Preliminary Marksmanship Instruction and Evaluation

Automatic Rifle - M249 Series

TC 3-22.249

Safe Weapons Handling

Rules of Firearms Safety

Standardized for any weapon a Soldier may employ

- Rule 1: Treat every weapon as if it is loaded
- Rule 2: Never point the weapon at anything you do not intend to destroy
- Rule 3: Keep finger straight and off the trigger until ready to fire
- Rule 4: Ensure positive identification of the target and its surroundings

Safe Weapons Handling

Weapon Safety Status

Standard code using common colors to represent level of readiness. Represents specific series of actions applied.

- Green: Bolt locked forward, fire/safe selector on FIRE. Feed tray and cover assembly closed. No ammunition.
- Amber: The M249-series machine gun **does not have** an amber status. Only aviation units may HALF-LOAD door mounted systems on Army aircraft.
- Red: Ammunition loaded on feed tray, bolt open and locked rearward, fire/safe selector on SAFE.
- Black: Red plus selector on FIRE, awaiting command to engage. Follow unit ROE and/or SOP.

Safe Weapons Handling

Weapons Control Status

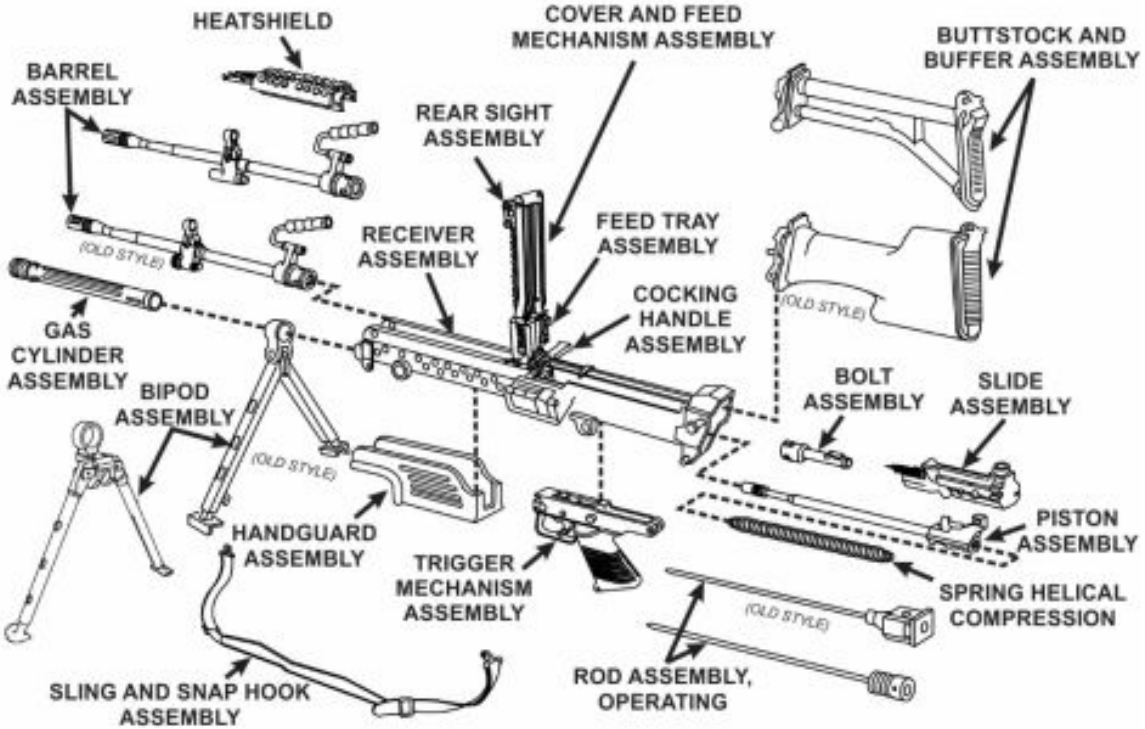
Tactical method of fire control given by a leader incorporating the situation, ROE, and anticipated enemy contact.

- Weapons Hold: Engage only if engaged or ordered to engage.
- Weapons Tight: Engage only if target is positively identified as enemy.
- Weapons Free: Engage targets not positively identified as friendly.

Principles of Operation

Major Components

The M249 is a gas-operated, belt-fed, air-cooled, fully automatic weapon that fires from the open-bolt position.



Principles of Operation

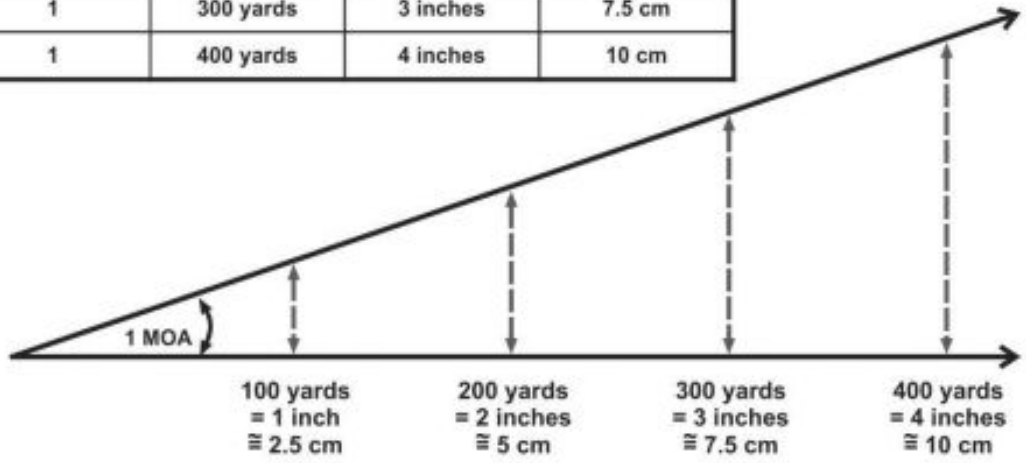
Technical Data

OLD STYLE BARREL	NEW MONO BLOCK BARREL
Carrying handle: Folding (three position)	Integral gas collar and gas regulator has no parts to disassemble.
Compensator: Minimizes muzzle flash, reduces and lessens muzzle climb.	
Gas collar: Setting has no effect on cyclic rate. Only function is to lock gas regulator into barrel assembly.	
M249 WITH EQUIPMENT	**M249 WITH EQUIPMENT (AR)**
Equipped with sling assembly and two each magazine and cartridge.	**Automatic Rifles are individual, not crew-served** **They are NOT indended for sustained fire** **Use and maneuver with a team**

Aiming Devices

Units of Angular Measurement - MOA

MOA	At Distance	Equals	
1	100 yards	1 inch	2.5 cm
1	200 yards	2 inches	5 cm
1	300 yards	3 inches	7.5 cm
1	400 yards	4 inches	10 cm



Angle dimension exaggerated for clarity. Examples are not to scale. Centimeter (cm) conversions are approximate.

MINUTE OF ANGLE (MOA) Unit of Measeurement	
There are 360 degrees in a circle.	There are 60 MOA in a degree.
There are 21,600 MOA in a circle.	1 MOA at 100 yards ≈ 1 inch.
Smaller measurements of an MOA are described in fractions, not seconds (i.e., 1/2 MOA).	

