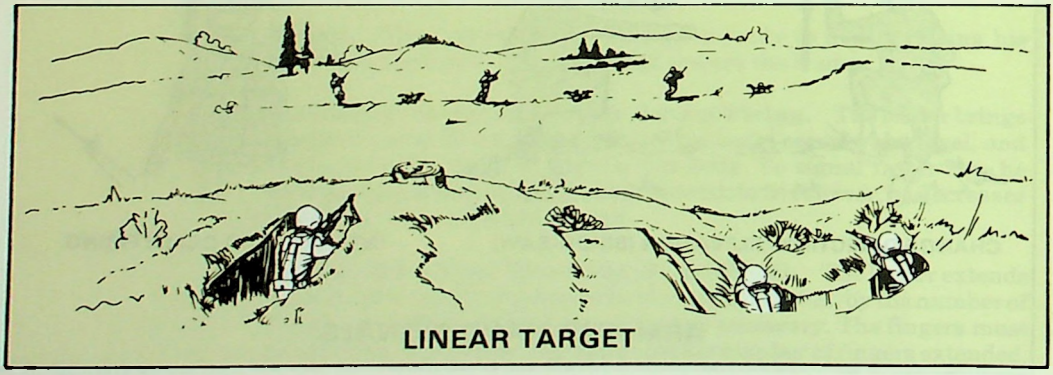
a. **POINT TARGETS.** These require the use of a single aiming point. Examples of point targets are enemy bunkers, weapons emplacements, vehicles, and troops.

b. **AREA TARGETS.** These may have considerable width and depth and may require extensive traversing and searching fire, such as a target where the enemy's exact location is unknown. Area targets are of three major kinds:

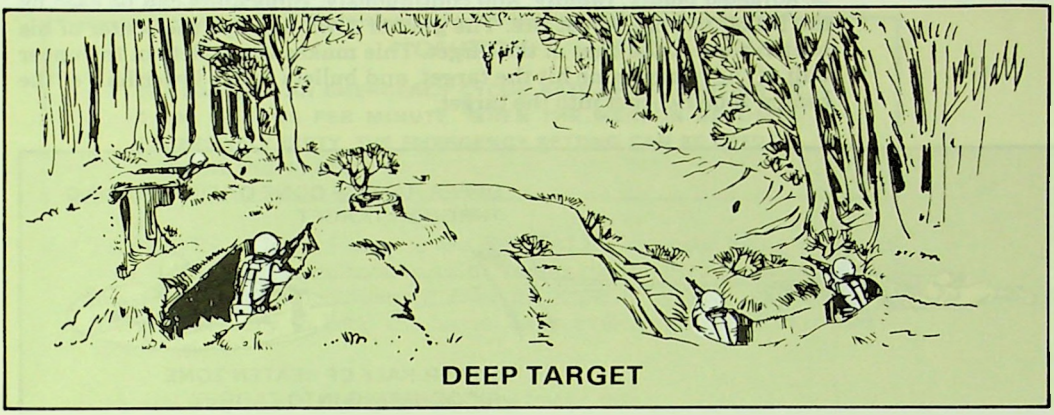
(1) Linear

(2) Deep

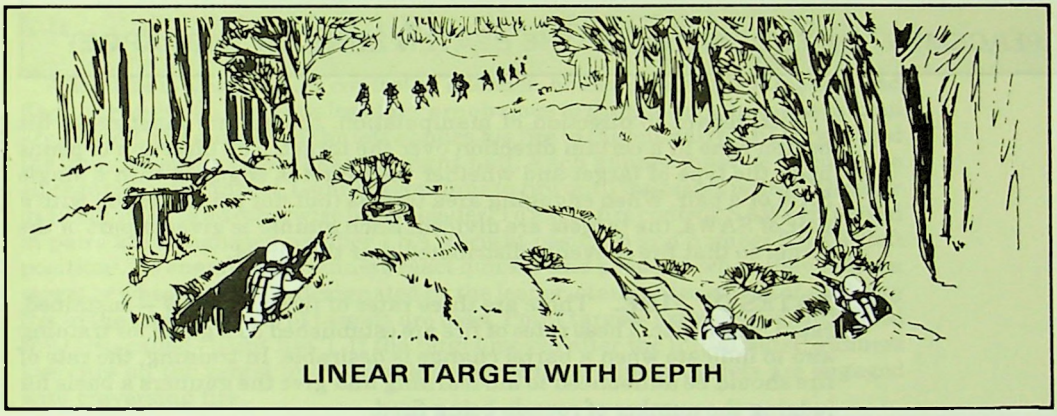
(3) Linear with depth.



LINEAR TARGET



DEEP TARGET



LINEAR TARGET WITH DEPTH

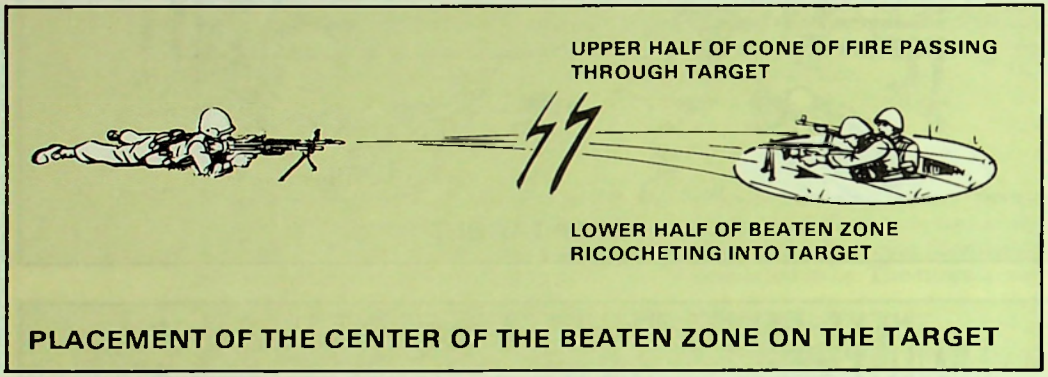
5-8. METHODS OF APPLICATION OF FIRE

In combat, the size and nature of a target may call for the fire of more than one SAW. The method of applying fire to a target is generally the same for either a single SAW or a pair.

a. **AREA AND POINT FIRE.** Area fire is fire that is delivered in width, in depth, or in a combination of both. To distribute fire properly, gunners must know where to aim, how to adjust their fire, and in which direction to manipulate the SAW.

With regard to the point of initial lay and adjustment, the gunner must aim, fire, and adjust on a certain point of the target. It is important that fire

be adjusted boldly, rapidly, and continuously. Binoculars can be used by the leader to help adjust fire. The gunner always keeps the center of his beaten zone at the base of the target. This makes the bullets in the upper half of the beaten zone hit the target, and bullets in the lower half of the beaten zone ricochet into the target.



PLACEMENT OF THE CENTER OF THE BEATEN ZONE ON THE TARGET

With regard to direction of manipulation, the gunner must move his beaten zone in a certain direction over the target. The direction depends upon the type of target and whether the target is engaged with a single SAW or a pair. When engaging area targets (but not point targets) with a pair of SAWs, the targets are divided. Each gunner is given a part of the target so that fire is evenly distributed over the target.

b. **RATES OF FIRE.** There are three rates of fire with SAW —sustained, rapid, and cyclic. These rates of fire are established as a guide for training and to indicate when a barrel change is desirable. In training, the rate of fire should be announced to aid learning and give the gunners a basis for judging the number of rounds being fired.

(1) **Sustained Fire.** Sustained fire is 85 rounds per minute in bursts of 5 to 7 rounds at 4- to 5-second intervals. It is directed by announcing, SUSTAINED.

(2) **Rapid Fire.** Rapid fire is 200 rounds per minute in bursts of 5 to 7 rounds at 2- to 3-second intervals. It is directed by announcing, RAPID.

(3) **Cyclic Fire.** Cyclic fire uses the most ammunition that can be used in 1 minute. The cyclic rate of fire with the SAW (approximately 750 rounds per minute) is fired when the trigger is held to the rear and ammunition is fed into the weapon. NORMAL cyclic rate of fire is 750 rounds per minute.

CAUTION

THE SAW HAS AN EMERGENCY CYCLIC RATE OF FIRE SETTING OF 1,000 ROUNDS PER MINUTE. WHEN THE WEAPON BECOMES EXCESSIVELY DIRTY, THE EMERGENCY SETTING CAN BE USED TO MINIMIZE STOPPAGES.

c. **TARGETS.** Ground targets are INITIALLY engaged using the rapid rate (200 rounds per minute) to gain fire superiority. Firing is then reduced to a rate that is sufficient to maintain fire superiority. This reduced rate of fire is necessary to keep the barrel from overheating and to conserve ammunition.

Aerial targets are engaged using the cyclic rate.

5-9. TARGET ENGAGEMENT — DIRECT LAY

When fire is under direct control of a leader, he designates the midpoint and flanks or ends of a target unless they are obvious to the gunners. In the case of an area target, the gunner on the left applies his fire to the left half of the target, and the gunner on the right takes the right half. Each gunner must be prepared to engage the entire target. Gunners continue to fire until the target is neutralized or until signaled to do otherwise by the leader. To aid in fire control, SAWs employed in pairs are designated number 1 SAW (right position) and number 2 SAW (left position). To ensure that gunners react quickly and properly when they detect a target or when a target is designated by the leader, standard methods of applying fire to the various types of targets are used. Point targets are engaged with fixed fire (also called "point fire"). If the target moves after the initial burst, gunners keep fire on the target by following its movement. Linear targets are engaged with traversing fire.

a. **SAWS IN PAIRS.** The target is divided at the midpoint with the right SAW (normally, number 1) firing on the right half and the left SAW (normally, number 2) firing on the left half. The point of initial lay and adjustment for both SAWs is on the midpoint. After adjusting on the midpoint, the right SAW traverses right, firing a burst after each change in direction, until it reaches one aiming point beyond the right flank (this ensures complete target coverage). The left SAW traverses to the left flank in the same way. Both gunners then reverse their directions and return to the midpoint. It is important to select aiming points for each burst rather than "spray" the target area.

If one part of the target is a greater threat, fire can be concentrated on the greater threat by dividing the target unevenly. The special division of the target is done with subsequent fire commands after firing begins. To

preclude confusion, the gunners initially lay on the midpoint regardless of the special division to be made.

b. **ONE SAW.** A single gunner must engage the entire width of a linear target. The point of initial lay is on the midpoint. The gunner then manipulates to cover the rest of the target.

c. **HARD-TO-IDENTIFY LINEAR TARGETS.** If a linear target is hard to identify, the leader may designate the target by using a reference point. When this method is used, the leader determines the center of mass of the target and announces the number of fingers from the reference point that will cause each gunner to lay on the center mass. The reference point may be within or adjacent to the target; however, it should be on line with the target for best effect. After the command to fire has been given, the leader maintains and controls the fire by subsequent fire commands.

Example of a fire command with the reference point OUTSIDE the target area:

FIRE MISSION

FRONT

REFERENCE: CHIMNEY, RIGHT FIVE, CENTER MASS

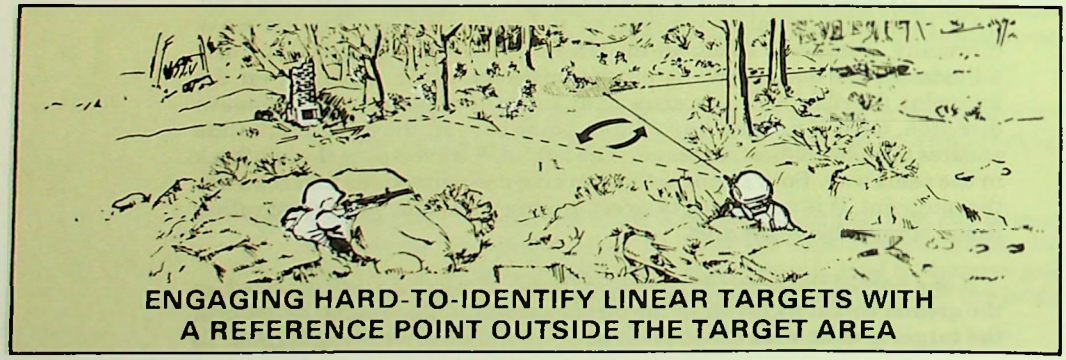
TARGET: TROOPS

600

TRAVERSE

AT MY COMMAND

FIRE



ENGAGING HARD-TO-IDENTIFY LINEAR TARGETS WITH A REFERENCE POINT OUTSIDE THE TARGET AREA

Example of a fire command with the reference point INSIDE the target area:

FIRE MISSION

LEFT FRONT

REFERENCE: BURNED-OUT TANK, CENTER MASS

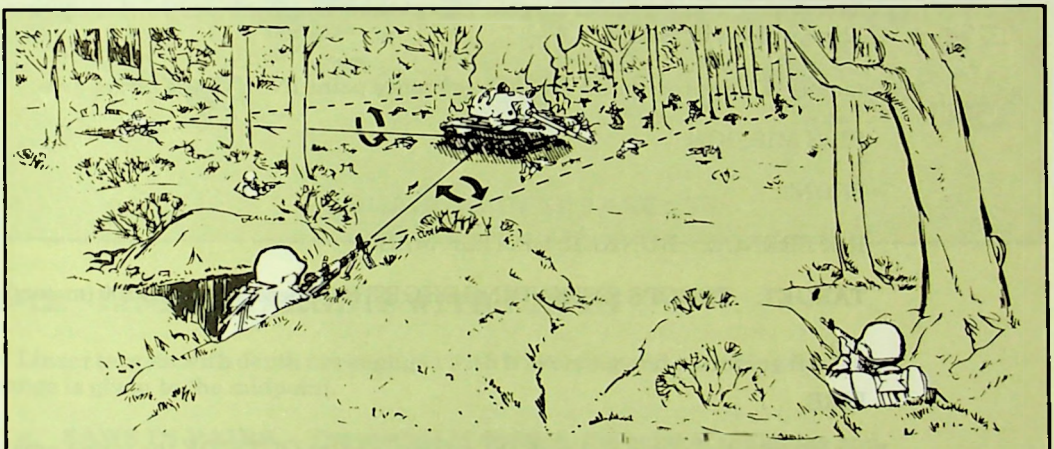
TARGET: TROOPS EXTENDING LEFT FIVE ZERO, RIGHT FIVE ZERO

700

TRAVERSE

AT MY COMMAND

FIRE



ENGAGING HARD-TO-IDENTIFY TARGETS WITH A REFERENCE POINT WITHIN THE TARGET AREA

5-10. DEEP TARGETS

Deep targets are engaged with searching fire. When the range is announced, it is given to the midpoint of the target.

a. **SAWS IN PAIRS.** The point of initial lay on a deep target for both SAWs is on the midpoint, which is also the point of division. Normally, the number 1 SAW has the near half and the number 2 SAW the far half. Since

enfilade fire is being delivered, it is not necessary to adjust on the midpoint of the target, because the long beaten zone will compensate for any range errors. After the initial burst, the right SAW searches down to one aiming point in front of the near end of the target and the left SAW searches up to one aiming point beyond the far end. Both gunners then reverse their direction of search and return to the midpoint.

b. **ONE SAW.** A single gunner initially lays on the midpoint of a deep target unless another portion of the target is more critical. The gunner then searches down to one aiming point in front of the near end and back up to one aiming point beyond the far end.

