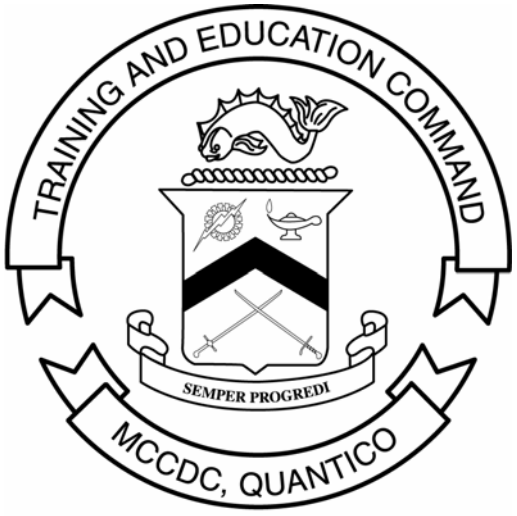
MCI 0368A

MARINE CORPS INSTITUTE



THE HEAVY MACHINEGUN CREWMAN

MARINE BARRACKS
WASHINGTON, DC

UNITED STATES MARINE CORPS
MARINE CORPS INSTITUTE
912 CHARLES POOR STREET SE
WASHINGTON NAVY YARD DC 20391-5680

IN REPLY REFER TO:
1550
Ser 0368A
30 Mar 07

From: Director
To: Marine Corps Institute Student

Subj: MCI 0368A, THE HEAVY MACHINEGUN CREWMAN

1. Purpose. MCI course 0368A, *The Heavy Machinegun Crewman*, provides distance training to all Marines.

2. Scope. MCI course 0368A, *The Heavy Machinegun Crewman*, is designed to provide fundamental and some advanced principles in employing the M2 HB .50-caliber and MK19 40mm machineguns. This course emphasizes identification of major components, assembly, system checkout procedures, loading, and target engagement. This course will also provide instruction on immediate action procedures and care and maintenance.

3. Applicability. This course is intended for instructional purposes only and is designed for MOS 0331 Marines possessing the ranks of Lance Corporal through Staff Sergeant. It is also designed for units using seven-ton trucks and armored HumVees.

4. Recommendations. Comments and recommendations on the contents of the course are invited and will aid in subsequent course revisions. Please complete the course evaluation questionnaire at the end of the final examination. Return the questionnaire and the examination booklet to your proctor.

T.M. FRANUS
By direction

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Table of Contents

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Student Information

Number and Title	MCI 0368A THE HEAVY MACHINEGUN CREWMAN
Study Hours	8
Course Materials	Text
Review Agency	School of Infantry East, Camp Lejeune, NC
Reserve Retirement Credits (RRC)	3
ACE	Not applicable to civilian training/education
Assistance	For administrative assistance, have your training officer or NCO log on to the MCI home page at www.mci.usmc.mil. Marines CONUS may call toll free 1-800-MCI-USMC. Marines worldwide may call commercial (202) 685-7596 or DSN 325-7596.

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Study Guide

Congratulations

Congratulations on your enrollment in a distance education course from the Distance Learning and Technologies Department (DLTD) of the Marine Corps Institute (MCI). Since 1920, the Marine Corps Institute has been helping tens of thousands of hard-charging Marines, like you improve their technical job performance skills through distance learning. By enrolling in this course, you have shown a desire to improve the skills you have and master new skills to enhance your job performance. The distance training course you have chosen, MCI 0368A, *The Heavy Machinegun Crewman*, is designed to introduce you to the M2 heavy-barrel (HB), .50-caliber and the MK19, 40mm machineguns by teaching characteristics, assembly and disassembly procedures, and sight manipulation for each weapon. The course also covers techniques of fire and care and maintenance.

Your Personal Characteristics

- **YOU ARE PROPERLY MOTIVATED.** You have made a positive decision to get training on your own. Self-motivation is perhaps the most important force in learning or achieving anything. Doing whatever is necessary to learn is motivation. You have it!

- **YOU SEEK TO IMPROVE YOURSELF.** You are enrolled to improve those skills you already possess, and to learn new skills. When you improve yourself, you improve the Corps!

- **YOU HAVE THE INITIATIVE TO ACT.** By acting on your own, you have shown you are a self-starter, willing to reach out for opportunities to learn and grow.

- **YOU ACCEPT CHALLENGES.** You have self-confidence and believe in your ability to acquire knowledge and skills. You have the self-confidence to set goals and the ability to achieve them, enabling you to meet every challenge.