Aiming Devices

Units of Angular Measurement - MOA

Rifle shooting is often measured in Minutes of Angle

60 Minutes of Angle per degree

21,600 Minutes of Angle per circle/revolution

1 MoA at 300 yards = π inches

Simplify this by rounding off:

100 yards: 1 MoA ≈ 1 inch (1.0471)

200 yards: 1 MoA ≈ 2 inches (2.0943)

300 yards: 1 MoA ≈ 3 inches (3.14159)

1000 yards: 1 MoA ≈ 10 inches(10.471)

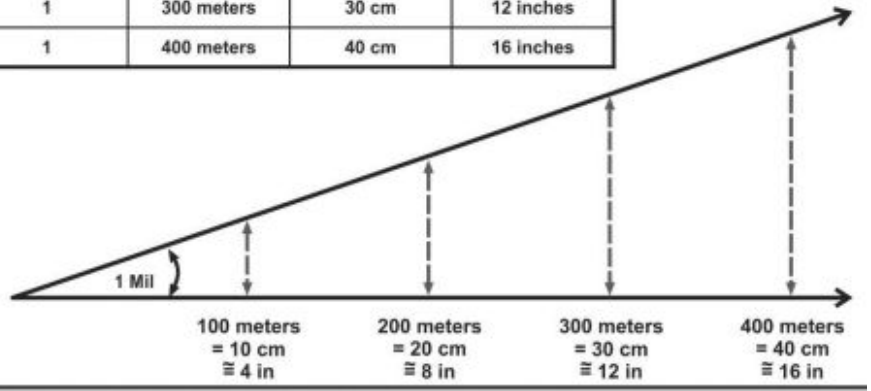
Aiming Devices

Units of Angular Measurement - Mils (milliradians)

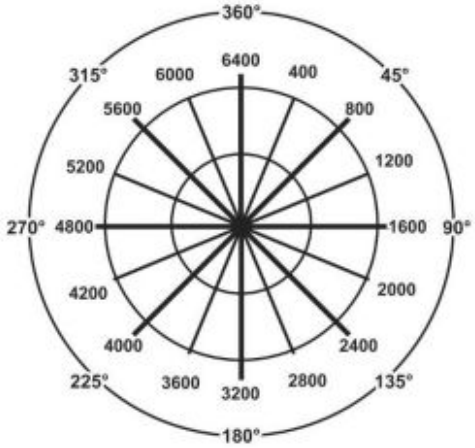
The mil is a common unit of angular measurement that is used in direct fire and indirect fire applications.

Check Technical Manual for your sight to know adjustments

Mil	At Distance	Equals	
1	100 meters	10 cm	4 inches
1	200 meters	20 cm	8 inches
1	300 meters	30 cm	12 inches
1	400 meters	40 cm	16 inches



MILS Unit of Measurement	
There are 360 degrees in a circle.	There are 17.78 mils in a degree.
There are 6400 mils in a circle	1 mil at 100 meters = 10 cm.



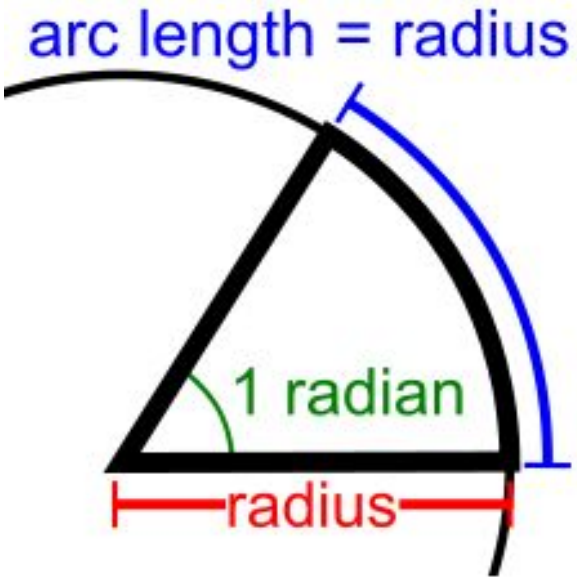
Aiming Devices

Units of Angular Measurement - Mils

Gunnery is often measured in Mils, increasingly popular for precision rifle

Mil (mrad) is short for milliradian

A circle (360 degrees) is 2 π radians



Aiming Devices

Units of Angular Measurement - Mils

"Milli-" prefix is 1/1000

Shortened to Mil, mil, or mrad

2000π milliradians = 2π radians

360 degrees = 6.283 radians = 6283 mils

1 Mil = 3.43 MoA (≈ 3.5 MoA ≈≈ 4 MoA)

Aiming Devices
Units of Angular Measurement - Mils

6283 mils are the true unit of angular measurement

1 mil subtends 1/1000 of the distance (radius)

Telescopic sight manufacturers using rangefinding reticles (e.g., mil dots) use this

There is NO difference between Army and Marine mils

6400 mils in NATO countries (“artillery mils”)

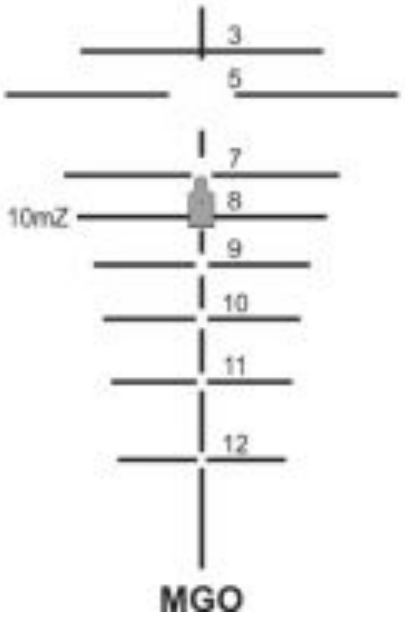
6000 mils in the former Soviet Union and Finland

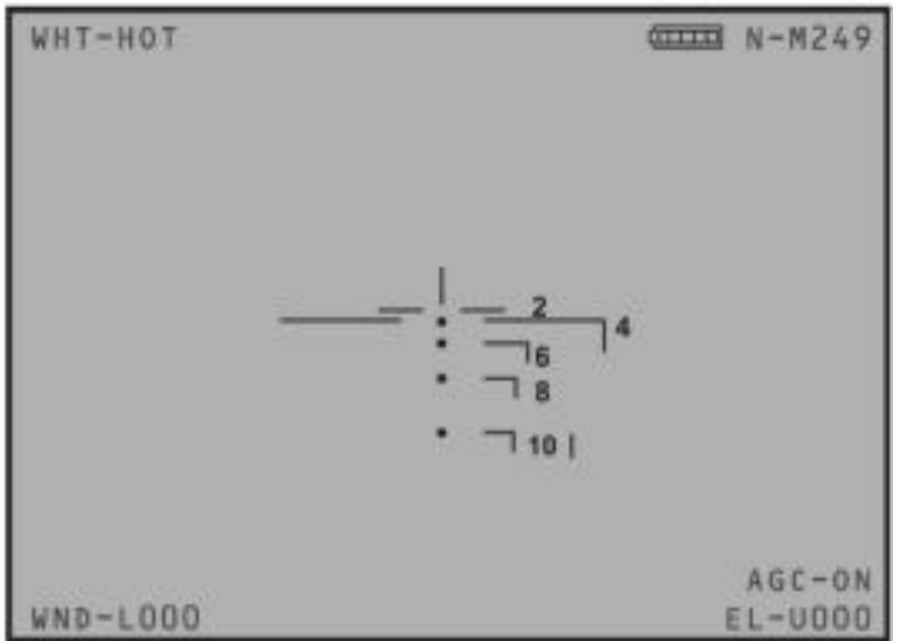
6300 mils in Sweden (streck, or “line")

Aiming Devices

Ballistic Reticles

A series of fine lines in the eyepiece used for aiming at varying distances and measuring for range estimation. Can be MOA or mils.