5-11. HARD-TO-IDENTIFY DEEP TARGETS

The center of mass of hard-to-identify deep targets may be designated by using reference points as for linear targets, except that the extent (depth) of the target is always given in meters.

Example of a fire command with the reference point INSIDE the target area:

FIRE MISSION

FRONT

REFERENCE: BUNKER, CENTER MASS

TARGET: TROOPS EXTENDING SHORT 100 (meters), OVER 100 (meters)

700

FIRE

Example of a fire command with the reference point OUTSIDE the target area:

FIRE MISSION

FRONT

REFERENCE: BUNKER, RIGHT FOUR, CENTER MASS

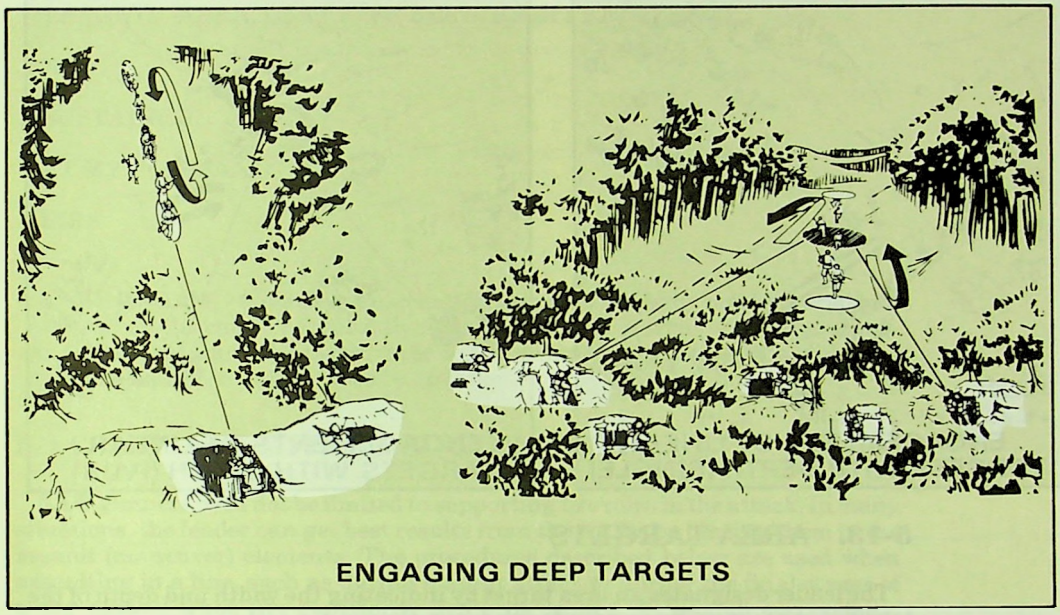
TARGET: TROOPS EXTENDING SHORT 100, OVER 100

600

SEARCH

AT MY COMMAND

FIRE



ENGAGING DEEP TARGETS

5-12. LINEAR TARGETS WITH DEPTH

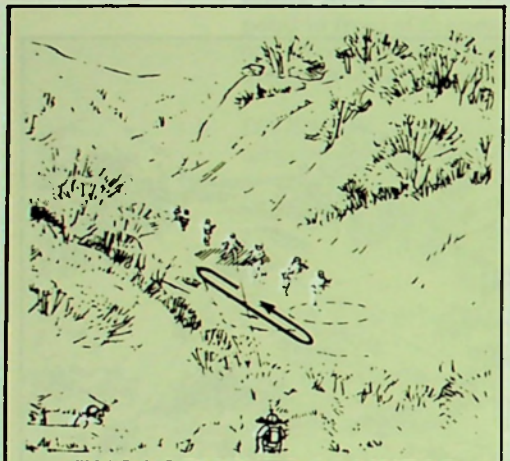
Linear targets with depth are engaged with traversing and searching fire. The range is given to the midpoint.

a. **SAWS IN PAIRS.** The method of division, the point of initial lay and adjustment, and the extent of manipulation for both SAWs is the same as that prescribed for linear targets. The gunners employ enough search between bursts to keep the center of impact on the base of the target.

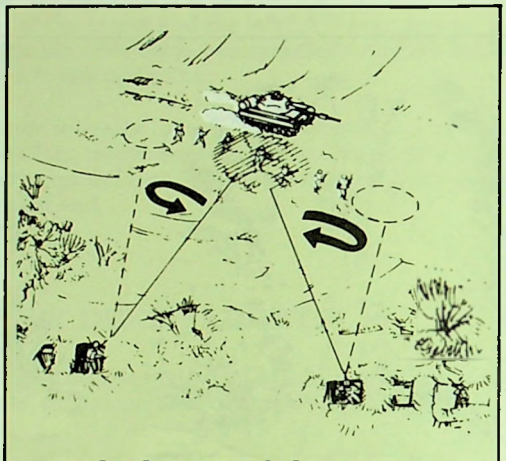
b. **ONE SAW.** A single gunner initially lays and adjusts on the midpoint of a linear target with depth, unless some other part of the target presents a greater threat. The gunner then traverses and searches to the near flank, then back to the far flank.

c. **HARD-TO-IDENTIFY LINEAR TARGETS WITH DEPTH.** The flanks and midpoint of a hard-to-identify linear target with depth should be designated with SAW or rifle fire. The reference-point method should

not be used because a minimum of two reference points are required to show the angle of the target.



ENGAGEMENTS OF LINEAR TARGETS WITH DEPTH (SINGLE)



ENGAGEMENTS OF LINEAR TARGETS WITH DEPTH (PAIR)

5-13. AREA TARGETS

The leader designates an area target by indicating the width and depth of the target. Area targets are engaged with traversing and searching fire.

a. **SAWS IN PAIRS.** The target is divided at the midpoint; the right SAW fires on the right half and the left SAW fires on the left half. The point of initial lay and adjustment for both SAWs is on the midpoint.

After adjusting fire on the center of mass, fire is distributed by applying direction and elevation changes that give the most effective coverage of the target area. The right gunner traverses to the right, applies the necessary amount of search, and fires a burst. He traverses and searches up and down until the right flank of the area target has been reached. The left gunner traverses and searches to the left flank in the same way.

Both gunners then reverse the direction of manipulation and return to the center of mass, firing a burst after each combined direction and elevation change.

Example of a fire comand to engage an area target:

FIRE MISSION

FRONT

REFERENCE: LONG PINE TREE, CENTER MASS

TARGET: AREA, LEFT FIVE ZERO, RIGHT FIVE ZERO

700

SUSTAINED

AT MY COMMAND

FIRE

b. **ONE SAW.** A single gunner engages an area target by laying and adjusting on the center of mass, then traversing and searching to either flank. Upon reaching the flank, direction is reversed and the SAW is traversed and searched in the opposite direction.

5-14. ASSAULT FIRE REQUIREMENTS

SAW gunners need not be limited to supporting fire roles in the attack. In many situations, the leader can get best results from the SAWs by placing them in the assault (maneuver) elements. The procedures described below are used when assaulting in a line, such as during a night attack or during the final stages of a day assault when fire superiority has been gained. To assault successfully, gunners must:

- Deliver fire effectively without use of sights
- Move rapidly and maintain alignment
- Reload rapidly to prevent lulls in the firing
- Keep the fire low on the objective area
- Distribute fire properly.

5-15. ASSAULT FIRE POSITIONS

There are three firing positions that may be used when firing the SAW in the assault — hip, shoulder, and underarm. The use of each position at the proper time allows gunners to place effective fire on the enemy without aligning the sights. In all assault firing positions, the gunner adjusts his fire by observing the tracers and the impact of the bullets in the target area. To support the SAW in the

assault, a sling is attached to the SAW and placed over the gunner's shoulder. It supports the weapon in the underarm or hip position.

a. **HIP FIRING POSITION.** The hip firing position is used to get a heavy volume of fire in the target area when rapid movement is not necessary. This position is stable, but it is awkward to use while moving. When firing from this position:

(1) The bipod legs are down for instant use in the prone position if necessary.

(2) The left hand is holding the handguard.

(3) The right hand is on the trigger-mechanism-group grip.

(4) The rear of the stock is held firmly against the forward portion of the right thigh.

(5) The left foot is pointed in the direction of the target during firing.

(6) The right foot is placed to the rear to provide stability.

(7) The gunner leans toward the target before and during firing.

HIP FIRING POSITION

b. **SHOULDER FIRING POSITION.** The shoulder firing position is used to hit specific points in the target area when rapid movement is not

necessary. The gunner pauses and fires a burst as his left foot strikes the ground. This position gives accuracy. When firing from this position:

(1) The bipod legs are down. To aim, the gunner aligns the front sight with the target, depressing the muzzle so the top of the front sight is below the target.

(2) The gunner's hands and feet are placed the same as when firing from the hip position.

(3) The stock of the SAW is held firmly against the shoulder, and the gunner leans toward the target before and during firing.

(4) Once the gunner has fired a burst, he removes the weapon from his shoulder and holds it in the ready position. He raises the weapon back to his shoulder to fire the next burst. This reduces muscular tension and fatigue.

SHOULDER FIRING POSITION

c. **UNDERARM FIRING POSITION.** The underarm firing position is used when closing with the enemy and when a heavy volume of fire and rapid movement are required. During limited visibility, this position may be used during the entire assault. When firing from this position:

(1) The bipod legs are down.

(2) The gunner's hands and feet are placed the same as when firing from the hip position.

(3) The weapon is held firmly, well up into the right underarm and the right side of the chest. The gunner leans forward while firing.

UNDERARM FIRING POSITION

5-16. MOVEMENT, SPEED, AND ALIGNMENT

SAW gunners must move rapidly and maintain alignment with the other members of the assaulting element. To accomplish this, gunners must use the following techniques:

a. Move as rapidly as possible, consistent with their ability to fire accurately and maintain alignment.

b. Maintain alignment by guiding on the base man, first team, or squad, using visual contact when possible. Use special techniques such as watch-

ing muzzle flashes and muzzle blasts, and sometimes making physical contact, during limited visibility.

5-17. RELOADING

Gunners must reload rapidly to avoid lulls in the firing. This can be achieved by practice and by applying the following techniques:

a. Prior to assault, the gunner conducts prefire checks on the weapon. He inspects ammunition to ensure that it is clean and serviceable, and he checks the box for serviceability.

b. During the assault, the gunner must continue moving forward and reload as rapidly as possible. The sling will assist the gunner in using both hands to reload.

5-18. FIRE ADJUSTMENT

Gunners have a tendency to fire high in the assault. To overcome this, they must be trained to boldly depress the muzzle when firing and then adjust upward. It is easier to adjust upward than downward, and firing low takes advantage of ricochets.

The use of tracer ammunition provides a means of adjusting fire. At night, it aids in illuminating the objective area and has a demoralizing effect on the enemy.

5-19. FIRE DISTRIBUTION.

To properly distribute fire over the objective, gunners must fire and adjust rapidly and continuously on as much of the objective area as possible without endangering friendly troops. They must give priority of fire to enemy automatic weapons.

5-20. OVERHEAD FIRE

Fire delivered over the heads of friendly troops is called OVERHEAD FIRE. It is used during training ONLY AFTER TROOP SAFETY IS CHECKED AND VERIFIED. The terrain and visibility dictate when overhead fire can be delivered safely. Refer to AR 385-63 for a complete summary of training safety requirements. Overhead fire CANNOT be safely delivered on a target at a range greater than 800 meters from the SAW, and it is not delivered over level or uniformly sloping terrain. Ideally, overhead fire is delivered when there is a depression in the terrain between the SAW position and the target. The de-

pression should place the gunner's line of aim well above the heads of friendly troops.

a. **SAFETY LIMIT.** The squad leader normally controls overhead fire. He lifts or shifts the fire when the friendly troops reach an imaginary line, parallel to the target, where further fire would cause casualties to friendly troops. This imaginary line is called the SAFETY LIMIT. The leader of the friendly troops may direct lifting of fire by prearranged signals transmitted by radio, wire, or visual means. The safety limit can be determined by observing the fire or by using the gunner's rule. To determine the safety limit by observation, the leader uses binoculars to see how close the fire is to advancing friendly troops. A safety limit can be selected by using the gunner's rule before the weapon is fired. The accuracy and safety of this method depends upon the weapon being ACCURATELY zeroed and the range to the target being correctly determined. The gunner's rule is used only when the target is between 350 and 800 meters from the weapon. The gunner's rule consists of the following procedure:

(1) Determine the range to the target and set the range on the rear sight.

(2) Lay the weapon to hit the target.

(3) Raise the rear sight to 1,000 meters.

(4) Look through the rear sight and note the point where the new line of aim strikes the ground. An imaginary line drawn through this point and parallel to the target is the SAFETY LIMIT.

(5) Reset the range to the target on the rear sight, re-lay on the target, and prepare to fire.

(6) Cease or shift fire when troops reach the SAFETY LIMIT.

b. **PRECAUTIONS.** The following safety measures MUST be applied when delivering overhead fire:

(1) Use field expedient depression stops to prevent the muzzle of the gun from accidentally being lowered below the SAFETY LIMIT.

(2) Do not deliver overhead fire through trees.

(3) Inform commanders of friendly troops when fire is to be delivered over their heads.

(4) Ensure that all gunners are aware of the SAFETY LIMIT.

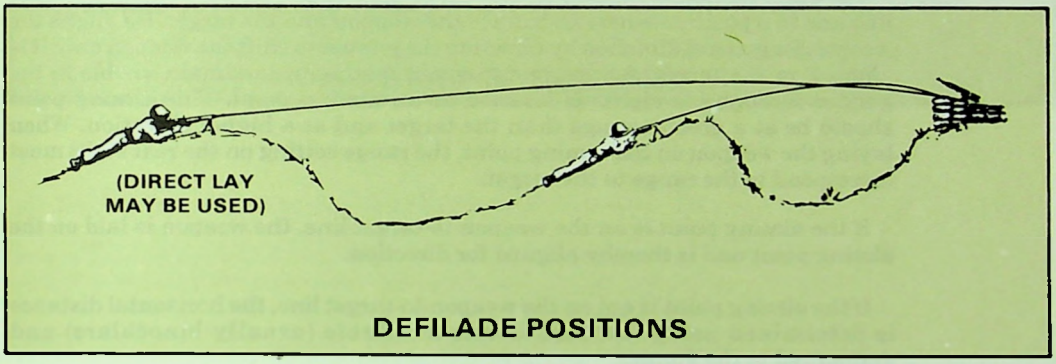
(5) Do not deliver overhead fire if the range from the weapon to the target is less than 350 meters or more than 800 meters.

(6) Do not use a barrel that is badly worn.

(7) During training exercises, do not lay SAWs where their trajectories will cross at a point directly over the heads of friendly troops; and consult AR 385-63 and local safety regulations concerning overhead fire.

5-21. DEFILADE POSITIONS

At times, it may be desirable to employ SAWs from defilade positions. A SAW is in defilade when the weapon and its gunner are completely behind terrain that masks them from the enemy (usually on the reverse slope of a hill). The weapon must fire up and over the hill. Its fire must be observed and adjusted by a squad member who can observe the target from a position on a flank or to the rear of the weapon (on higher ground). A defilade position allows little opportunity to engage new targets. A SAW is in partial defilade when it is positioned just back of the crest of a hill so that the crest provides some protection from enemy direct fire and the weapon is still able to engage its target by direct-lay techniques.