- **YOU ARE ABLE TO SET AND ACCOMPLISH PRACTICAL GOALS.** You are willing to commit time, effort, and the resources necessary to set and accomplish your goals. These professional traits will help you successfully complete this distance learning course.

Continued on next page

Beginning Your Course

Before you actually begin this course of study, read the student information page. If you find any course materials missing, notify your training officer or training NCO. If you have all the required materials, you are ready to begin.

To begin your course of study, familiarize yourself with the structure of the course text. One way to do this is to read the table of contents. Notice the table of contents covers specific areas of study and the order in which they are presented. You will find the text divided into several study units. Each study unit is comprised of two or more lessons and lesson exercises.

Leafing Through the Text

Leaf through the text and look at the course. Read a few lesson exercise questions to get an idea of the type of material in the course. If the course has additional study aids, such as a handbook or plotting board, familiarize yourself with them.

The First Study Unit

Turn to the first page of study unit 1. On this page, you will find an introduction to the study unit and generally the first study unit lesson. Study unit lessons contain learning objectives, lesson text, and exercises.

Reading the Learning Objectives

Learning objectives describe in concise terms what the successful learner, you, will be able to do as a result of mastering the content of the lesson text. Read the objectives for each lesson and then read the lesson text. As you read the lesson text, make notes on the points you feel are important.

Completing the Exercises

To determine your mastery of the learning objectives and text, complete the exercises developed for you. Exercises are located at the end of each lesson, and at the end of each study unit. Without referring to the text, complete the exercise questions and then check your responses against those provided.

Continued on next page

Continuing to March

Continue on to the next lesson, repeating the above process until you have completed all lessons in the study unit. Follow the same procedures for each study unit in the course.

Preparing for the Final Exam

To prepare for your final exam, you must review what you learned in the course. The following suggestions will help make the review interesting and challenging.

- **CHALLENGE YOURSELF.** Try to recall the entire learning sequence without referring to the text. Can you do it? Now look back at the text to see if you have left anything out. This review should be interesting. Undoubtedly, you'll find you were not able to recall everything. But with a little effort, you'll be able to recall a great deal of the information.

- **USE UNUSED MINUTES.** Use your spare moments to review. Read your notes or a part of a study unit, rework exercise items, review again; you can do many of these things during the unused minutes of every day.

- **APPLY WHAT YOU HAVE LEARNED.** It is always best to use the skill or knowledge you've learned as soon as possible. If it isn't possible to actually use the skill or knowledge, at least try to imagine a situation in which you would apply this learning. For example make up and solve your own problems. Or, better still, make up and solve problems that use most of the elements of a study unit.

- **USE THE "SHAKEDOWN CRUISE" TECHNIQUE.** Ask another Marine to lend a hand by asking you questions about the course. Choose a particular study unit and let your buddy "fire away." This technique can be interesting and challenging for both of you!

- **MAKE REVIEWS FUN AND BENEFICIAL.** Reviews are good habits that enhance learning. They don't have to be long and tedious. In fact, some learners find short reviews conducted more often prove more beneficial.

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Tackling the Final Exam

When you have completed your study of the course material and are confident with the results attained on your study unit exercises, take the sealed envelope marked **"FINAL EXAM"** to your unit training NCO or training officer. Your training NCO or officer will administer the final examination and return the examination and the answer sheet to MCI for grading. Before taking your final examination, read the directions on the DP-37 answer sheet carefully.

Completing Your Course

The sooner you complete your course, the sooner you can better yourself by applying what you've learned! HOWEVER--you do have 2 years from the date of enrollment to complete this course.

Graduating!

As a graduate of this distance education course and as a dedicated Marine, your job performance skills will improve, benefiting you, your unit, and the Marine Corps.

Semper Fidelis!

STUDY UNIT 1

M2 HEAVY BARREL .50-CALIBER MACHINEGUN

Overview

History

John Browning designed the heavy barrel machinegun (M2HB) just after World War I. During World War II, U.S. troops nicknamed it the "Ma Deuce" or simply, the Browning.

The United States used the M2 Heavy Barrel (HB) .50-caliber machinegun extensively as a vehicle-mounted weapon and for aircraft armament during World War II. On today's battlefield the M2 continues to lead the way in combat.

Scope

This study unit is designed to give you the characteristics, maintenance, operation, immediate action, and firing procedures for the M2 HB .50-caliber machinegun.