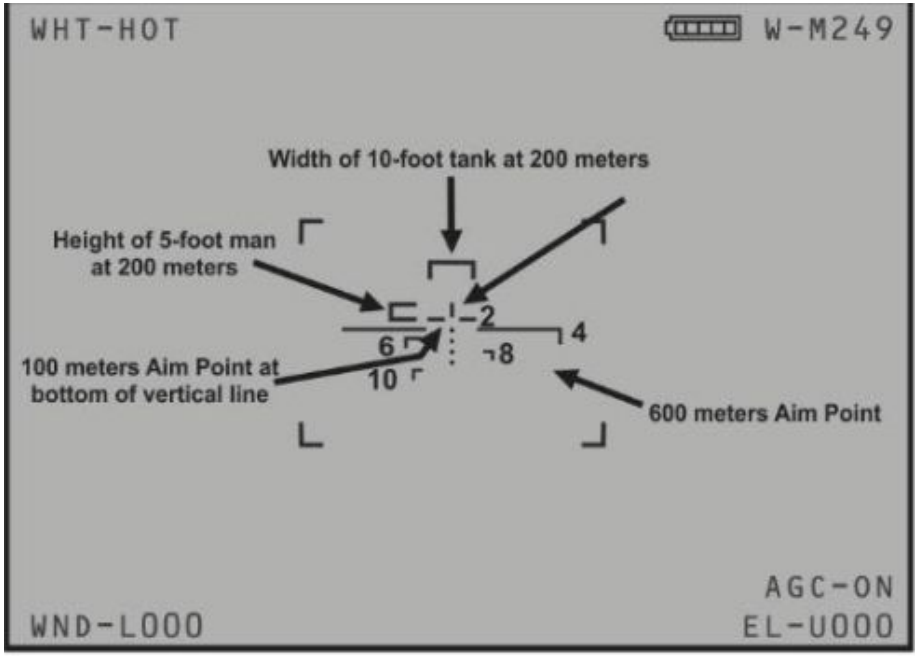




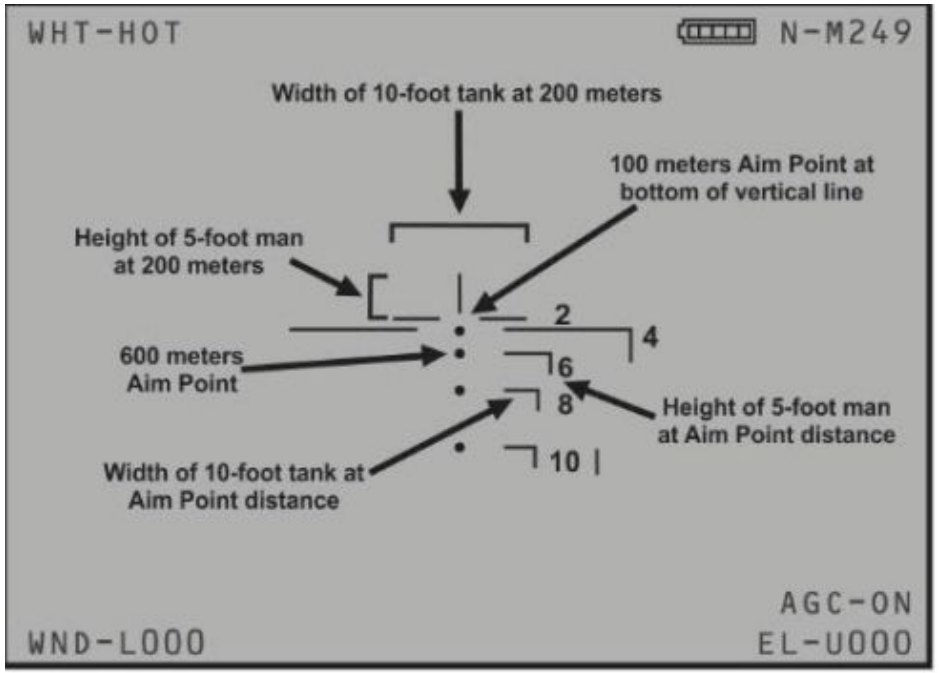
Aiming Devices

Stadia Reticles

Vertical and horizontal lines reflect size of vehicles, personnel, etc. at distance.
Placed next to a series of aim points (dots here) for different ranges.



WFOV



NFOV

Aiming Devices

Iron Sights

Rear sight adjusts elevation and windage/azimuth

- Elevation: Twist rear peep. 1 full turn/revolution = 1 mil (~4 MOA)
- Windage: 1 click = 0.5 mil (~2 MOA)
- POI in same direction sight moves.

Rear sight elevation knob adjusts for range AFTER zero

700m = 10m zero

400m = 25m zero

IRON SIGHT

FUNCTION	SINGLE CLICK	
ZERO WINDAGE	M249	White Line
ZERO ELEVATION	M249	400 (25 meters) / 700 (10meters)
WINDAGE	M249	0.5 cm at 10 Meters
ELEVATION (RANGE)	M249	0.5 cm at 10 Meters

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Aiming Devices

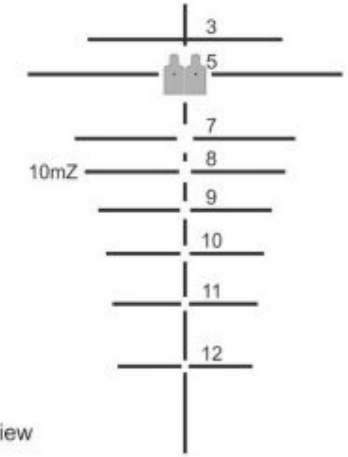
M145 MGO

- 100m Bullet Drop Compensator
- Double target (1 meter) wide
- Clicks: 0.25 mil ~ 1 MOA
- Illuminated reticle (battery)
- 10mZ/800: Aim point for 10 mete zero and 800 meters
- Elcan (Canada) made sight

M145 STRAIGHT TELESCOPE		
DIMENSIONS		
LENGTH	7.0 in	17.8 cm
BATTERY LIFE	175 hours average (New Battery)	
WEIGHT	24 oz	681 g

FUNCTION	SINGLE CLICK	
	10 METERS	500 METERS
ZERO WINDAGE	2.5 mm	5 inches
ZERO ELEVATION	2.5 mm	5 inches

RETICLE



NOTE: 500 m reticle view

LEGEND

cm	centimeters	in	inches	mZ	meter zero
g	grams	mm	millimeters	oz	ounces

Employment

Shot Process

The object is to fire an Accurate Initial Burst, adjust fire, and develop speed.

- Pre-shot
- Shot
- Post-shot

Pre-shot	Position
	Natural Point of Aim
	Sight Alignment / Picture
	Hold
Shot	Refine Aim
	Breathing Control
	Trigger Control
Post-shot	Follow-through
	Recoil management
	Call the Shot
	Evaluate

Employment

Functional Elements

The object is to fire an Accurate Initial Burst, adjust fire, and develop speed.

- **Stability**: Provide a consistent base to fire from and maintain through the Shot Process until the recoil pulse has ceased. Includes hold/position.
- **Aim**: Continuous process of orienting the weapon, aligning the sights, using appropriate lead and elevation during engagement.
- **Control**: All conscious actions before, during, and after the Shot Process. Trigger control is of primary importance, along with whether, when, and how to engage. Incorporates the Soldier as a function of safety and responsibility.
- **Movement**: The process of moving during the engagement process. Into and out of position, moving laterally, forward, diagonally, and in a retrograde manner while maintaining stabilization, appropriate aim, and control

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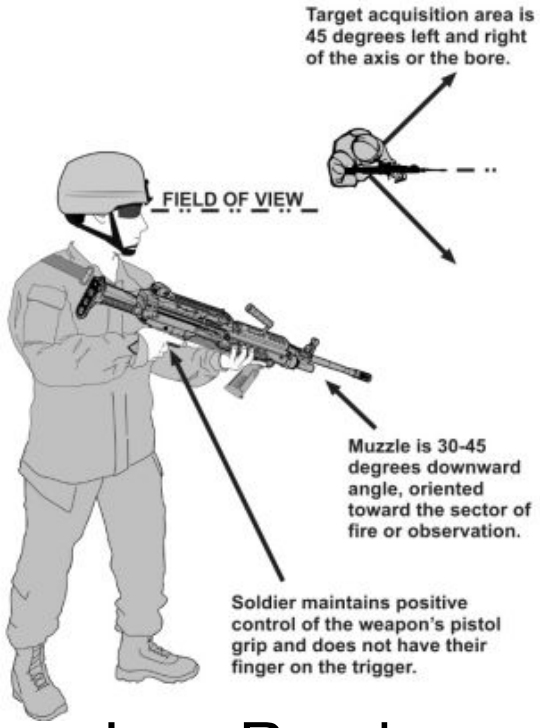
Employment

Carry Positions

Safe Hang



Low Ready

Ready

Employment

Stability

The object is to fire an Accurate Initial Burst, adjust fire, and develop speed

- **Support**: Use support (bipod) and bone structure primarily.
- **Muscle relaxation**: Use good positioning (cheek weld, body straight behind line of recoil, etc.) to enhance support.
- **Natural Point of Aim**: Where barrel naturally orients when position is solid, muscles relaxed and support is achieved. Should be **on target**.
- **Recoil management**: Maintain stable firing position and followthrough the recoil pulse to mitigate movement during the cycle of function,

Note. The steadier the position, the smaller the wobble area. The smaller the wobble area, the more precise the burst.