DEFILADE POSITIONS

a. ADVANTAGES

(1) The gunner has cover and concealment from enemy direct fire weapons.

(2) The gunner has some freedom of movement in the vicinity of the position.

(3) Control and supply are easier.

(4) The smoke and flash of the weapon are hidden from the enemy.

b. DISADVANTAGES

(1) Rapidly moving ground targets are hard to engage because adjustment of fire must be made through an observer.

(2) Targets close to the mask usually cannot be engaged.

(3) It is hard to get a final protective line.

5-22. ENGAGEMENT

The essential elements in the engagement of a target from position defilade are mask clearance, direction, elevation, and adjustment of fire. If possible, a minimum mask clearance (minimum elevation) will be determined for the entire sector of fire. However, it may be necessary (due to the slope of the mask) to establish clearance for each target.

5-23. LAYING THE SAW FOR DIRECTION

The observer places himself to the rear of the weapon on the weapon-to-target line and in a position where he can see the weapon and the target. He aligns the weapon for general direction by directing the gunner to shift the weapon until it is aligned on the target. A prominent terrain feature or landmark visible to the gunner through his sights is selected as an aiming point. This aiming point should be at a greater range than the target and at a higher elevation. When laying the weapon on the aiming point, the range setting on the rear sight must correspond to the range to the target.

If the aiming point is on the weapon-to-target line, the weapon is laid on the aiming point and is thereby aligned for direction.

If the aiming point is not on the weapon-to-target line, the horizontal distance is determined using the best means available (usually binoculars) and announced to the gunner.

5-24. LAYING THE SAW FOR ELEVATION

The observer measures the vertical distance from the aiming point to the base of the target using the best means available and directs the gunner to depress the muzzle of the weapon. The weapon should now be laid to hit the target.

5-25. CONTROLLING FIRE

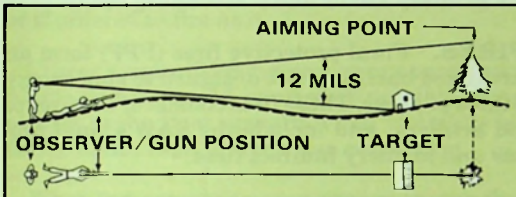
Fire from position defilade is controlled by an observer in a position near the weapon. An example of a fire command used to engage a target from position

defilade is as follows (the weapon has already been laid for direction and elevation):

AS LAID

AT MY COMMAND

FIRE

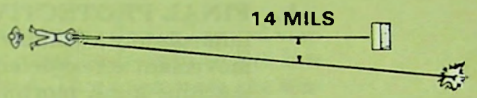


AIMING POINT ON GUN-TO-TARGET LINE

GUN-TO-TARGET RANGE: 1,000 METERS

DIRECTION: WITH REAR SIGHT SET AT 1,000 METERS, LAY GUN ON AIMING POINT

ELEVATION: DEPRESS GUN 12 MILS



AIMING POINT NOT ON GUN-TO-TARGET LINE

GUN-TO-TARGET RANGE: 1,000 METERS

DIRECTION: WITH REAR SIGHT AT 1,000 METERS, LAY GUN ON AIMING POINT; TRAVERSE GUN LEFT 14 MILS

ELEVATION: DEPRESS GUN 12 MILS

ADJUSTING FIRE BY OBSERVER

CHAPTER 6

Techniques of Fire During Limited Visibility

6-1. TERMINOLOGY

a. **SECTOR OF FIRE.** A sector of fire is an area to be covered by fire that is assigned to an individual, a weapon, or a unit. SAWs are normally assigned two sectors of fire: a primary sector and a secondary sector.

b. **FINAL PROTECTIVE FIRES.** Final protective fires (FPF) form an immediately available prearranged barrier of fire designed to stop enemy movement across defensive lines or areas. These fires consist of the fires of machine guns, mortars, and artillery, and include the SAW's final protective line (FPL) and mortar and artillery indirect fires.

c. **FINAL PROTECTIVE LINE.** An FPL is a predetermined line along which grazing fire is placed to stop an enemy assault. If an FPL is assigned, the SAW is laid on it except when other targets are being engaged. An FPL becomes the SAW's part of the unit's final protective fires. An FPL has the following characteristics:

(1) It is fixed in direction and elevation; however, a small shift for search must be employed to prevent the enemy from crawling under the FPL and to compensate for irregularities in the terrain or the sinking of the bipod legs into soft soil during firing.

(2) Fire can be delivered under all conditions of visibility.

d. **PRINCIPAL DIRECTION OF FIRE.** A principal direction of fire (PDF) is a priority direction of fire assigned to cover an area which provides good fields of fire or has a likely avenue of approach. It is also used to provide mutual support to an adjacent unit. Weapons are laid on the PDF if an FPL has not been assigned. If a PDF is assigned and other targets are not being engaged, weapons are laid on the PDF. A PDF has the following characteristics:

(1) It is used only if an FPL is not assigned; it then becomes the SAW's part of the unit's final protective fires.

(2) When the target has width, direction is determined by laying on one edge of the target area and noting the amount of traverse necessary to cover the entire target.

(3) The gunner is responsible for the entire wedge-shaped area from the muzzle of the gun to the target, but elevation may be fixed for a priority portion of the target.

6-2. ENGAGEMENT OF VISIBLE TARGETS

During limited visibility (darkness, and during daylight when smoke, fog, rain, or snow is present), it is hard to detect and identify targets. The leader's ability to control the fire of his weapons is also reduced, so he may instruct the gunners to fire without command when targets become visible. Gunners should engage targets only when they can identify them, unless ordered to do otherwise. For example, if one gunner detects a target and engages it, the other gunners will observe the area fired upon and add their fire only if they can identify the target or if ordered to fire at it.

Tracer ammunition helps a gunner engage visible targets during limited visibility, and it should be used if possible. Gunners must be trained to fire low at first and adjust upward when visibility is limited. This overcomes the tendency to fire high under those conditions.

When two or more weapons are engaging the same linear targets, linear targets with depth, or deep targets, no attempt is made to divide these targets as is done when visibility is good. When visibility is poor, the center and flanks of these targets may not be clearly defined; therefore, each gunner observes his tracers and covers what he believes to be the entire target.

6-3. VARIOUS TARGETS

a. **LINEAR TARGETS.** The gunner lays on what appears to be the center of mass of the target. With the bipod-mounted gun, the gunner traverses rapidly back and forth across the target by selecting successive aiming points.

b. **LINEAR TARGETS WITH DEPTH.** The gunner lays on the center of mass of the target. He then traverses and searches the target, covering the side closest to his position first. With the bipod-mounted gun, the gunner selects successive aiming points, covering what appears to be the entire target by observing his tracers.

c. **DEEP TARGETS.** The gunner first lays on the center of mass of the target. He searches down to the near end and then up to the far end. With the bipod-mounted weapon, the gunner covers the entire target by selecting successive aiming points and observing his tracers.

One type of target for the SAWs during limited visibility is enemy crew-served weapons. These enemy weapons may be identified during limited visibility by their muzzle flashes. To engage these targets, the gunner uses his night vision device. Fire should be delivered at the rapid rate and adjusted by observing the tracer stream.

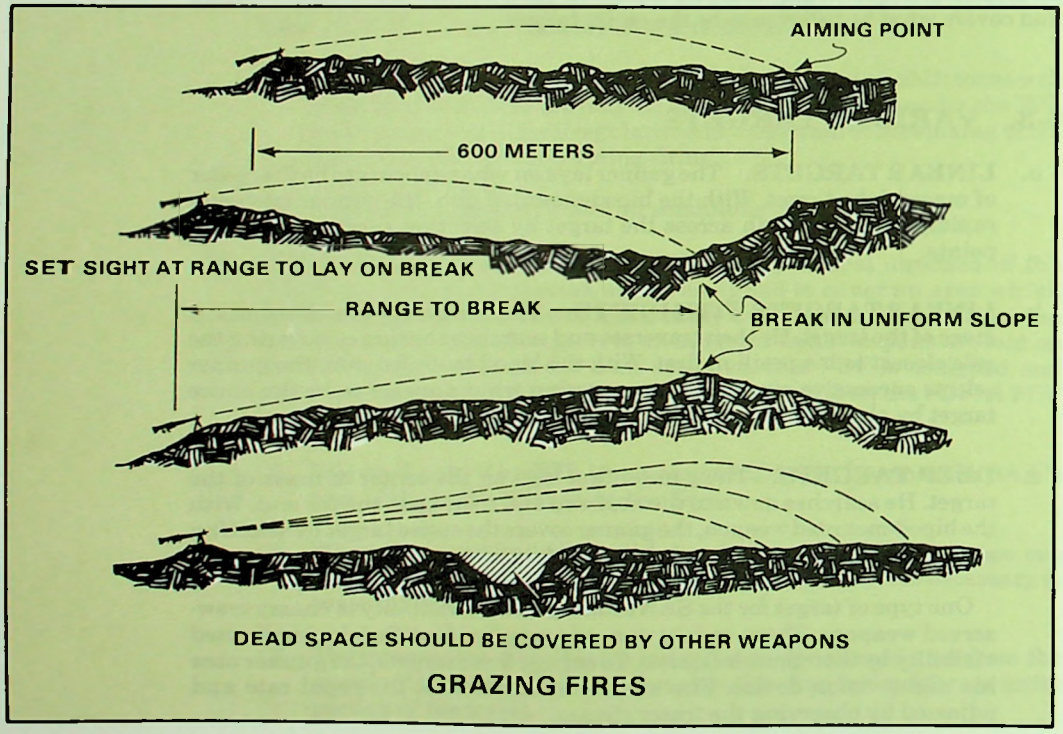
6-4. PREDETERMINED FIRES

Predetermined fires are used to cover target areas such as avenues of enemy approach, likely sites for enemy weapons, and probable enemy assault routes.

a. **GRAZING FIRE.** A good FPL covers the maximum area with grazing fire. Grazing fire can be obtained over various types of terrain to a maximum range of 600 meters.

To obtain the maximum extent of grazing fire over level or uniformly sloping terrain, the gunner sets the rear sight at 600 meters. He then selects a point on the ground which he estimates to be 600 meters from the weapon, and he lays, fires, and adjusts on that point.

If the gunner cannot obtain 600 meters of grazing fire because of a break in the terrain at ranges less than 600 meters, he determines the range to the break, indexes that range on his rear sight, and then lays, fires, and adjusts on that point.



GRAZING FIRES

To prevent enemy troops from crawling under the 1-meter-high grazing fire, a few mils of search (downward) should be applied by lowering the muzzle of the weapon.

b. **DEAD SPACE.** The extent of grazing fire and the extent of dead space may be determined in two ways:

(1) In the preferred method, a weapon is laid for elevation and direction (and cleared). A member of the squad then walks along the FPL while the gunner looks through his sights. In places where the soldier's waist (midsection) falls below the gunner's line of aim, dead space exists. Arm-and-hand signals must be used to control the soldier who is walking and to obtain an accurate account of the dead space and its location.

(2) Another method is to observe the flight of tracer ammunition from a position behind and to the flank of the weapon.

c. **FIRE CONTROL.** Predetermined targets, including the FPL or PDF, are engaged on order or by SOP. The signal for calling for these fires is normally stated in the defense order. Fires on predetermined targets may be controlled by arm-and-hand signals, voice commands, or pyrotechnic devices.

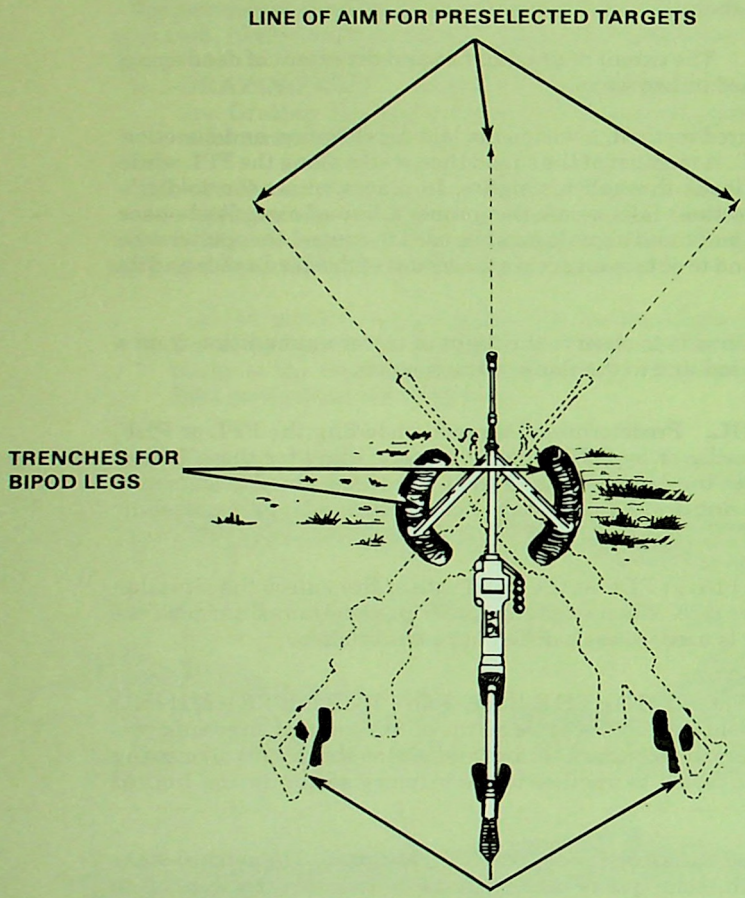
SAWs fire the FPL or PDF at the rapid rate of fire unless the situation calls for a higher rate. When engaging other predetermined targets, the rapid rate of fire is used unless a different rate is ordered.

d. **METHODS OF LAYING THE SAW FOR PREDETERMINED TARGETS.** Field expedients serve as the only means of engaging predetermined targets in secondary sectors and aiding the gunner in moving quickly from one target to another in the primary sector during limited visibility.

(1) **The Notched-Stake or Tree-Crotch Technique.** The notched-stake or tree-crotch technique is used with the bipod-mounted weapon to engage predetermined targets within a sector or to define sector limits. This method is effective under all conditions of visibility and requires little additional material.

The stock of the weapon is placed in the rest of a notched stake or tree crotch and is adjusted to hit selected targets or to define sector limits.

Shallow, curved trenches or grooves are dug for the bipod feet. These trenches allow rotation of the bipod feet as the stock is moved from one crotch or stake to another.