In This Study Unit

This study unit contains the following lessons:

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LESSON 1

CHARACTERISTICS AND GENERAL DATA OF THE M2

Introduction

Scope

Familiarizing yourself with the characteristics of the M2 HB .50-caliber machinegun and having the ability to identify major components of the weapon system is crucial to the success of its employment.

This lesson will cover the characteristics of the M2 HB .50-caliber machinegun, as well as identification of its major components.

Learning Objectives

Upon completing this lesson, in accordance with the TM 02498A-10/1, you should be able to

- Identify important specifications associated with the M2 HB .50-caliber machinegun.
- Identify major components of the M2 HB .50-caliber machinegun.
- Identify components that support the stability of the M2 HB .50-caliber machinegun when firing.
- Identify the use of standard types of ammunition for the M2 HB .50-caliber machinegun.
- Identify the stages in the cycle of operation for the M2 HB .50-caliber machinegun.

In This Lesson

This lesson contains the following topics:

Specifications

Type

The table below provides a description of the M2.

Type	Description
Belt-fed, Closed-bolt	The gun is capable of alternate feed (ammunition can be fed from either the right or left sides) by repositioning some of the components. The infantry generally uses left side feed. A disintegrating metallic link belt is used for feeding.
Air-cooled	The maximum surface of the barrel and receiver is exposed to permit air-cooling. Perforations in the barrel support allow air to circulate around the breech end of the barrel and help in cooling the parts. The heavy barrel is used to delay early overheating.
Recoil-operated	The expanding gases (which various springs, cams, and levers control) provide the force for recoil operation.

Weight

The table below shows the weights and lengths of the main components of the M2 machinegun.

Component	Weight, lbs.	Length, in.
Receiver	60	20.13
Barrel	24	45
M3 tripod mount (w/T&E and pintle)	44	
Total weight of gun mounted on tripod	128	

Note: T&E, traversing and elevating mechanism.

Continued on next page

Specifications, Continued

Ranges

The table below shows the maximum effective ranges of the M2 machinegun.

Ranges	Distance, meters
Maximum (M2 ball)	7,400
Maximum effective (Area target)	1,830
Maximum effective (Point target)	1,500
Grazing fire	700

Rate of Fire

The table below shows the various rates of fire for the M2 machinegun.

Rate	Rounds per minutes
Sustained	40 or less
Rapid	40 or more
Cyclic	450–550

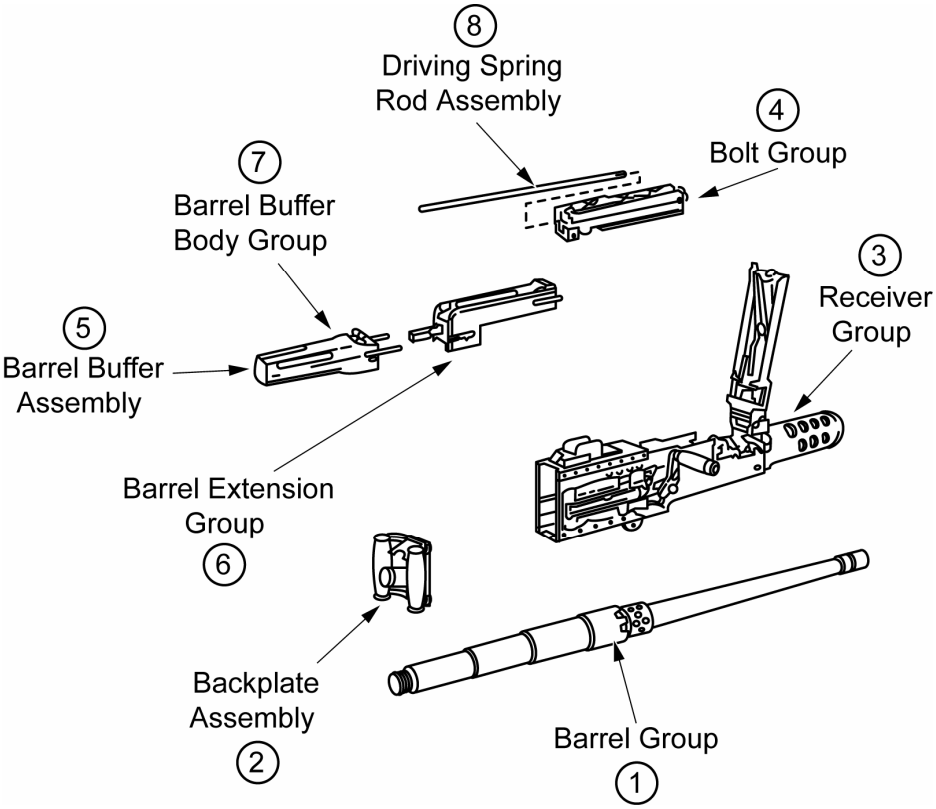
Muzzle Velocity

The muzzle velocity of the M2 HB .50-caliber machinegun is 3,050 feet per second, with M2 ball ammunition.