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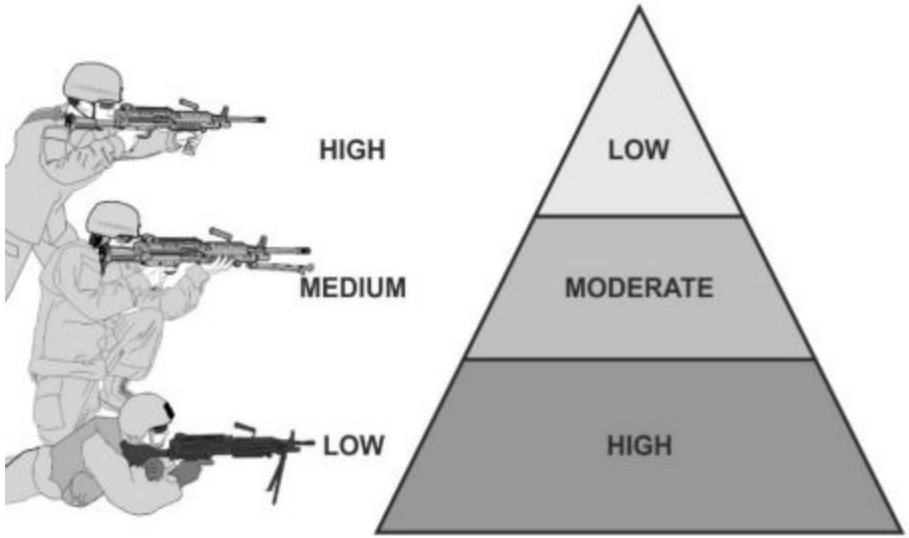
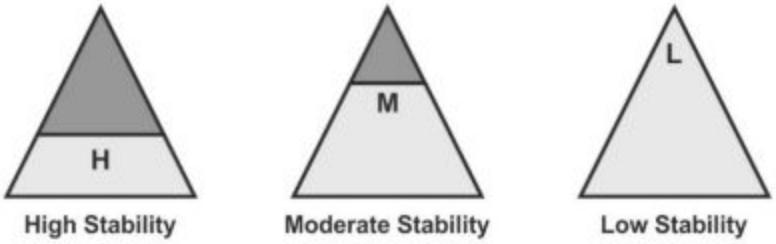
Employment



As the center of gravity (CoG) increases, the level of stability decreases.



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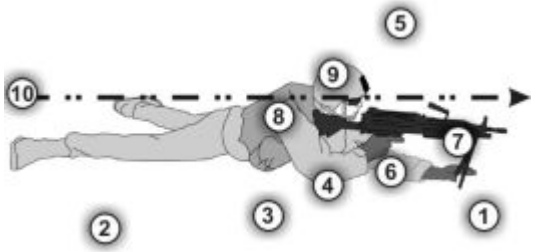
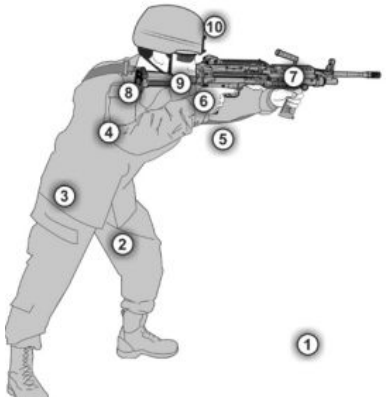
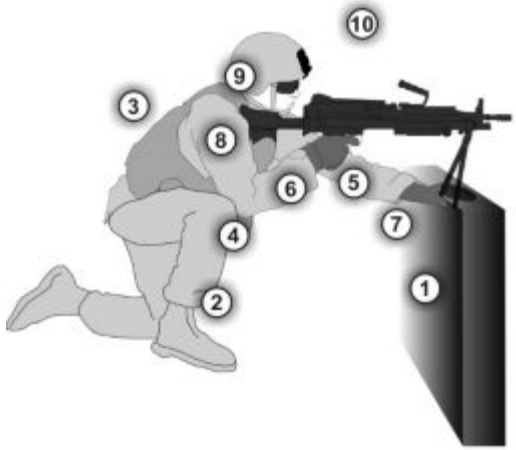
Employment

Firing Positions

A position is good *ONLY* if it consistently produces a tight Cone of Fire!

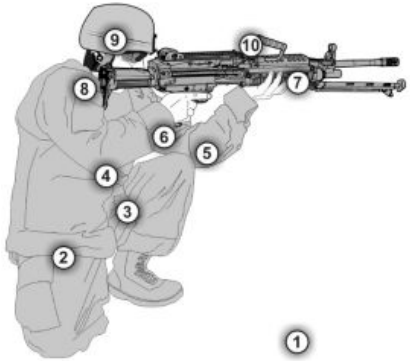


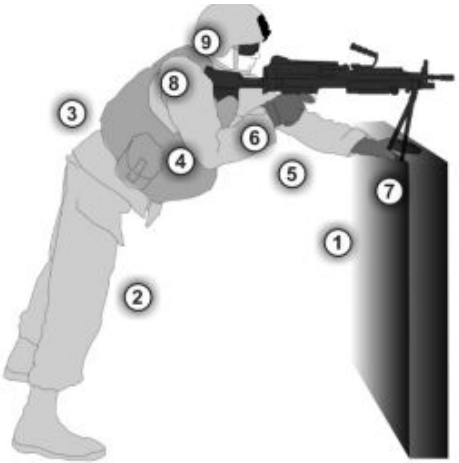




Bipod

- Straight inline with recoil
- Both hands firm grasp
- Pull into shoulder
- Firm cheek weld





Employment

Aim

Sight Alignment: Relationship between the aiming device and the firer's eye.

Maintain by using **consistent cheek weld and head placement**.

- **Iron sight**. Relationship of front sight, rear sight, and firer's eye. Maintain by keeping focus on the top of the front sight.
- **Optics/Thermal**. Relationship between the reticle and the firer's eye. Maintain by ensuring full, centered field of view (no shadow in magnified optics)
- **Pointers/Illuminators/Lasers**. Relationship between the firer's eye, the night vision device placement and focus, and the laser aiming point on the target.