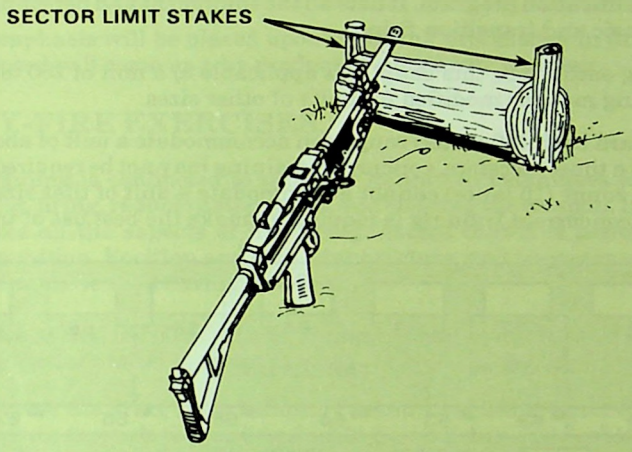
NOTCHED-STAKE OR TREE-CROTCH TECHNIQUE OF ENGAGING PRESELECTED TARGETS

(2) **The Horizontal Log or Board Technique.** This technique is used to mark sector limits and engage wide targets. The horizontal log or

board technique is good for all conditions of visibility. It is best suited for flat, level terrain. The bipod firing position and grip are used, and the procedure is as follows:

(a) Place a log or board beneath the stock of the weapon so that the stock can slide across it freely.

(b) The sector limits may be marked by notching or placing stops on the horizontal log or board.



HORIZONTAL LOG OR BOARD USED WITH THE BIPOD-MOUNTED WEAPON

CHAPTER 7

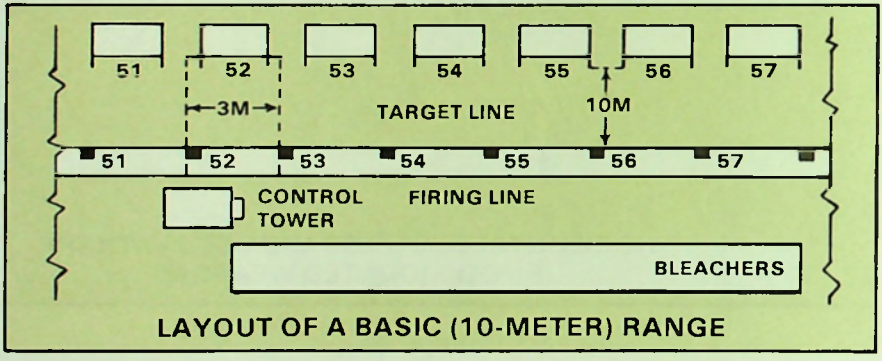
Marksmanship Training

7-1. PHASES AND ORGANIZATION

SAW marksmanship training includes qualification training on both the basic (10-meter) and the transition ranges. Marksmanship training is conducted in three phases: bipod instructional firing on the basic (10-meter) range; qualification practice and record firing on the basic (10-meter) range; and practice and qualification firing on the transition range. This chapter is specifically designed to assist unit commanders in the preparationand conduct of a SAW qualification program. It lists all the equipment and personnel required to conduct basic and transition firing.

Training outlined in this chapter is applicable to a unit of 200 to 250 soldiers. The training must be modified for units of other sizes.

A standard basic (10-meter) range can accommodate a unit of about 200 to 250 soldiers at a time; therefore, concurrent training may not be required. A standard transition range (10 lanes) cannot accommodate a unit of that size at one time; therefore, concurrent training is required to make the best use of training time.



LAYOUT OF A BASIC (10-METER) RANGE

An officer assigned as the principal instructor or alternate instructor may perform the duties of safety officer; however, the officer in charge cannot also act as safety officer. Chartmen and demonstrators may be used as lane or safety NCOs, group leaders, and assistant instructors, depending on the type of instruction. (Local range regulations may permit the use of an NCO as safety officer.)

7-2. OBJECTIVES

During basic marksmanship training with the bipod-mounted SAW, the objectives and fundamentals of automatic fire marksmanship are taught and

then applied and reinforced during live-fire exercises. This instruction is designed to introduce the gunner to the characteristics, noise, and recoil of the weapon during firing. The areas emphasized in marksmanship training are as follows:

a. Dry-fire exercise

b. Obtaining an accurate initial burst

c. Distribution of fire

d. Observation and adjustment of fire

e. Operating with speed.

Initially, emphasis will be placed upon attaining proficiency in the first four objectives. Speed will come as a by-product of constantly training.

7-3. DRY-FIRE EXERCISES.

Dry-fire training is conducted to train the gunner in techniques for loading, proper holding, firing, reducing stoppages, and clearing the weapon. In addition, it incorporates all the aspects of live firing, except that it is performed with dummy ammunition. Position and grip, sight picture, and trigger manipulation are the same as those used during live fire.

a. **FIRING SEQUENCE.** Each dummy round is aimed and fired at the aiming paster on the 10-meter target.

(1) During the firing of each dummy round, the gunner observes his sight picture through the feeding, locking, and firing cycle, which provides feedback on his ability to maintain his hold/sight picture.

(2) Immediate action is applied after firing each shot in order to extract and eject the dummy cartridge and return the bolt to the cocked position. The charging handle is returned to the forward position.

(3) If at the completion of the firing cycle, the gunner observes movement of the sight picture any greater than 1/2 centimeter off the point-of-aim, his position and/or holding techniques are not steady.

b. **SIGHT SETTING AND SIGHT CHANGES.** These exercises are to train the gunner in the proper operation and adjustment of the rear sight.

(1) Adjustments for range are taught by requiring the gunner to manipulate the rear sight to each range setting (300 to 1,000 meters), noting the even-numbered range settings are on the left side of the scale wheel, and odd-numbered range settings are on the right. Rotation of the knob (rear knob) toward the muzzle increases range, while rotation toward the stock decreases range.

(2) Adjustments for windage are taught by requiring the gunner to traverse the rear sight across the entire allowable clicks. Rotation of the windage knob (front knob) toward the muzzle moves the peep aperture right, while rotation toward the stock moves the aperture left.

(3) Fine adjustments for elevation are taught by requiring the gunner to manipulate the peep aperture through its maximum range from bottom (0 clicks in elevation) to the top (approximately 9 clicks elevation). Clockwise rotations decrease elevation, while counterclockwise rotations increase elevation. Each 180-degree turn equals a 1/2-centimeter change in impact at a 10-meter range.

(4) Starting position for zeroing an unzeroed gun:

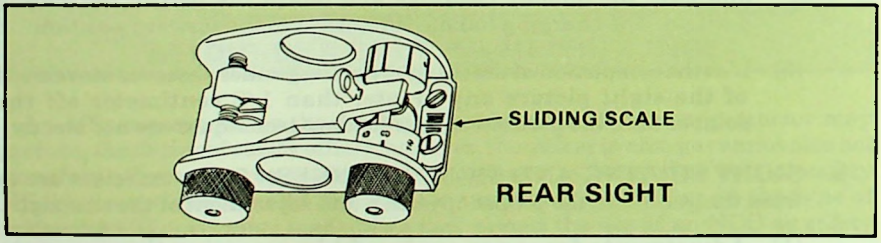
(a) The starting position will be taught as center for windage (approximately 12 clicks L) and 500 elevation (peep sight at lowest position).

NOTE: Each sight may vary as to how many clicks are needed to center the sight. To check your sight, start with the sight all the way to the right and, while counting the clicks, rotate the windage knob backwards until it stops on the left side. Divide the number of clicks by two. Example: 24 clicks = 12 to center. If the number of clicks is uneven, use the larger figure. Example: 23 clicks = 11 + 12; use 12.

(b) Recording zero is taught by determining the total adjustment required —from the starting position — and recording the final sight setting.

(c) Adjust the sliding scale at the rear of the sight to center the large index line under the zeroed windage mark on the sight.

NOTE: Soldiers should practice the tasks until they become proficient before they are given the dry-fire proficiency exam.



c. **DRY-FIRE PROFICIENCY (PERFORMANCE) EXAM.** The thrust of this program is performance-oriented training. It emphasizes learning by doing. Proficiency will be tested on a pass/fail basis. The evaluation tests in Appendix A will be used for this purpose. Soldiers who fail must be retrained and retested. Soldiers who have passed the

proficiency test may be used to assist in the training of soldiers experiencing difficulty. A soldier must demonstrate skill in all the tasks of the dry-fire proficiency exam before he is allowed to progress to 10-meter live firing.

d. **REMEDIAL TRAINING.** Remedial training must be given to soldiers who fail to pass the performance objectives. Remedial training is essentially retraining on those tasks in which the soldier has failed to demonstrate proficiency. Following retraining, the soldier will be retested in those tasks.

7-4. FIRE COMMANDS

The standard fire command is used as a means of control during marksmanship training. The fire command, as it applies to the basic range, must be explained to the gunner. The elements are given (as appropriate) before each firing exercise. The gunner takes action as directed and repeats each element as it is announced. For a detailed explanation of fire commands, refer to Chapter 5. Some of the elements are:

a. **ALERT.** The alert is given as a fire mission. Upon hearing the alert, the gunner loads his weapon and places the safety lever on FIRE.

b. **DIRECTION.** Since the targets appear to the gunner's front on the basic range, direction is given as FRONT.

c. **DESCRIPTION.** Description is given as PASTER NUMBER (pasters 1 through 8 as appropriate), at which time the gunner lays on the announced paster.

d. **RANGE.** A range setting of 500 meters on the rear sight assembly is always used on the basic range. This is announced as FIVE HUNDRED, at which time the gunner must ensure that his rear sight assembly has the correct range setting.

e. **METHOD OF FIRE.** Firing on the basic range with the bipod-mounted weapon is a point target, so the method of fire is announced as FIXED. The gunner fires either single rounds or bursts of six at a rate slower than the substained rate; therefore, the rate-of-fire element is omitted.

f. **COMMAND TO OPEN FIRE.** This is announced as AT MY COMMAND. When the gunner is ready, he announces UP and extends his left hand and arm in the READY signal. When all gunners are ready to fire, the command FIRE is given.

7-5. TARGET ANALYSIS AND SCORING

a. The basic machine gun marksmanship target is used on the basic range. The following explanation of the target, including the size of the aiming

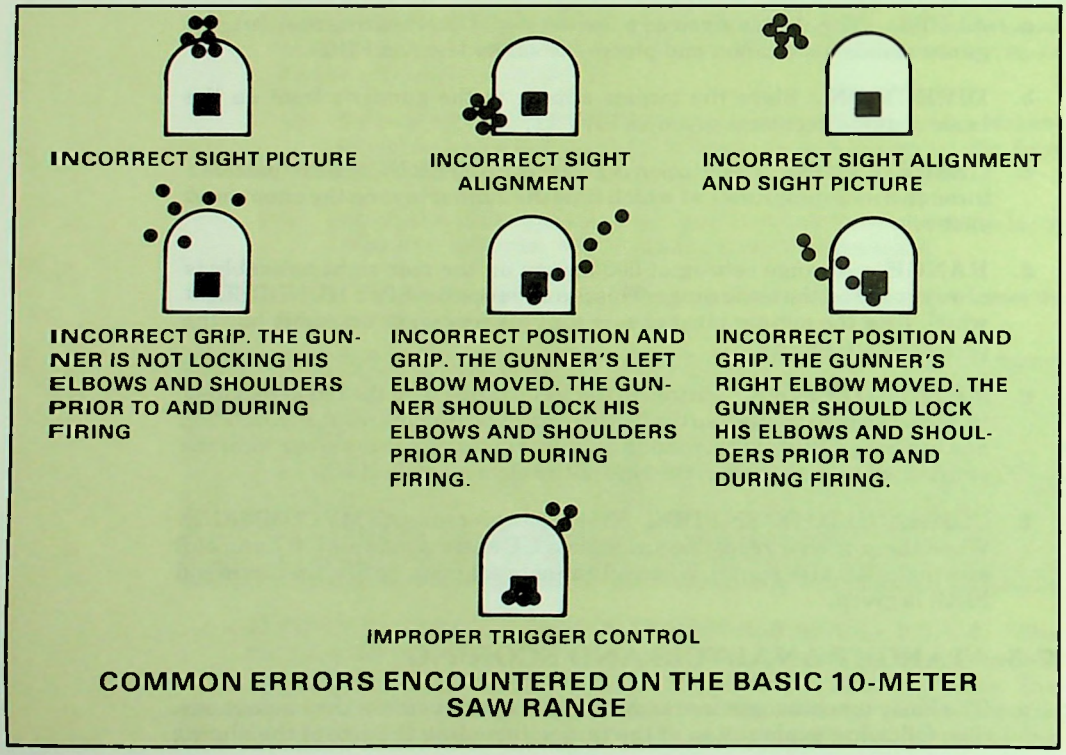
pasters and scoring spaces, will aid in zeroing the SAWs and will facilitate control during firing exercises.

b. The target consists of four sections, lettered A, B, C, and D. Each section has scoring spaces for eight fixed-fire exercises (scoring spaces 1, 2, 3, 4, 5, 6, 7, and 8) and two traversing and searching exercises (scoring spaces 5 and 6, and 7 and 8).

c. Each scoring space is 4 centimeters wide and 5 centimeters high. The black aiming paster within each numbered scoring space is 1 centimeter square.

d. 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 SAW marksmanship.

e. During bipod firing, a target is best analyzed by considering the common errors of SAW marksmanship. The common errors shown below assume a properly zeroed weapon.



COMMON ERRORS ENCOUNTERED ON THE BASIC 10-METER SAW RANGE

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

7-6. OBTAINING AN ACCURATE INITIAL BURST

The fundamentals of obtaining an accurate two- to three-round initial burst include firing position, grip, aim, trigger manipulation, and a good zero on the weapon.

a. **FIRING POSITION AND GRIP.** In automatic fire, position is the most important aspect of marksmanship. To better understand this, assume that the firer has a good zero, aims his weapon correctly, and properly applies a steady hold in firing a burst of two or three rounds. The first round of that burst will hit the target at the point of aim; however, this will not necessarily be true of the second and third rounds. The first round hits the aiming point the same as when a round is fired singly. The recoil from the first and subsequent rounds will disturb the lay of the weapon progressively with each round of the burst. The relationship between the point of impact of the first and subsequent rounds of the burst will depend on the stability of the firer's position. The firer's body, directly behind the weapon, serves as a foundation, and his grip serves as a lock to hold the weapon against this foundation. The better the body alignment and the steadier the grip, the less dispersed will be the rounds of a burst of automatic fire. The SAW firing position and grip require the gunner to:

(1) Assume a prone position and place the folding shoulder rest on the right shoulder. An imaginary line drawn through the weapon should bisect the right shoulder and the right buttock.

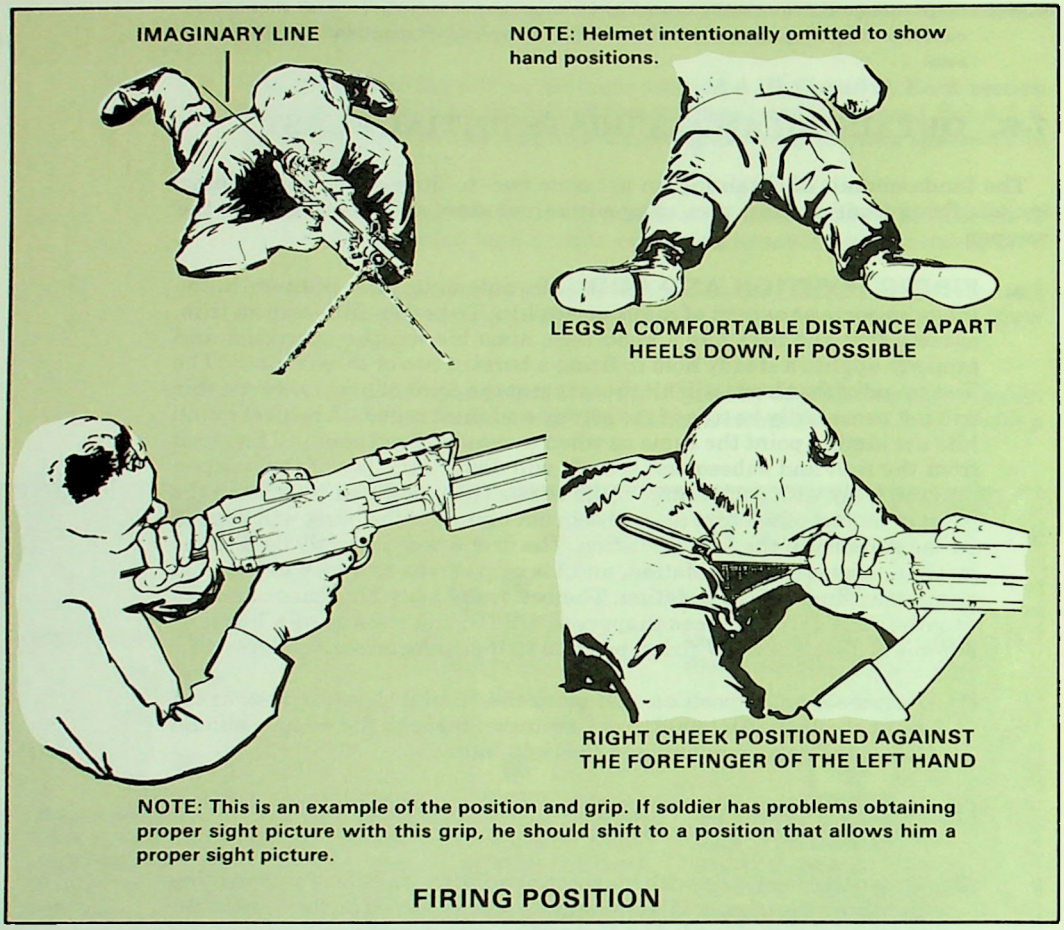
(2) Spread his legs to a comfortable distance apart with heels down as close to the ground as possible.

(3) Grasp the pistol grip with his right hand with his index finger resting lightly on the trigger. His left hand should be placed on the comb of the stock with thumb curled underneath.

(4) Position his right cheek against the forefinger of the left hand at a point between the second joint and the hand to form a spotweld. A conscious effort should be made to position the left hand and cheek at the same spot on the stock each time the weapon is fired.

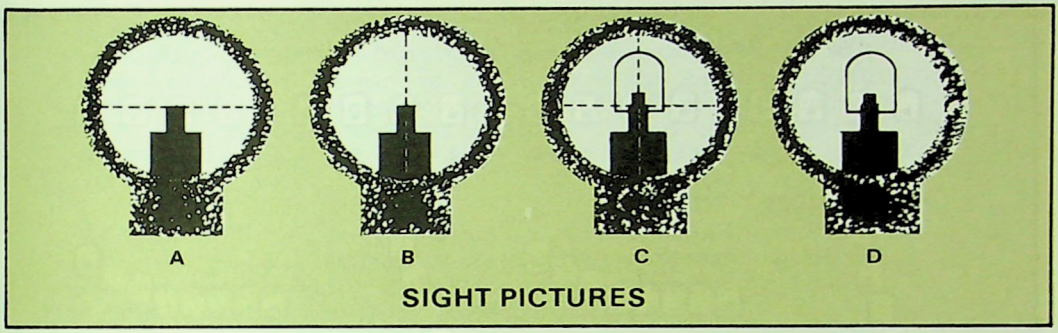
(5) Apply a firm, steady pressure rearward and to the left to bring the weapon tightly into the shoulder and neck while aiming and firing.

(6) Keep his shoulders level and his elbows an equal distance from the receiver of the weapon.



NOTE: LEFT-HANDED FIRING. Reverse sides for the previous instruction. Keep in mind that the SAW ejects expended brass and links at a 90-degree angle to the RIGHT of the weapon and downward. Caution should be taken to avoid bouncing brass.

b. **AIM.** The gunner aligns the peep sight with the round sight aperture on the front sight, which places the front sight post in the center of the peep sight. An imaginary horizontal line drawn through the center of the peep sight would touch the top of the front sight post. Add an imaginary vertical line through the center of the peep sight; it would bisect the front sight post. The gunner centers the top of the front sight post on the center base of the target.



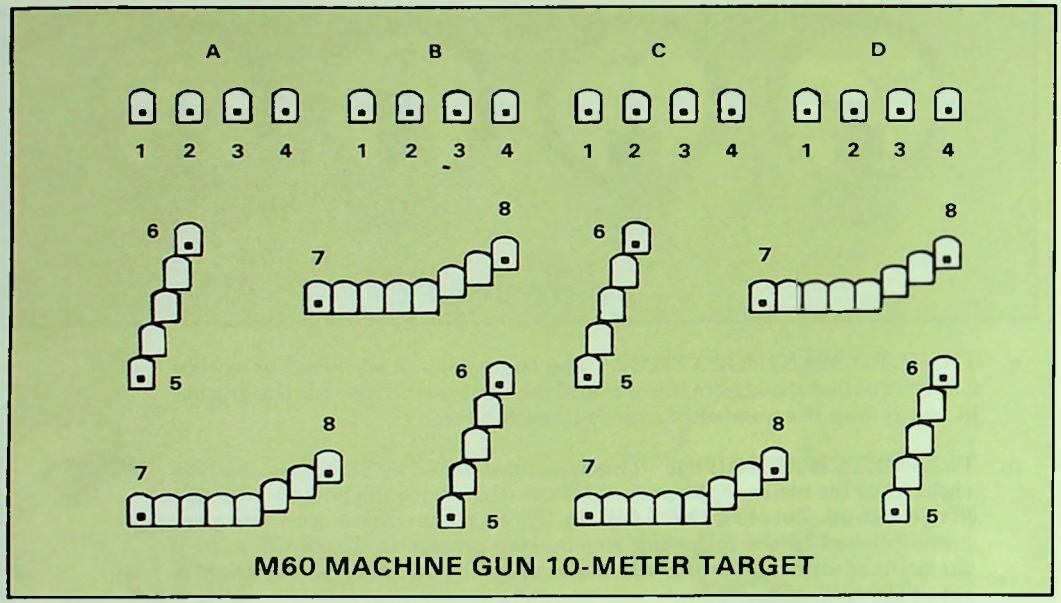
SIGHT PICTURES

c. **TRIGGER MANIPULATION.** The trigger is not squeezed as with a rifle; it is pulled straight to the rear and then released. This aids the gunner in controlling the number of rounds in each burst.

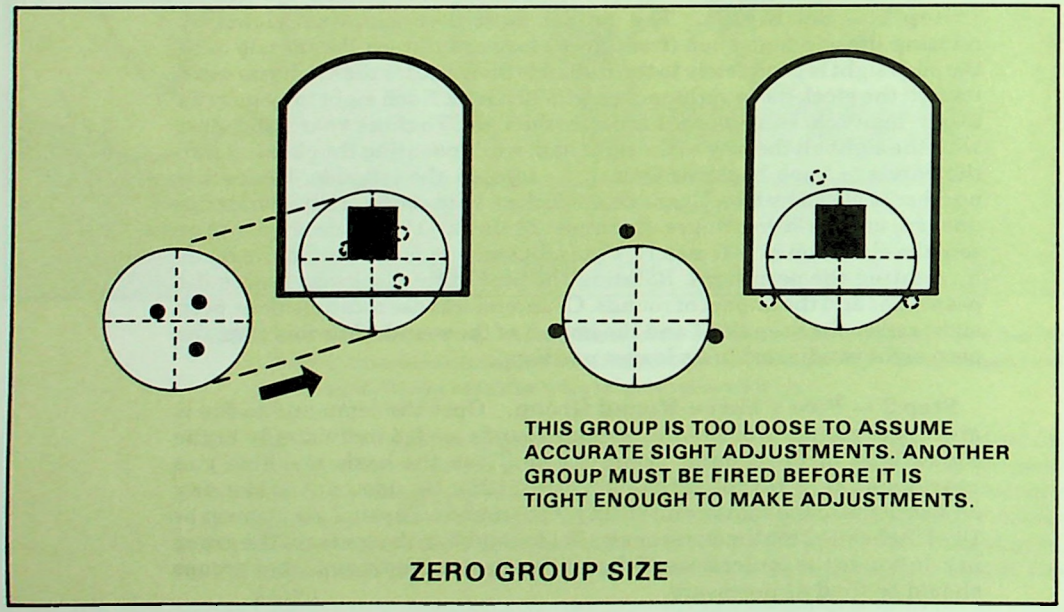
d. **TEN-METER ZEROING.** This is accomplished by adjusting the rear sight until the strike of the projectiles coincides with the point of aim at a given range. Zeroing the SAW on the basic machine gun range is accomplished by the following step-by-step procedure. The SAW will hit the point of aim at 10 meters when the range elevation knob (rear knob) is set at 500 meters.

Step 1 — Set Sights. The gunner must first center his sights by rotating the windage knob (front knob) forward toward the muzzle until the peep sight is completely to the right. He then rotates the knob rearward toward the stock (peep sight moves left) 12 clicks. Each sight may vary as to how many clicks are needed to center the sight. To check your sight, start with the sight all the way to the right and, while counting the clicks, rotate the windage knob backwards until it stops on the left side. Divide the number of clicks by two. Example: 24 clicks = 12 to center. If the number is uneven, use the larger figure. Example: 23 clicks = 11 + 12; use 12. He then sets the elevation at 500 meters. Fine adjustments for elevation are made by rotating the peep sight. Rotating the peep sight clockwise lowers the peep sight and the impact of rounds. Counterclockwise rotation of the peep sight raises the peep sight and the impact of the rounds. For this step, the peep sight is adjusted to its lowest position.

Step 2 — Fire a Three-Round Group. Once the command to fire is given, the gunner will fire three single rounds loaded individually at the center base of the aiming paster A1 or C1 on the basic machine gun marksmanship target (FSN 6920-078-5128). He does not make any adjustments to the sights while firing these rounds. The shot group must be 1 1/4 inches (3.2 centimeters) or smaller to establish the center of the group in relation to the center base of the aiming paster. Additional shot groups should be fired as necessary.



M60 MACHINE GUN 10-METER TARGET



THIS GROUP IS TOO LOOSE TO ASSUME ACCURATE SIGHT ADJUSTMENTS. ANOTHER GROUP MUST BE FIRED BEFORE IT IS TIGHT ENOUGH TO MAKE ADJUSTMENTS.

ZERO GROUP SIZE

Step 3 — Correct for Windage. If the center of the group is to the left or right of the black aiming paster, the gunner must correct for windage. To do this, he must turn the windage knob to move the peep sight in the direction of the desired change (moving the sight RIGHT moves the impact RIGHT; moving it LEFT moves the impact LEFT). Each click equals 1/2 mil, which moves the impact 1/2 centimeter at 10 meters (each aiming paster is 1 centimeter).

EXAMPLE: If the gunner sees that the center of the shot group is 2 centimeters (two black aiming pasters) to the left of the aiming point, he turns the windage knob four clicks in the direction of the aiming point (to the right) by rotating the windage knob towards the muzzle.

Step 4 — Correct for Elevation. If the center of the shot group is above the aiming point, the gunner has most likely fired with an incorrect sight picture (too high up on the aiming paster) and should refire, concentrating on the proper point-of-aim sight picture. A similar group fired with a proper sight picture indicates incorrect sight calibration and the weapon should be turned in for maintenance. If the center of the shot group is below the aiming point, the gunner will correct for elevation. He rotates the elevation knob to the 1,000-meter mark to make the peep sight easier to grasp. Each 180-degree turn of the peep sight equals 1/2 centimeter at 10 meters. Return the elevation setting to 500 meters after completing fine elevation adjustments.

Step 5 — Confirm. The gunner will fire another three-shot group (loaded singly) at A2 or C2 after making his corrections for windage and elevation. If the center of the group is still off the aiming point, he should make further adjustments as necessary. This procedure should continue until the group is centered on the point of aim.

Step 6 — Record Zero. Upon confirming his zero, the gunner must record his zero. He must count the number of clicks he moved his windage scale to the left (starting at the extreme right) and how many half turns up he moved the peep sight for elevation (starting from extreme bottom).

EXAMPLE: If after zeroing he turned the peep sight down seven half-turns, he would record UP7 and move the peep sight to its proper position seven clicks upward. If he had moved his windage knob two more clicks to the left after centering the sight, he would record 2L.

e. **FIELD ZEROING.** Gunners must be taught how to zero the SAW at long ranges in field and combat situations.

(1) To field zero the SAW, the gunner must first center the rear sight in the same manner as step 1 of 10-meter zeroing.

(2) He then selects a target at 300 to 500 meters and selects the appropriate meter mark with his elevation knob.

(3) The gunner fires a three-round burst and makes windage and elevation corrections as necessary. The gunner continues this process until rounds are impacting on the target.

NOTE: Each click of windage and elevation will move the impact of the round 0.16 meter or about 6 inches at 300 meters.

(4) If the impact of the rounds (beaten zone) is over the target, the gunner has most likely fired with an incorrect sight picture (too high on the target) and should refire concentrating on proper point of aim and sight picture. If the gunner again fails to zero with a proper sight picture, inspect the sight calibration of the front sight. There should be two threads showing on the front sight post. If not, have the unit armorer correct the calibration and the gunner repeat the zeroing procedure.

7-7. DISTRIBUTION OF FIRE

Distributed fire is fire in depth and width so that a target is effectively covered. The object of distributed fire is to place a heavy volume of fire between the known or suspected flanks of the target. The gunner places fire within the area of such a target by selecting successive aiming points within the target area and placing aimed fire onto each point. In the event that a gunner must engage targets with width or depth, he must be able to move the gun to distribute fire throughout the target area.

a. **TRAVERSING.** This is moving the muzzle of the weapon to the left or right to distribute fire laterally. The gunner will accomplish this by making minor changes in direction by shifting his shoulders slightly to the left or right. To make major changes, he must move his elbows and realign his body position to remain directly behind the weapon. After the muzzle has been moved, aimed fire is placed on the new point.

b. **SEARCHING.** This is moving the muzzle of the weapon up or down to distribute fire in depth. The gunner must move his elbows closer together (lowering the impact) or farther apart (raising the impact) to accomplish this. After the muzzle has been moved, aimed fire is placed on the new point.

7-8. OBSERVATION AND ADJUSTMENT OF FIRE

Gunners must observe and rapidly adjust their fire. Fires are observed by noting the strike of projectiles in the target area and the tracers in flight. To adjust fires, use the traversing and searching techniques discussed in the previous paragraphs.

7-9. RANGE CONFIGURATIONS

Ten-meter firing is conducted to teach the soldier techniques of shot grouping, zeroing, engagement of point and area targets, and distribution of fire. Transition range firing is a series of practical live-fire exercises that require the gunner to apply all the fundamentals of automatic weapon marksmanship learned in preparatory marksmanship training and 10-meter firing. It is on the transition range that the SAW gunner demonstrates his proficiency in automatic weapon marksmanship by engaging the types of targets he would be expected to engage in combat.

a. **TEN-METER FIRING (TABLES I, II, AND III).** The standard M60 machine gun 10-meter target (FSN 6920-078-5128) is used for this exercise.