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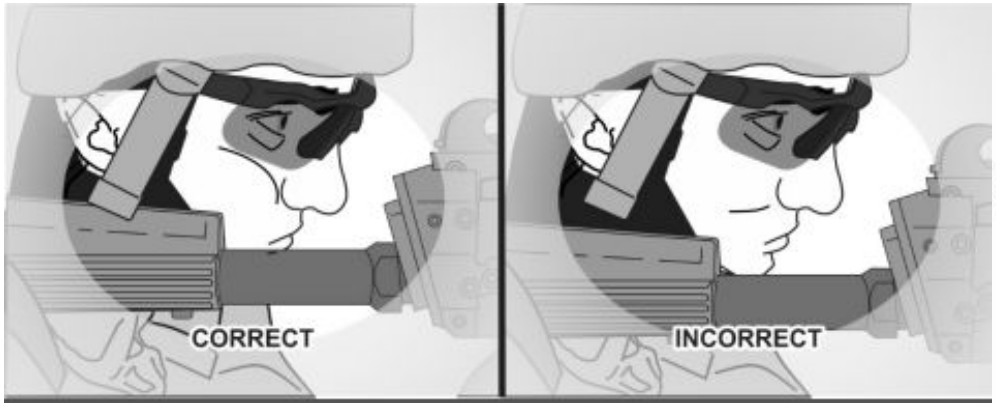
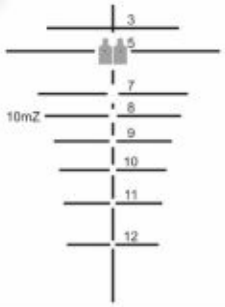
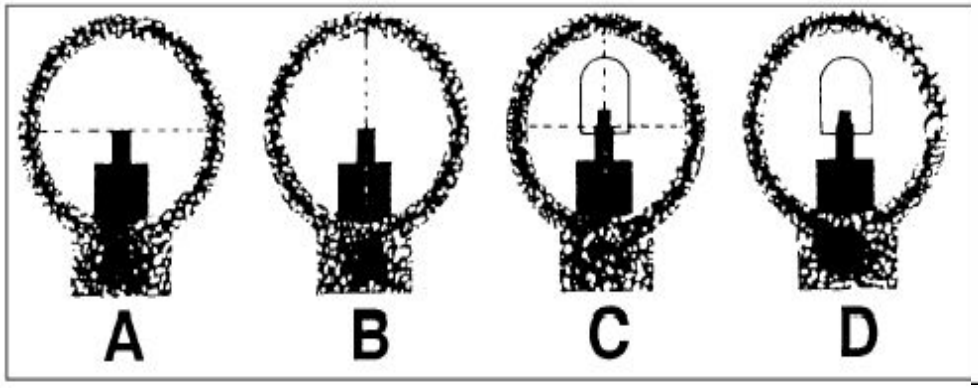


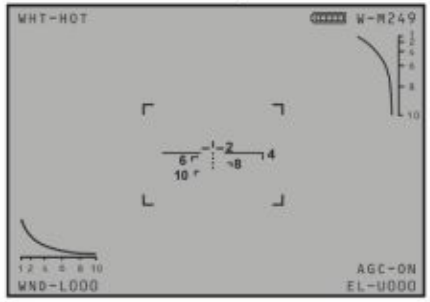
Focus on the front sight post, not the target itself.

Focus on the correct aim point along the bullet drop compensator.





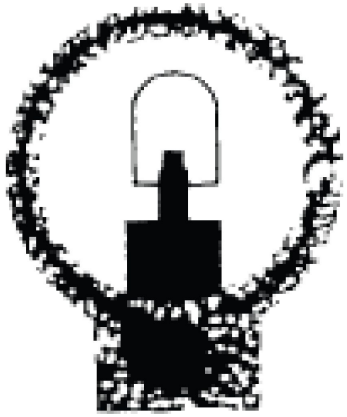
There is no difference in focal viewing when using thermal optics. Align the reticle at the desired point of aim.

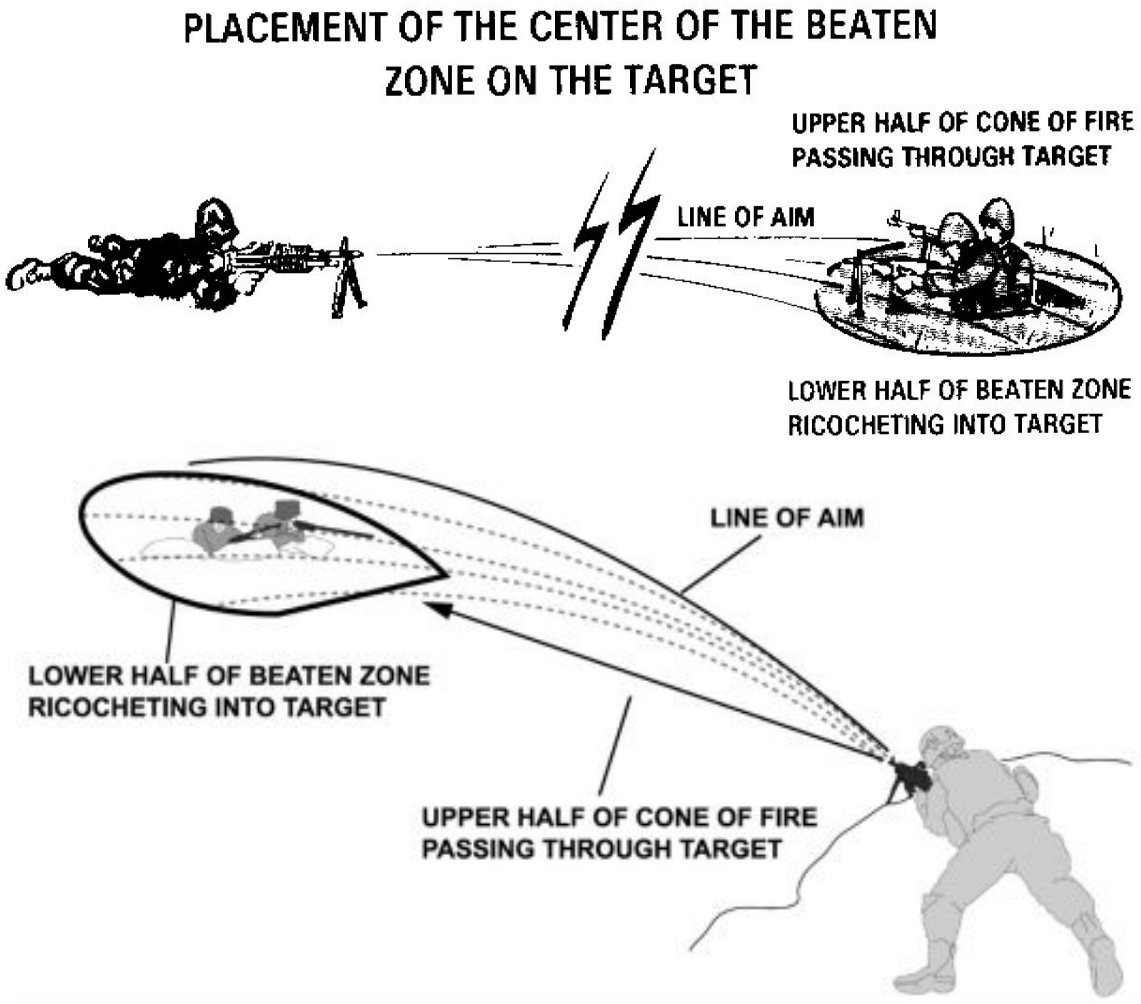


Employment

Center Base Aimpoint

- Used to place Beaten Zone correctly on targets with depth
- **NOT** because "the gun climbs in recoil"
- Gun climbing in recoil = poor position and bad shooting