(1) **Grouping and Zeroing.** Using the single aiming points at the top of the 10-meter target, the gunner fires three single-shot, shot groups for grouping and sight adjustments in determining his weapon's zero. This firing reinforces the dry-fire experience and allows the gunner loading practice while providing the most accurate and tight shot grouping obtainable with the SAW.

Table I. Basic (10-Meter) Markmanship - Bipod Firing

Time	Rounds per Firer	Target	Type Ammo	Type Fire
No limit	9	Basic Machine Gun Pasters 1, 2, & 3 (Section A or C)	Ball	Zeroing (single rounds)
No limit	3	Basic Machine Gun Paster 1 (Section B or D)	Ball	Fixed - one burst
No limit	3	Basic Machine Gun Paster 2 (Section B or D)	Ball	Fixed - one burst
No limit	3	Basic Machine Gun Paster 3 (Section B or D)	Ball	Fixed - one burst
No limit	15	Basic Machine Gun Pasters 5 - 6 (Section A or C)	Ball	Traverse & Search - 3 rounds per scoring paster
No limit	24	Basic Machine Gun Pasters 7 - 8 (Section A or C)	Ball	Traverse & Search - 3 rounds per scoring paster
Total	57			

(2) **Point Targets.** Using single targets at the top of the target (second section), the gunner fires three-round bursts using individual three-round belts of ammunition. This firing exposes the gunner to automatic fire and the action of the weapon, while at the same time introducing the short bursts to begin training trigger control.

(3) **Area Targets.** The gunner engages the target group 6 through 5 on the 10-meter target. This target group exposes the gunner to body position changes to engage targets in depth (elbow position changes)

and causes him to use a series of aiming points to disburse fire across the target.

The gunner engages the target group 7 through 8 on the 10-meter target. This target exposes the gunner to position changes to engage linear targets with depth and causes him to control the burst length from the weapon, use a series of aiming points, and disburse fire across the target.

Table II. Basic (10-Meter) Marksmanship - Bipod Firing, Qualification Practice

Time	Rounds per Firer	Target	Type Ammo	Type Fire
20 sec	15	Basic Machine Gun Pasters 5 - 6 (Section B or D)	Ball	Traverse & Search - 3 rounds per scoring paster
25 sec	24	Basic Machine Gun Pasters 7 - 8 (Section B or D)	Ball	Traverse & Search - 3 rounds per scoring paster
Total	39			

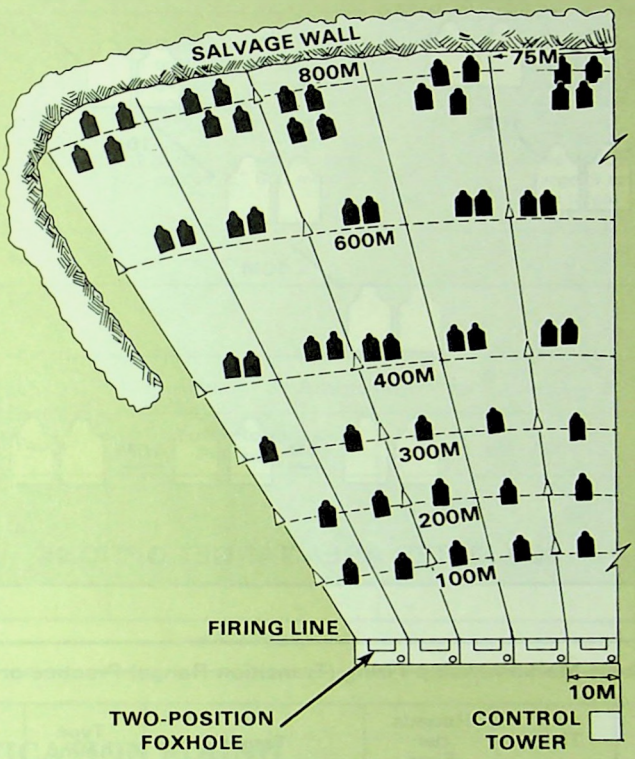
Table III. Basic (10-Meter) Marksmanship - Bipod Firing, Qualification

Time	Rounds per Firer	Target	Type Ammo	Type Fire
No limit	3	Basic Machine Gun Paster 1 (Section A or B)	Ball	Confirm Zero (single rounds)
20 sec	15	Basic Machine Gun Pasters 5 - 6 (Section A or B)	Ball	Traverse & Search - 3 rounds per scoring paster
25 sec	24	Basic Machine Gun Pasters 7 - 8 (Section A or B)	Ball	Traverse & Search - 3 rounds per scoring paster
Total	42			

b. **TRANSITION RANGE FIRING.** Transition firing (instructional and qualification) may be conducted using any of the range configurations in the following figure.

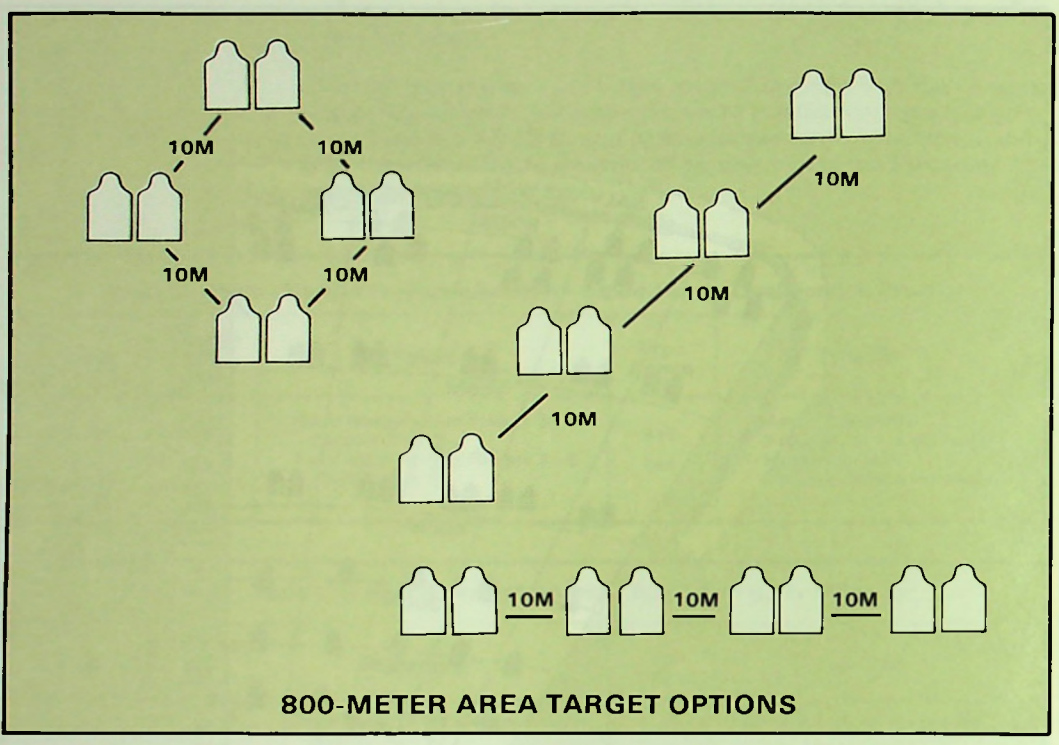
(1) **M16 Rifle Record Fire Range (Firing Table IV).** One-hundred-meter to 300-meter single E-silhouette targets are used. Targets at 50, 150, and 250 meters are not necessarily used.

(2) **M60 Machine Gun Transition Range (Table V).** This range can be used to engage point targets out to 600 meters. It will require a modification at the 800-meter line to support area target engagement.



RANGE CONFIGURATIONS

(3) **800-Meter Area Target.** This is a grouping of four target mechanisms, each supporting a double "E" target display. They are arranged in one of three configurations with 10-meter spacing between target mechanisms.



800-METER AREA TARGET OPTIONS

Table IV. Basic Marksmanship Firing (Transition Range) Practice or Qualification

Range	Time	Rounds per Firer	Target	Type Ammo	Type Fire
Confirmation of zero	No limit	9	300 or 400 meters	Ball	Three 3-round bursts
Subtable A 100-300 meters	25 sec	12	4 single "E" 100-300 meters	4-1	Fixed: 3-round burst per target
Subtable B 100-300 meters	30 sec	15	5 single "E" 100-300 meters	4-1	Fixed: 3-round burst per target
Subtable C 100-300 meters	30 sec	12	4 single "E" 100-300 meters	4-1	Fixed: 3-round burst per target
Subtable D 100-300 meters	40 sec	15	5 single "E" 100-300 meters	4-1	Fixed: 3-round burst per target

Total Rounds 117 - 63 Practice, 54 Qualification

Table V. Basic Marksmanship Firing (Transition Extended Range) Practice or Qualification

Range	Time	Rounds per Firer	Target	Type Ammo	Type Fire
Subtable A	75 sec	91	3 double "E" 400 meters 1 double "E" 600 meters 1 4-double "E" array at 800 meters	4-1	Fixed: 3-round burst per target, 5 to 7-round burst per target, traverse and search, 5 to 7-round burst at target
Subtable B	90 sec	50	3 double "E" 400 meters 1 double "E" 600 meters	4-1	Fixed: 3-round burst per target 5 to 7-round burst per target
Total Rounds 282 - 141 Practice, 141 Qualification					

Table VI. Recapitulation of Ammunition for Tables I - V

Table	Total Rounds Per Firer	Type of Ammo
I	57	Ball
II	39	Ball
III	42	Ball
IV	117	Ball and 4-1
V	282	4-1
Total 537 Rounds		

7-10. QUALIFICATION FIRING

Qualification firing is conducted in two phases: 10-meter firing and transition/record fire range.

NOTE: Two gunners can use one target by engaging either A and B or C and D sections.

a. TEN-METER QUALIFICATION FIRING (TABLE III)

(1) The gunner will fire three single rounds at an aiming paster on the top line of the target to establish a three-shot group and confirm his zero. If zero adjustments are needed, corrections should be made before firing another group.

(2) The gunner will then engage target group 5 through 6 with a 15-round belt of ammunition; he will be given 20 seconds for this group. He should fire a three-round burst at each target paster.

(3) The gunner will then engage target group 7 through 8 with a 24-round belt of ammunition; he will be given 25 seconds for this group. He should fire a three-round burst at each target paster.

(4) When scoring the target, only groups 5 through 6 and 7 through 8 are scored. One point is given for each hit, not to exceed three, in each scoring space. Holes touching the boundary of a scoring space are considered hits but can be counted in only one scoring space. When firing group 5 through 6, five scoring spaces are engaged with 15 rounds, with a possible score of 15 points. When firing group 7 through 8, eight scoring spaces are engaged with 24 rounds, with a possible score of 24 points. The total possible score of both groups is 39 points. A minimum of 23 points is required to qualify on the 10-meter range.

(5) Soldiers failing to achieve minimum standards must be retrained and retested in a dry-fire mode on tasks until proficiency is demonstrated. They may not move on to longer range firing. Soldiers should then refire the 10-meter portion, with close supervision and coaching to ensure that the fundamentals are applied properly during live fire and that they qualify.

b. TRANSITION RANGE QUALIFICATION RECORD FIRING (TABLES IV AND V)

(1) The gunner will fire subtables A, B, C, and D of Table IV, using 12-, 15-, 12-, and 15-round belts of ammunition respectively for each, from the prone position.

(2) The gunner will then fire subtables A and B of Table V, using 91 rounds for subtable A and 50 rounds for subtable B, from the prone position.

NOTE: Tables IV and V were prepared in their respective bands 100-300 and 400-800 to take advantage of current standard range configurations (M16A1 qualification and M60 transition ranges).

(3) One point is given for each target hit. The total possible transition range points is 27. A minimum of 15 points (15 out of 27 exposures) is required to qualify on the transition range.

7-11. QUALIFICATION STANDARDS

Qualification scores and ratings are as follows:

POSSIBLE	27
EXPERT	27 - 24
FIRST CLASS	23 - 20
SECOND CLASS	19 - 15
UNQUALIFIED	14 - Below

A scorecard (DA Form 5503-R) is used for recording the gunner's performance on the transition qualification range. Additionally, the scorecard provides for recording the gunner's 10-meter qualification score. This card, which will be reproduced locally on 8½ × 11-inch paper, is located at Appendix F.

7-12. UTILIZATION TRAINING

Utilization training on the SAW will encompass minimum essential instruction and firing to teach the soldier the functioning, loading, firing, clearing, immediate action, and general characteristics of the weapon. Utilization training and firing will incorporate significantly less time and ammunition. The gunner fires only the 10-meter practice fire (Table I) and the transition range practice fire (Tables IV and V A).

a. **TEN-METER FIRING (TABLE I)**

(1) The gunner conducts grouping and zeroing adjustments using single targets at the top of the target (Section A).

(2) Using single targets at the top of the target (Section B), the gunner fires three three-round bursts using individual three-round belts of ammunition.

(3) Using a 15-round belt, the gunner engages target group 6 through 5 in section A (average three rounds per subtarget).

(4) Using a 24-round belt, the gunner engages target group 7 through 8 in Section A (average three rounds per subtarget).

RECORD FIRE SCORECARD — For use of this form, see FM 23-14; the proponent agency is TRADOC.

FIRER'S NAME (LAST)	(FIRST)	(MI)	RANK	SSN	UNIT	ORDER
JACKSON	JOHN	M	PFC	123-45-6789	D Co	FIRST

WEATHER: RECORD FIRE CLEAR — TIME: RECORD FIRE (AM / PM) CROSS OUT ONE
10-METER OVERCAST — 10-METER (AM / PM) CROSS OUT ONE

TABLE III (10 METER)

PHASE	RANGE	SEC	HIT	MISS	NO FIRE
5-6	10M	20	11	4	
7-8	10M	25	18	6	

MINIMUM SCORE REQUIRED TO PROCEED IS 23

IV A 3	IV C 3	V A 4
IV B 4	IV D 4	V B 3

SUBTABLE IV A
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	200	5	✓		
2	300	10	✓		
3	100	10	✓		
	200			✓	
SUB-TOTAL			3	1	

SUBTABLE IV B
FIRING POINT NO

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	100	10	✓		
	200		✓		
2	100	20	✓		
	200			✓	
	300		✓		
SUB-TOTAL			4	1	

SUBTABLE IV C
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	300	10	✓		
2	200	15	✓		
	300			✓	
3	200	5	✓		
SUB-TOTAL			3	1	

10 METER AND QUALIFICATION RESULTS

RECORD FIRE SCORE	10-METER NO GO	10-METER GO
21	—	GO ✓(29)

QUALIFICATION: (CIRCLE ONE)
EXPERT (FIRST CLASS) SECOND CLASS UNQUALIFIED

SUBTABLE IV D
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	200	15	✓		
	300			✓	
2	300	10	✓		
3	100	15	✓		
	300		✓		
SUB-TOTAL			4	1	

SUBTABLE V A EXTENDED RANGE
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	400	15	✓		
2	800	30	✓		
3	400	30		✓	
	600		✓		
4	400	15	✓		
SUB TOTAL			4	1	

SUBTABLE V B EXTENDED RANGE
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	400	15	✓		
2	600	30	✓		
	400			✓	
3	400	15	✓		
SUB TOTAL			3	1	

QUALIFICATION SCORES AND RATING:

EXPERT	27-24
FIRST CLASS	23-20
SECOND CLASS	19-15
UNQUALIFIED	14 and below

DATA REQUIRED BY PRIVACY ACT OF 1974.
AUTHORITY: Executive order 9397. PRINCIPAL PURPOSE: Record of individual's SQUAD AUTOMATIC WEAPON (SAW) qualification score. ROUTINE USES: SSN will be used for positive identification only. DISCLOSURE: Voluntary. Individual not providing information cannot be rated scored.