Employment

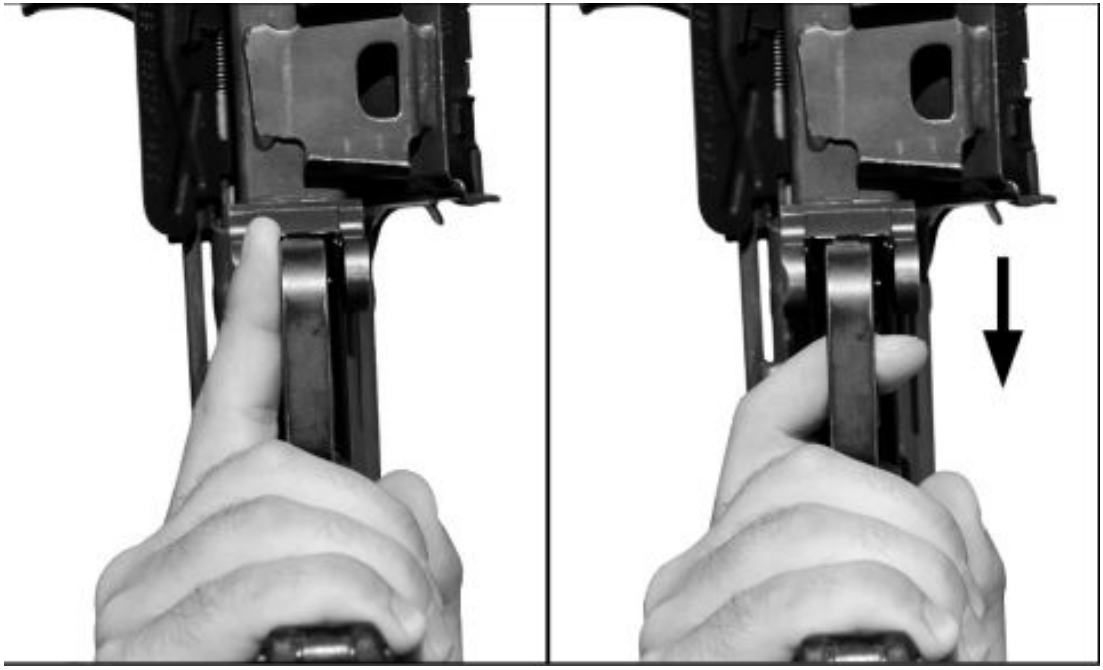
Control

- All conscious actions before, during, and after the shot process
- Includes safety and decision to shoot (when/if based on ROE)
- Proper trigger control without disturbing the sights is a critical aspect of Control and the most difficult to master
- Shot anticipation (flinch, pre-ignition push) disrupts Control
- Reducing or eliminating shot anticipation with good trigger control is often most effective way to improve shooting results

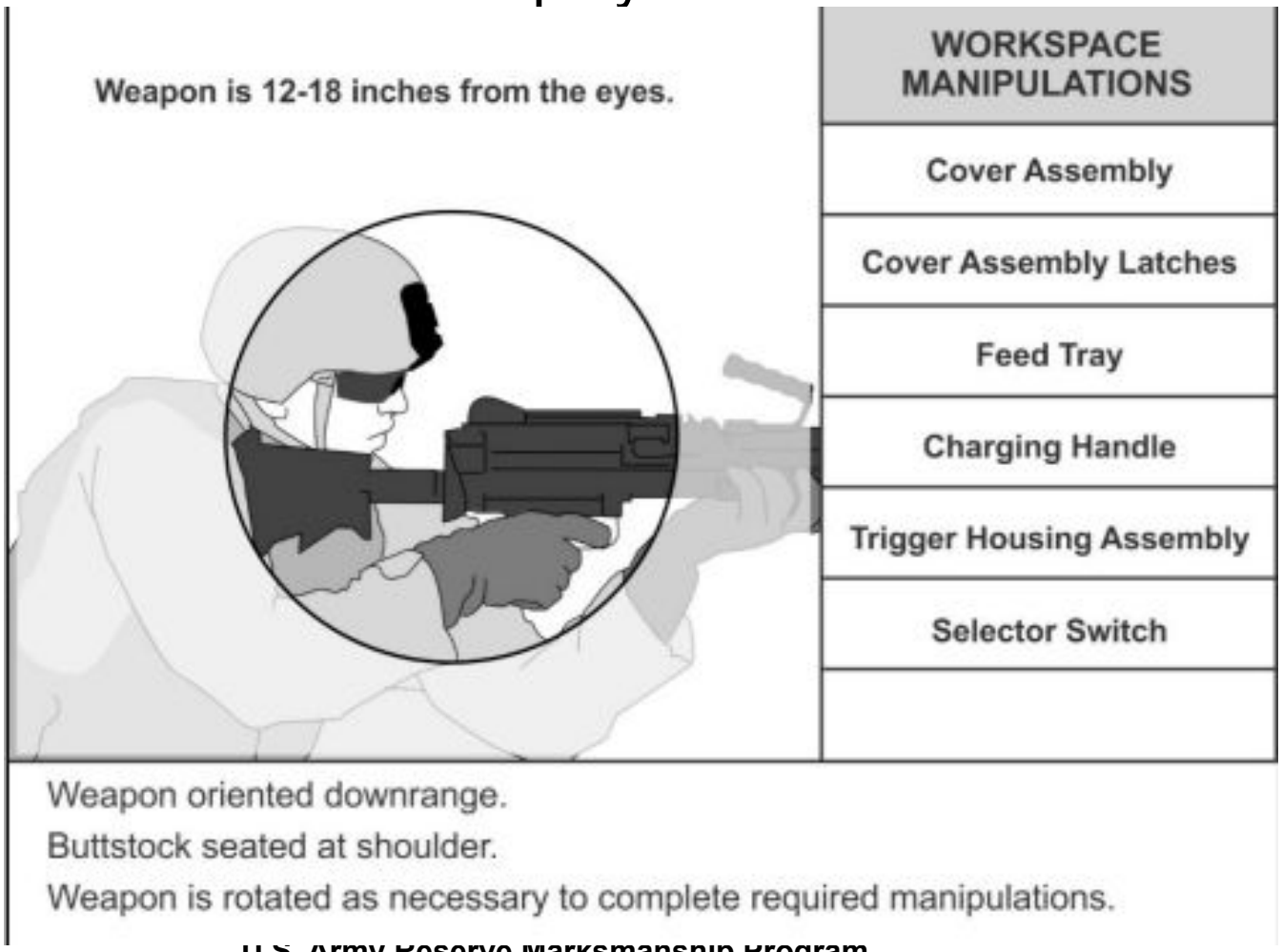
Employment

Control

- Trigger finger placement lays naturally across the trigger after achieving proper grip. No specified point must be used
- Trigger squeeze/press. Pull in a smooth, consistent manner. Add steady pressure until the weapon fires.
- Trigger reset. Retain sight focus while resetting the trigger



Employment


Weapon is 12-18 inches from the eyes.
WORKSPACE MANIPULATIONS
Cover Assembly
Cover Assembly Latches
Feed Tray
Charging Handle
Trigger Housing Assembly
Selector Switch
Weapon oriented downrange.
Buttstock seated at shoulder.
Weapon is rotated as necessary to complete required manipulations.

Employment

Control: Rate of Fire

- **Normal Fire**: Automatic Rifles are individually-issued and maneuver with the rest of the fire team. Engage point targets as a rifleman using **aimed** 3 round bursts instead of individual semi-automatic shots to increase volume of fire.

- Automatic Rifles are NOT machine guns, are not crew-served, do not fulfill sustained fires (barrel change), and do not use rapid fire or cyclic rates.

- **Suppressive Fire**: Fires that degrades the performance of an enemy force below the level needed to fulfill its mission. Must either hit directly or land close enough to convince the enemy fires ***could*** have hit.
  - Volume does NOT equal suppressive fire unless directly accurately enough that it ***could*** hit on purpose

Employment

Control

- **Follow-through**: Continued mental and physical application of the shot process' functional elements
  - Firer's head stays in contact with the stock, the firing eye remains open, and the trigger finger holds the trigger back through recoil (semi-auto and fixed ammunition drill)

- **Calling The Shot**: State where you think the shot/burst went based on where the sights were when the shot/burst was released
  - Call is expressed in clock direction and amount from point of aim
  - Peer coach/Assistant Gunner verifies actual location
  - Poor/inconsistent shot call is a poor application of Control

Drills

Drill structure is standardized for all weapons to reinforce common actions

A: Weapon Check-Condition Green, serial numbers, function check

B: Sling/Unsling. Go between Safe Hang, Low Ready, Ready, and other positions

C: Equipment Check/PCC

D: Load

E: Carry (5/3) Move between 5 methods of carry 3 times.

F: Fight Down. Start in the standing/offhand position and assume the kneeling, sitting, and prone (or variations) in order.

G: Fight Up. Start prone and assume positions up to standing in order.

H: Go-To-Prone. Rapidly drop from standing/crouching low ready into prone. Do while stationary, walking, or during a tactical rush.

I: Reload. Completely reload from ammunition stored in load bearing equipment. Drums, belts, magazines.

J: Clear Malfunction. Reduce the most common malfunctions.