OFFICER'S SIGNATURE
I.C TARGETS CPT INF

DA FORM 5503-R, DEC 85

b. TRANSITION RANGE FIRING (TABLES IV AND V A)

(1) Upon completing the 10-meter exercise, the gunner will proceed to the transition/qualification range where he will engage a series of single and multiple targets at ranges of 100 to 300 meters (Table IV). Table IV consists of four subtables in which five targets are presented. The gunner is provided 12-, 15-, or 12- and 15-round belts for each subtable as appropriate.

(2) Upon completion of Table IV, the gunner will relocate as required and fire Table V A (extended range). The targets presented are:

- SINGLE "E" AT 400 METERS
- FOUR DOUBLE "E" TARGET ARRAY 800 METERS
- DOUBLE "E" AT 400 METERS AND A DOUBLE "E" AT 600 METERS
- DOUBLE "E" AT 400 METERS.

NOTE: See range configurations for description of the target array. The gunner is provided 91 rounds to engage these targets. The 400-meter targets are engaged by one three-round burst. The 600- and 800-meter targets are engaged using burst fire (5-7 rounds per burst) with no more than 41 rounds expended per target. Any hit counts as successful engagement of the 600-meter double "E" or the 800-meter array.

APPENDIX A

Qualification Training Program

This appendix provides guidance for conduct and performance of unit training during preliminary instruction and marksmanship training, including a proficiency examination.

A-1. AREAS

The training program for unit training with the bipod-mounted SAW is subdivided into the following areas:

a. **INTRODUCTION**

b. **PRELIMINARY MARKSMANSHIP TRAINING AND DRY FIRE**

c. **PROFICIENCY (PERFORMANCE) EXAMINATION**

d. **TEN-METER PRACTICE AND QUALIFICATION**

e. **TRANSITION RANGE PRACTICE RECORD QUALIFICATION FIRING**

f. **TRANSITION RANGE QUALIFICATION FIRING.**

A-2. PERIOD 1 — INTRODUCTION (3-HOUR PERIOD)

After a brief description of the weapon, soldiers will receive the following instruction:

a. **DISASSEMBLY AND ASSEMBLY** (Reference TM 9-1005-201-10, Chapters 2 and 3)	**TIME ALLOWED**
(1) Detailed disassembly	25 minutes
(2) Operator maintenance	
(a) *Inspection*	10 minutes
(b) Cleaning	10 minutes
(c) Lubrication	10 minutes
(3) Detailed assembly	25 minutes

(4)	Detailed disassembly and assembly (practice exercise — optional).	50 minutes
	SUBTOTAL	130 minutes

b. **CHARACTERISTICS OF FIRE** (Reference Chapter 5)		**TIME ALLOWED**
(1)	Burst fire	15 minutes
(2)	Trajectory and beaten zone	15 minutes
(3)	Engagements of targets	
(a)	*Point*	10 minutes
(b)	*Area.*	10 minutes
	SUBTOTAL	50 minutes
	TOTAL	3 hours

A-3. PERIOD 2 — PRELIMINARY MARKSMANSHIP TRAINING AND DRY FIRE (3-HOUR PERIOD)

After a brief description of the training to be conducted, soldiers will receive the following instruction:

a. **TECHNIQUES OF FIRE WITH BIPOD-MOUNTED SAW** (Reference Chapter 7 and TM 9-1005-201-10, Chapter 2)		**TIME ALLOWED**
(1)	Position and grip, aiming, and trigger manipulation	30 minutes
(2)	Loading, reducing stoppages, and clearing the weapon	15 minutes
(3)	Magazine and belt ammunition loading	15 minutes
(4)	Zeroing procedures.	30 minutes
	SUBTOTAL	90 minutes

b. **DRY-FIRE PRACTICE**
(Reference Chapter 7)

(1)	Aiming/firing sequence	30 minutes
(2)	Sight setting and sight changes	30 minutes
(3)	Zeroing procedures.	30 minutes
	SUBTOTAL	90 minutes
	TOTAL	3 hours

A-4. PERIOD 3 — PROFICIENCY (PERFORMANCE) EXAMINATION (1-HOUR PERIOD)

This period is designed to test and evaluate tasks learned in Periods 1 and 2. The proficiency examination described in Appendix B is used for this period of instruction.

TOTAL 1 hour

A-5. PERIOD 4 — TEN-METER PRACTICE AND QUALIFICATION (4-HOUR PERIOD)

	INSTRUCTIONAL SUBPERIOD	TIME ALLOWED
(1)	Preparatory marksmanship (instruction including aiming, sight picture, trigger control, bipod position, and grip) (Reference Chapter 7)	30 minutes
(2)	Function checks, loading, immediate action, clearing, and range safety (Reference TM 9-1005-201-10 and local range regulations).	15 minutes

NOTE: The function check is conducted in two phases: first, cock the weapon with safety on and attempt to fire; second, place the weapon's safety on FIRE, hold back on the charging handle, and pull the trigger. The bolt should go forward.

INSTRUCTIONAL SUBPERIOD		TIME ALLOWED
(3)	Introduction to the 10-meter firing (includes group and zeroing on the 10-meter target and scoring of the target) (Reference Chapter 7)	15 minutes
(4)	Grouping and zeroing Table I (Reference Chapter 7)	1 hour
(5)	Practice record Table II (Reference Chapter 7)	1 hour
(6)	Record fire Table III (Reference Chapter 7).	1 hour
	TOTAL	4 hours

A-6. PERIOD 5 — TRANSITION RANGE PRACTICE RECORD QUALIFICATION FIRING (4-HOUR PERIOD)

INSTRUCTION		TIME ALLOWED
(1)	Introduction to field firing (includes the transition/qualification range organization and operation)	15 minutes
(2)	Fire standard qualification course for practice (in accordance with procedures contained in Chapter 7).	3 hours, 45 minutes
	TOTAL	4 hours

A-7. PERIOD 6 — TRANSITION RANGE QUALIFICATION FIRING (4-HOUR PERIOD)

Soldiers will fire the standard qualification course for record in accordance with procedures contained in Chapter 7.

TOTAL 4 hours

SUMMARY OF HOURS		SUMMARY OF AMMUNITION REQUIRED FOR QUALIFICATION	
Period 1	3	Period 4 (Tables I, II and III)	138 rounds
Period 2	3		

Period 3	1
Period 4	4
Period 5	4
Period 6	4
TOTAL	19 hours

Period 5 (Table IV)	63 rounds
(Table V)	141 rounds
Period 6 (Table IV)	54 rounds
(Table V)	141 rounds
TOTAL	537 rounds

APPENDIX B

Proficiency (Performance) Examination

This appendix provides a guide for administering the proficiency examination to gunners. The purpose of this examination is to determine whether the soldier can perform all the tasks taught in the dry-fire training.

B-1. DRY-FIRE PROFICIENCY EXAMINATION

a. The examination is a practical nonfiring exercise given during the last period of the SAW block of instruction prior to range firing. It is not required that it be conducted on a range, and it may be held indoors if available facilities will permit. The soldier will be required to demonstrate proper techniques for the following tasks:

(1) Sight setting

(2) Loading

(3) Obtaining the proper firing position

(4) Obtaining the proper sight picture

(5) Trigger control (press and release)

(6) Steady holding through the burst

(7) Application of immediate action

(8) Re-engagement of the target

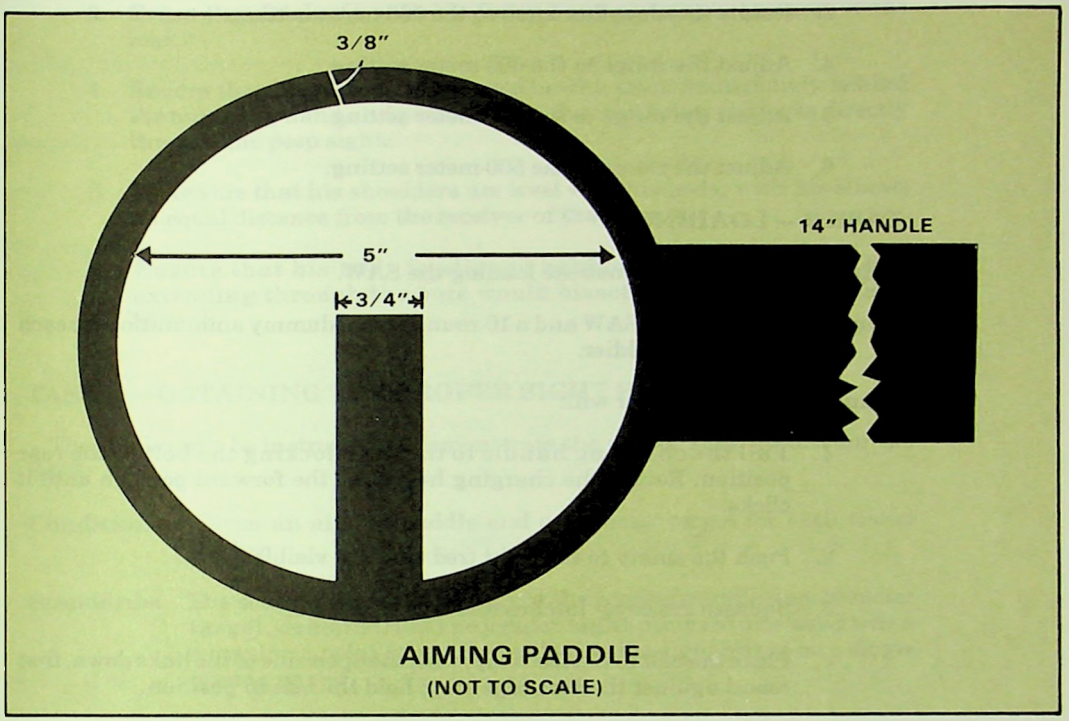
(9) Distribution of fire

(10) Applying the adjusted point of aim

(11) Unloading and placing the SAW on SAFE.

b. In the conduct of this examination, tasks 1, 2, 3, 5, 6, 7, and 11 are performed with the SAW. This can be conducted using the coach-and-pupil method, with an instructor or assistant instructor supervising no more than 10 pairs.

c. Tasks 4, 8, 9, and 10 are performed using a 10-meter target and an aiming paddle containing the front and rear sight image. The aiming paddle will be locally reproduced in accordance with the dimensions in the following figure.



AIMING PADDLE
(NOT TO SCALE)

B-2. TASKS

TASK 1 — SIGHT SETTING

Each soldier will be instructed to set his sight on the proper starting position for zeroing on the 10-meter range. He will then be required to adjust the sight to 600 meters, then 300 meters, and then return the sight to the starting position.

Conditions: Given a SAW for each tested soldier.

Standards: The soldier will, without error:

1. Determine the total number of clicks of windage available on the sight going from extreme right to extreme left, and then position the rear sight at the numerical center by counting the clicks.

2. Rotate the elevation knob to the 1,000-meter setting; grasp the peep aperture and rotate it to the bottom position.

3. Rotate the elevation knob to the 500-meter setting.

4. Adjust the range to the 600-meter setting.

5. Adjust the range to the 300-meter setting.

6. Adjust the range to the 500-meter setting.

TASK 2 — LOADING

Each soldier will demonstrate loading the SAW.

Conditions: Given a SAW and a 10-round belt of dummy ammunition for each tested soldier.

Standards: The soldier will:

1. Pull the charging handle to the rear, locking the bolt in the rear position. Return the charging handle to the forward position until it clicks.

2. Push the safety to the right (red ring not visible).

3. Squeeze the cover latches and raise the cover.

4. Place the belt in the feed tray, with the open side of the links down, first round against the cartridge stop; hold the belt in position.

5. Close the cover.

6. Check the cartridge indicator — it should stick up above the top of the left side of the cover.

TASK 3 — OBTAINING THE PROPER FIRING POSITION

The soldier wil be instructed to demonstrate the proper firing position and hold.

Conditions: Given a SAW for each tested soldier.

Standards: The soldier will:

1. Assume a prone position, placing the folding shoulder rest on the right shoulder.

2. Grasp the stock immediately behind the receiver with the thumb and fingers of his nonfiring hand around the stock, and place firm pressure down and to the rear.

3. Grasp the pistol grip with his firing hand and apply pressure to the rear.

4. Ensure that his head is positioned on the stock immediately behind the nonfiring hand and positioned so that the firing eye looks directly through the peep sight.

5. Make sure that his shoulders are level with his body, with his elbows an equal distance from the receiver of the weapon.

6. Ensure that his body is aligned behind the bore so that a line extending through the bore would bisect his right shoulder and buttock.

TASK 4 — OBTAINING THE PROPER SIGHT PICTURE

The soldier will be instructed to demonstrate the proper sight picture for the SAW.

Conditions: Given an aiming paddle and a 10-meter target for each tested soldier.

Standards: The soldier will, with the aid of the aiming paddle and 10-meter target, demonstrate the proper sight picture to be used when engaging a point target by overlaying the sight image on a single aiming paster.

TASK 5 — TRIGGER CONTROL

The soldier will demonstrate trigger control to be used in burst fire.

Conditions: Given a SAW and a 10-round belt of dummy ammunition for each tested soldier.

Standards: The soldier will demonstrate the trigger pull and release, and the appropriate short burst. Hold is accomplished by holding for a 1-second count.

TASK 6 — STEADY HOLD THROUGH BURST

See Task 8.

TASK 7 — APPLICATIONS OF IMMEDIATE ACTION

See Task 8.

TASK 8 — RE-ENGAGE THE TARGET

The soldier will be instructed to fire five simulated bursts using proper holding techniques and applying immediate action between bursts.

Conditions: Given a SAW, a 10-meter target, and a five-round belt of dummy ammunition for each tested soldier.

Standards: The soldier will:

1. Demonstrate proper steady holding through each burst with imperceptible weapon movement, except for that caused by the loading and firing action of the mechanism.

2. Demonstrate immediate action by grasping the charging handle with the firing hand, palm up, pulling it completely to the rear, ejecting the dummy cartridge, and returning it forward until it clicks.

3. Reacquire a sight picture and steady hold on the target.

TASK 9 — DISTRIBUTION OF FIRE

Each soldier will be instructed to demonstrate the proper techniques for distribution of fire on a linear target.

Conditions: Given an aiming paddle and a 10-meter target for each tested soldier.

Standards: The soldier will demonstrate, with the aiming paddle, the acquisition of successive aiming points in the target area, by overlaying the sight image on each of the scoring spaces in target groups 7 through 8.

TASK 10 — APPLYING THE ADJUSTED POINT OF AIM

Each soldier will be instructed to demonstrate proper aiming techniques when utilizing the adjusted point of aim method.