K: Unload/Show Clear

Drill A: Weapon/Function Check

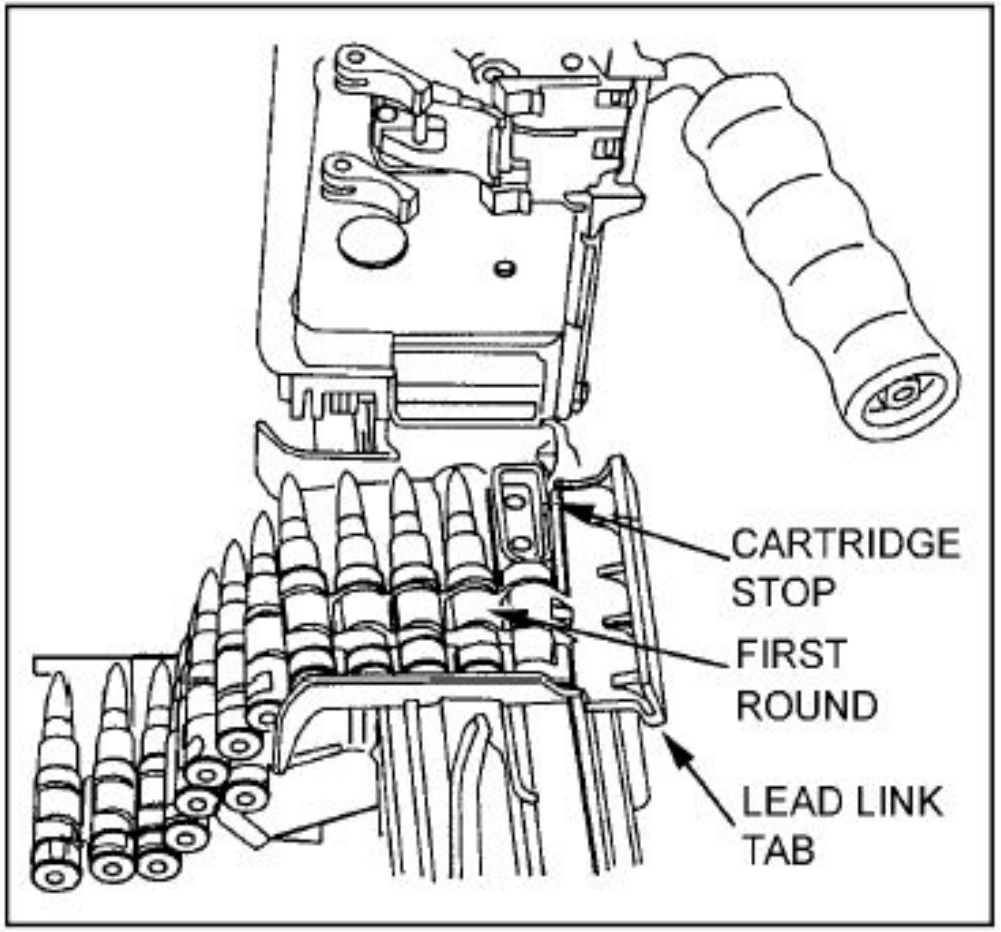
Go to Condition Green

- Lock bolt to rear, place on SAFE. Pull trigger. Nothing should happen.
- Grasp charging handle, place on FIRE, pull trigger, ride bolt forward.
- Lock bolt to rear, place on FIRE.
- Use linked dummy ammo to check stripping, locking, loading, unlocking, extracting and ejecting.
- CAUTION: Do not dry fire on empty chamber.
- Weapon should not go on SAFE when bolt is forward
- DO NOT HALF COCK
- There is no Amber with the M249 series

Drill D: Load

- Condition Red
- Bolt rear, on Safe
- Cover open, belt placed on feed tray

- Condition Black
- Red plus selector on Fire
- Follow unit ROE and/or SOP



Drill I: Reload

- M249 uses the same ammunition and magazines as the M16/M4

- Can fire with magazine or linked ammunition (belt) from drum or assault pack

- Loose belts acceptable for practice but Automatic Rifles must move with Team

- Qualification requires reloading with drum/pack and magazines

- Store ammunition in LBE

- Units need to procure appropriate LBE pouches to carry drums/assault packs

Drill J: Clear Malfunctions

Any failure of the weapon to complete normal cycle of function. Correct by:

- Use secondary weapon (if available and appropriate)
- Apply Corrective Action
  - **Immediate action**. Simple, rapid action to correct basic disruptions
  - Commonly fix simple failures to fire, especially ammunition related
    - **Pull** and lock the cocking handle to the rear
    - **Observe** ejection port and belt for ejection and advance
    - **Push** the cocking handle to its forward position
    - **Proceed/Press** trigger

  - **Remedial action**. Skilled/thorough response to specific problem or issue that simple Immediate action cannot correct
  - Typically requires unload/show clear to correct

No single corrective resolve all malfunctions.

Drill K: Unload/Show Clear

- Check feed pawl assembly under feed cover
- Check feed tray assembly
- Lift feed tray assembly and inspect chamber
- Check space between bolt assembly and chamber
- Weapon is now Green

Zeroing

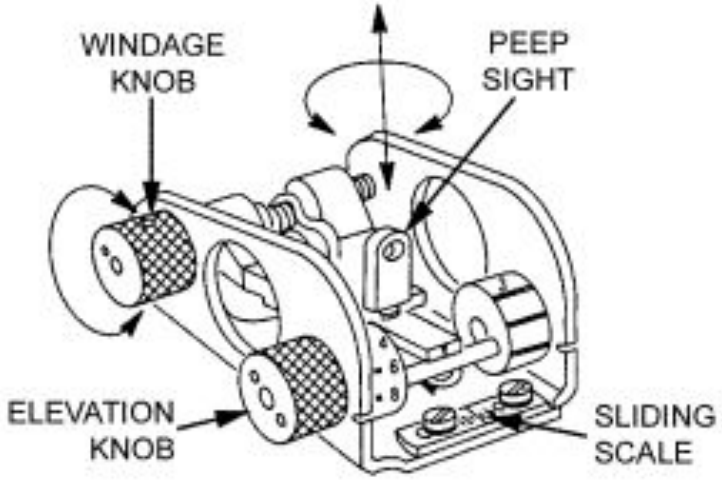
- Iron sight:
  - 700 (10 meters)
  - 400 (25 meters)
- M145:
  - Top of 800 (10 meters)
  - Bottom of 300 (25)

10 meters: 1 cm = 1 mil ~ 4 MOA

25 meters: 1 MOA ~ 0.25 mil

IRON SIGHT

FUNCTION	SINGLE CLICK	
ZERO WINDAGE	M249	White Line
ZERO ELEVATION	M249	400 (25 meters) / 700 (10meters)
WINDAGE	M249	0.5 cm at 10 Meters
ELEVATION (RANGE)	M249	0.5 cm at 10 Meters



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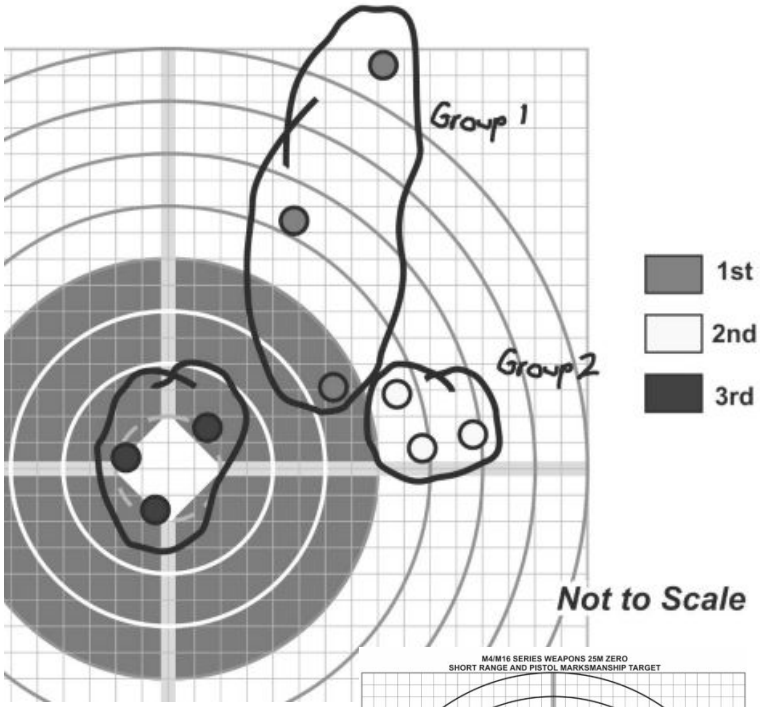
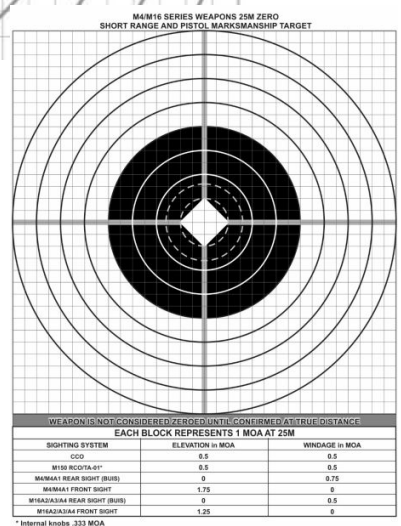
Zeroing

1. 25 Meter, A8 rifle zero target
   - Observe with optics
   - Don't walk downrange after each group
   - Can be done "slick" (no field gear)
2. Zero with single-loaded rounds
   - Center groups with center hold
   - Groups should be 6 MOA (threshold) or 4MOA (objective) and four of five rounds centered in target
   - Single round zeros need confirmation
3. Confirmation at distance
   - After completion of 25-meter zero, hit a properly presented E-type target with a minimum of four of five (80-percent) shots at full distance





Support Barricade

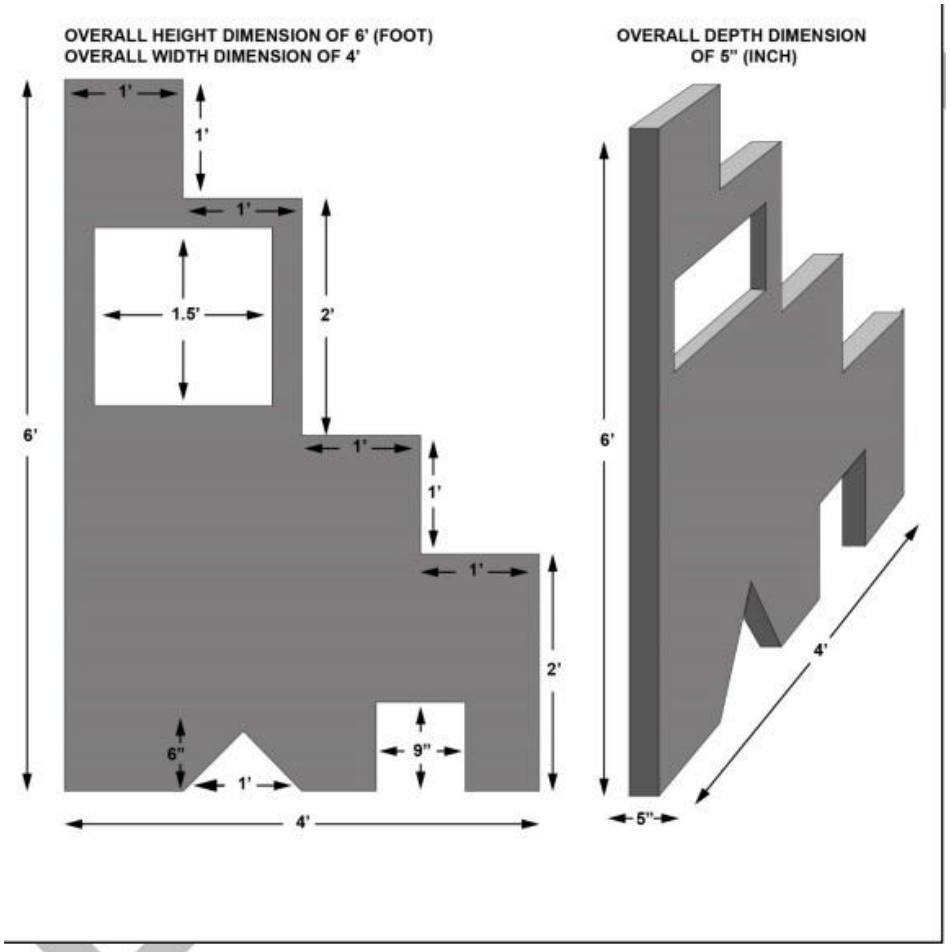


Figure 3-2. Example of the Army standard barricade for live-fire

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Support Barricade

- Basic frame for kneeling supported and standing supported. Design can vary.
- Used for Primary Qualification and Postal Match.
- RETS/ARF “pop up” ranges and 25 meter ranges

Qualification Practice Table V

- Run as four continuous phases (no stopping)
- Three 50-round belts and two 25-round magazines in LBE/pouches
- Engage each target with one five-round burst
- Reload and change positions between phases without command

Table V Practice "Fast Run"

- Single target engagements are exposed for 3 seconds.
- Double target engagements are exposed for 5 seconds.
- Triple target engagements are exposed for 12 seconds.
- Quadruple target engagements are exposed for 16 seconds.
- 2-second delay between each engagement.
  - 5-second delay between the first (React To Contact offhand) and second engagement to allow Go To Prone
- 10-second transition delay (reload/change position) between phases
- Submit first attempt scores as a **Postal Match**

Qualification Table VI

- Run as four continuous phases (no stopping)
- Four 50-round belts in LBE/pouches
- Engage each target with one five-round burst
- Reload and change positions between phases without command

Table VI Qualification

- Single target engagements are exposed for 5 seconds.
- Double target engagements are exposed for 8 seconds.
- Triple target engagements are exposed for 12 seconds.
- Quadruple target engagements are exposed for 16 seconds.
- 2-second delay between each engagement.
  - 5-second delay between the first (offhand) and second engagement to allow Go To Prone
- 8-second transition delay (reload/change position) between phases
- Only the first attempt for record counts
- Submit first attempt scores as a **Postal Match** (USAR Course of Fire Book)

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Primary Qualification

Engagement 1 offhand,
Go To Prone for Engagement 2

Table VI, Qualification, Engagements 1 through 5, React to Contact, Transition to Prone, Unsupported

Engagement	Target Type	Range	Exposure Time
1	F-type	50 m RIGHT	5 sec
2	E-type	100 m	5 sec
3	E-type	150 m	5 sec
4	E-type	50 m LEFT	12 sec
	E-type	150 m	
	E-type	200 m	
5	E-type	150 m	16 sec
	E-type	200 m	
	E-type	250 m	
	E-type	300 m	

Table VI, Qualification, Engagements 6 through 10, Prone, Supported

Engagement	Target Type	Range	Exposure Time
6	E-type	100 m	5 sec
7	E-type	150 m	8 sec
	E-type	300 m	
8	E-type	200 m	8 sec
	E-type	300 m	
9	E-type	250 m	8 sec
	E-type	300 m	
10	E-type	150 m	12 sec
	E-type	250 m	
	E-type	300 m	

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Primary Qualification

Table VI, Qualification, Engagements 11 through 14, Kneeling, Supported

Engagement	*Target Type*	*Range*	*Exposure Time*
11	E-type	50 m LEFT	12 sec
	E-type	100 m	
	E-type	200 m	
12	F-type	50 m RIGHT	8 sec
	E-type	200 m	
13	E-type	150 m	8 sec
	E-type	250 m	
14	E-type	100 m	12 sec
	E-type	150 m	
	E-type	200 m	

Table VI, Qualification, Engagements 15 through 18, Standing, Supported

Engagement	*Target Type*	*Range*	*Exposure Time*
15	E-type	50 m LEFT	8 sec
	E-type	100 m	
16	E-type	200 m	8 sec
	E-type	250 m	
17	F-type	50 m RIGHT	12 sec
	E-type	100 m	
	E-type	150 m	
18	E-type	100 m	12 sec
	E-type	200 m	
	E-type	250 m	