Conditions: Given an aiming paddle and a target with beaten zones in high right, low left, low, and high positions for each tested soldier.

Standards: The soldier will show the correct adjusted point of aim for each of the misplaced beaten zones.

1. Aim low left in the same amount that the high right beaten zone is off the aiming point.

2. Aim high right in the same amount that the low left beaten zone is off the aiming point.

3. Aim high in the same amount that the low beaten zone is off the aiming point.

4. Aim low in the same amount that the high beaten zone is off the aiming point.

TASK 11 — UNLOADING AND PLACING THE SAW ON SAFE

Conditions: Given a SAW loaded with dummy ammunition for each tested soldier.

Standards: The soldier will demonstrate:

1. Placing the safety on by pushing the button to the right (red ring not visible).

2. Raising the cover.

3. Removing the belt of dummy ammunition.

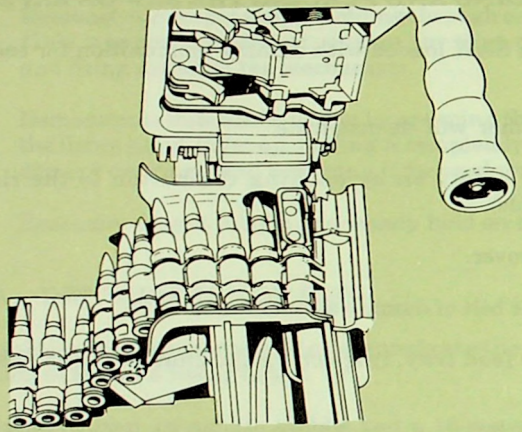
4. Raising the feed tray, inspecting the chamber, and ensuring it is clear.

5. Lowering the feed tray, closing the cover assembly, and pushing the safety to the left (red ring visible). Holding the cocking handle to the rear, depressing the trigger, and riding the bolt forward to close and lock it.

APPENDIX C

Ammunition

This appendix describes the ammunition to be used in the M249 SAW. The ammunition is issued in a disintegrating, metallic, split-linked belt.



5.56-mm AMMUNITION IN METALLIC BELT

C-1. CLASSIFICATION

M249 SAW ammunition is classified as follows:

a. **BALL CARTRIDGE** — for use against light materials and personnel, and for range training.

b. **TRACER CARTRIDGE** — for observation of fire, incendiary effects, signaling, and use during training.

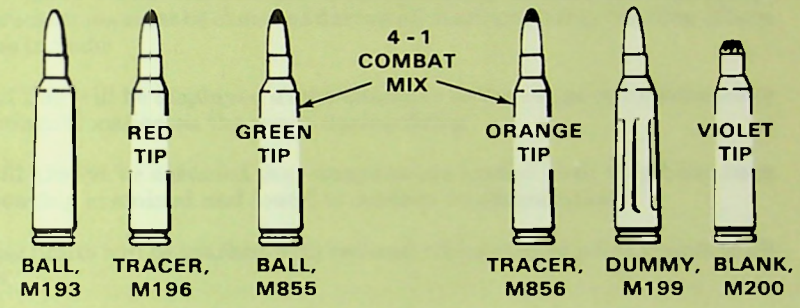
c. **DUMMY CARTRIDGE** — for use during mechanical training.

d. **BLANK CARTRIDGE** —for use during training when simulated live fire is desired. A blank firing attachment must be used to fire this ammunition.

C-2. IDENTIFICATION

a. The 5.56-mm NATO cartridge may be identified by its appearance, the painting of the projectile tips, the stamping of the manufacturer's initials and year of manufacture on the base of the cartridge case, and the markings on the packing containers.

b. When removed from the original packing container, the cartridge may be identified by its physical characteristics.



CARTRIDGES FOR THE M249 SAW

C-3. STORAGE

Ammunition should be stored under cover. If it is necessary to leave ammunition in the open, keep it at least 15 centimeters (6 inches) from the ground and cover with a double thickness of tarpaulin. Place the cover so that it protects the ammunition and allows ventilation. Dig trenches to prevent water from flowing under the ammunition.

C-4. CARE, HANDLING, AND PRESERVATION

a. Ammunition containers should not be opened until the ammunition is to be used. Ammunition removed from the airtight containers, particularly in damp climates, is likely to corrode.

b. Protect ammunition from mud, dirt, and water. If ammunition gets wet or dirty, wipe it off before using. Wipe off lightly corroded cartridges as soon as the corrosion is discovered. Heavily corroded cartridges, dented cartridges, and cartridges with loose projectiles should not be fired.

c. Do not expose ammunition to the direct rays of the sun. If the powder is hot, excessive pressure may be developed when the round is fired.

d. Do not oil ammunition. If it is oiled, dust and other abrasives will collect on it and possibly damage the operating parts of the weapon.

C-5. PACKAGING

Ammunition is packaged in a plastic box containing one bandoleer. Each bandoleer contains 200 rounds and weighs approximately 6.92 kilograms (15.22 pounds). Ammunition in the bandoleer may be removed for firing.

APPENDIX D

Safety

This appendix recommends safety precautions for the ranges described in this manual, but this information is not intended to replace AR 385-63 or local regulations. Range safety requirements will vary because of the different requirements of the courses of fire.

D-1. SAFETY PRECAUTIONS

Safety precautions must be observed during all marksmanship training. These precautions include:

a. A red flag will be displayed at the entrance to the range or in some other prominent location on the range during firing.

b. It will always be assumed that weapons are loaded until they have been thoroughly examined and found to contain no ammunition.

c. Firing limits will be marked with red-and-white-striped poles visible to all firers.

d. Obstructions will never be placed in the muzzles of weapons about to be fired.

e. When not in use, all weapons will be kept in a prescribed area with proper safeguards.

f. No smoking will be permitted near ammunition, explosives, or flammables.

g. Hearing protection devices will be worn by all personnel during firing.

D-2. RANGE PROCEDURES

The range can be a dangerous place, especially if safety procedures are not followed. Everyone must stay alert and adhere to the following precautions.

a. BEFORE FIRING

(1) All prescribed roadblocks and barriers will be closed and necessary guards posted.

(2) All weapons will be checked to ensure that they are clear of ammunition and obstructions, and that the covers are UP to show they are cleared.

(3) All personnel will be briefed on the firing limits of the range and firing lanes.

(4) Range clearance will be obtained from the installation range-control office.

(5) The downrange area will be checked before firing to ensure that all personnel and equipment are clear of the area.

(6) A complete first-aid kit will be on the range.

(7) Medical personnel will be located on or near the range where they can be contacted quickly.

(8) All weapons will be checked by an officer or noncommissioned officer to ensure that they are operational.

(9) Weapons will not be handled except on command from the tower operator or the officer in charge.

(10) Ammunition will be drawn and issued only on command of the officer in charge. When two or more lots of ammunition are used for firing, the officer in charge must ensure that the lots are separated and properly identified so that identification can be made by lot numbers in case of an accident or malfunction.

(11) All ammunition must be protected from the direct rays of the sun.

(12) No one will move forward of the firing line without permission of the tower operator, safety officer, or officer in charge.

b. DURING BASIC FIRING

(1) Should an unsafe condition be noted during firing, the person noting the condition will immediately call, CEASE FIRE. Firing will not resume until directed by the officer in charge.

(2) During basic firing, all personnel on the range must be aware of the danger in moving forward of the firing line to score their targets. Before the firing line is clear and anyone is allowed forward, all SAWs will be cleared by the officer in charge or the safety officer.

(3) In clearing the SAW, the gunner pulls the cocking handle to the rear, places the safety lever on the SAFE position, and pushes the cocking handle forward. He then raises the cover and inspects the tray assembly and chamber. If it is clear, he declares, CHAMBER CLEAR. An assistant instructor (officer) then runs a cleaning rod through the

barrel until he sees the end of the rod in the receiver; he then withdraws it. If the gun is clear, the gunner pulls the cocking handle to the rear, places the safety lever in the FIRE position, pulls the trigger, and eases the bolt forward. After the bolt has gone forward, he places the safety lever on the SAFE position, and the procedure is complete.

c. WHEN FIRING DURING DARKNESS

The following special precautions apply:

(1) The downrange area will be checked before firing to ensure that all personnel and equipment are clear of the area. This will be done by asking three times over a public address system, IS THERE ANYONE DOWNRANGE? Pause each time long enough to permit a response.

(2) A blinking red light must be used in addition to the red flag. It should be displayed at the entrance to the range or at some other prominent location.

(3) Two red lights will be mounted on the striped poles marking the limits of fire. They must be visible to all firers.

(4) No one will move from position until told to do so by the officer in charge.

d. AFTER FIRING

(1) Safety personnel will inspect all weapons to ensure that they are clear. A check will be conducted to determine if troops have any brass, links, or live ammunition.

(2) When weapons have been cleared, they will be kept in a prescribed area with the bolt forward, safety lever on the SAFE position, and the feed cover raised.

APPENDIX E

M249 SAW in Air Defense

This appendix describes the use of the M249 SAW in an air defense role, including the concept and two techniques for applying lead. Also discussed are the rules of engagement and firing positions.

E-1. PASSIVE AND ACTIVE MEASURES

a. A unit can take passive and active measures to defend itself against enemy air attack. Passive measures are those that help the unit identify enemy aircraft before the aircraft locate the unit, make the unit difficult to locate, and make the unit less vulnerable when attacked. The unit must develop and practice camouflage as a passive measure. Concealment from the air must be considered when selecting routes of travel or defensive positions. The use of air guards is important to give the unit time to react. Air guards should be used to cover interlocking sectors of visible airspace.

b. Active measures for appropriate reactions to an air attack should be prescribed in unit SOPs. Each of the two techniques for applying lead (discussed below) is based on delivering a heavy volume of fire ahead of the target. Accuracy is not the major concern. The idea is to have every soldier in the unit engage the target. To achieve volume fire, soldiers armed with SAWs should fire at the cyclic rate.

c. Although volume fire is the key and accuracy is not the major concern, there is a need to get the fire coordinated and accurate.

d. If an aircraft is attacking his position, the soldier sees the aircraft in a head-on or diving view. To engage this aircraft, the soldier would fire slightly above its nose. Adjacent units would see the aircraft in a crossing view. To engage the aircraft, these units would have to apply a proper lead. The method of applying lead depends on the technique used.

   (1) The first technique is the football-field technique, used primarily in the offensive. When engaging high-performance aircraft (those flying in excess of 200 miles per hour), gunners should apply a one-football-field lead in front of the target and fire at the cyclic rate until the target passes through the tracer stream. If the target is a low-performance aircraft, such as a helicopter, with a speed of 200 miles per hour or less, gunners should apply half a football-field lead in front of the target, again firing the cyclic rate. With all soldiers firing, a curtain of fire is formed because of slight differences in each soldier's estimate of the distance and lead (football-field lead).

(2) The next technique is the reference-point technique, used primarily in the defense. The unit leader designates terrain features as reference points. Upon spotting enemy aircraft, the leader commands, ENEMY AIR, REFERENCE POINT 1. At this time, the SAW gunner points his weapon at reference point 1, elevates it approximately 45 degrees above the ground, and fires on command. Once a gunner sights the target, he can make minor adjustments to align his fire on the target.

E-2. RULES OF ENGAGEMENT

a. When planning for air defense, it is important to consider the use of tracers so that the gunner can observe the tracer stream and better align his fire on the target.

b. A unit may engage an attacking aircraft without command. If an aircraft is not attacking, the unit may not fire on it unless ordered to fire. The unit leader will have the authority to make the decision to fire, and the decision will be based on the estimate of situation, guidance from higher headquarters, and identification of the aircraft as hostile.

E-3. FIRING POSITION

When firing the SAW in an air defense role, the gunner should fire from a protected position if possible. He must get the weapon pointed in the air and choose a firing support. In an emergency, another soldier can act as a hasty firing support. In the offensive, the hip firing position is recommended.

APPENDIX F

Blank Form

This appendix provides a blank copy of DA Form 5503-R (Record Fire Scorecard.) This form is not available through normal supply channels. It may be reproduced locally on 8½ × 11 inch paper.

RECORD FIRE SCORECARD — For use of this form, see FM 23-14; the proponent agency is TRADOC.

FIRER'S NAME (LAST) (FIRST) (MI) RANK SSN UNIT ORDER

WEATHER: RECORD FIRE _____ TIME: RECORD FIRE (AM PM) CROSS OUT ONE
10-METER _____ 10-METER (AM PM) CROSS OUT ONE

TABLE III (10 METER)

PHASE	RANGE	SEC	HIT	MISS	NO FIRE
5-6	10M	20			
7-8	10M	25			
MINIMUM SCORE REQUIRED TO PROCEED IS 23					

IV A	IV C	V A
IV B	IV D	V B

SUBTABLE IV A
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	200	5			
2	300	10			
3	100 200	10			
SUB-TOTAL					

SUBTABLE IV B
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	100 200	10			
2	100 200 300	20			
SUB-TOTAL					

SUBTABLE IV C
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	300	10			
2	200 300	15			
3	200	5			
SUB-TOTAL					

10 METER AND QUALIFICATION RESULTS

RECORD FIRE SCORE	10-METER NO GO	GO

QUALIFICATION: (CIRCLE ONE)

EXPERT, FIRST CLASS, SECOND CLASS, UNQUALIFIED

OFFICER'S SIGNATURE

SUBTABLE IV D
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	200 300	15			
2	300	10			
3	100 300	15			
SUB-TOTAL					

SUBTABLE V A EXTENDED RANGE
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	400	15			
2	800	30			
3	400 600	30			
4	400	15			
SUB-TOTAL					

SUBTABLE V B EXTENDED RANGE
FIRING POINT NO.

PHASE	RANGE	TIME (SEC)	HIT	MISS	NO FIRE
1	400	15			
2	600 400	30			
3	400	15			
SUB-TOTAL					

QUALIFICATION SCORES AND RATING:

EXPERT	27-24
FIRST CLASS	23-20
SECOND CLASS	19-15
UNQUALIFIED	14 and below

DATA REQUIRED BY PRIVACY ACT OF 1974

AUTHORITY: Executive order 9397. PRINCIPAL PURPOSE: Record of individual's SQUAD AUTOMATIC WEAPON (SAW) qualification score. ROUTINE USES: SSN will be used for positive identification only. DISCLOSURE: Voluntary. Individual not providing information cannot be rated/scored.

DA FORM 5503-R, DEC 85

References

REQUIRED PUBLICATIONS

Required publications are sources that users must read in order to understand or to comply with this publication.

Technical Manuals (TMs)

9-1005-201-10	Operator's Manual Machine Gun, 5.56-mm, M249

Department of the Army Forms (DA Forms)

DA Form 5503-R	Record Fire Scorecard

RELATED PUBLICATIONS

Related publications are sources of additional information. They are not required in order to understand this publication.

Army Regulations (ARs)

385-10	Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat

Field Circulars (FCs)

23-10	Basic Marksmanship Training Bipod Mounted Squad Automatic Weapon (SAW)

Field Manuals (FMs)

21-26	Map Reading
21-40	NBC (Nuclear, Biological and Chemical) Defense
21-60	Visual Signals

Technical Manuals (TMs)

3-22	Fallout Prediction

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By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

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Brigadier General, United States Army
The Adjutant General

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