Components

Table The table below lists the assemblies and groups of the M2 HB .50-caliber machinegun.

Item Number	Assemblies/ Groups	Purpose
1	Barrel Group	Houses cartridges for firing and directs projectile.
2	Backplate Assembly	Houses the trigger, bolt latch release, buffer tube sleeve, and the left and right spade grips.
3	Receiver Group	Serves as a support for all major components and houses the action of weapon. This controls the function of the weapon.
4	Bolt Group	Provides feeding, chambering, firing and extracting by using the propellant gases and recoil spring for power.
5	Barrel Buffer Assembly	Assists in recoil and counter-recoil of the bolt group.
6	Barrel Extension Group	Secures the barrel to the recoiling of the bolt group.
7	Barrel Buffer Body Group	Houses the barrel buffer assembly.
8	Drive Spring Rod Assembly	Drives the bolt forward when the bolt latch release is depressed.



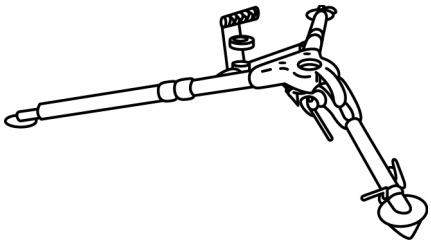
Mounts and Accessories

Purpose

You must place the M2 HB .50-caliber machinegun on a mount to establish a steady platform when firing. Along with the mount, you need to install a T&E mechanism to permit a high degree of accuracy and control.

M3 Tripod Mount

The M3 tripod mount (shown below) is the principal ground mount for the M2 HB .50-caliber machinegun.



The tripod has three folding, telescoping legs that can be stomped into the ground for greater stability. The gun is connected to the tripod by a pintle that is semi-permanently attached to the gun. The pintle seats into the tripod head and is locked in place.

A traversing bar between the two trail legs serves as a support for the traversing and elevating mechanism. The T&E mechanism attaches to the rear of the gun and is locked onto the traversing bar.

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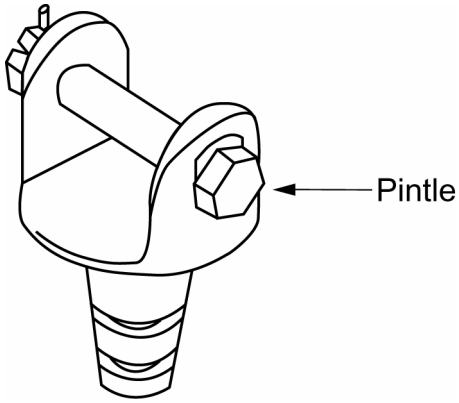
Pintle Vehicle Mount

The M2 HB .50-caliber machinegun can be mounted on two different mounts.

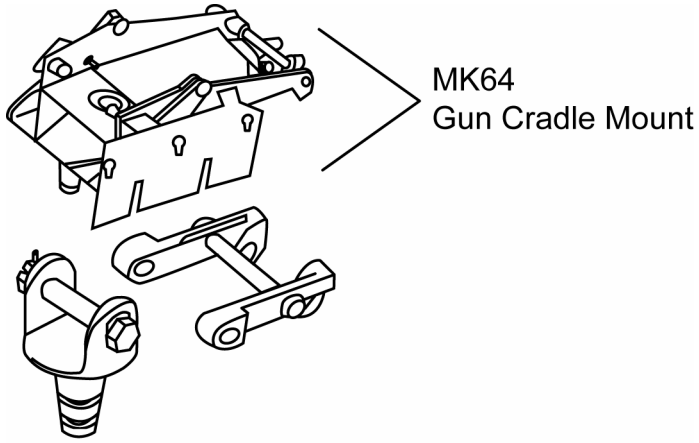
- High-mobility multipurpose wheeled vehicle (HMMWV) weapons station
- M66 ring mount

Each of these mounts has a pintle adapter that accepts the pintle shown below.



HMMWV Weapons Station

The HMMWV weapons station has a ring mount that, when used with the MK64 cradle mount (shown below), will accept the M2 HB .50-caliber machinegun.



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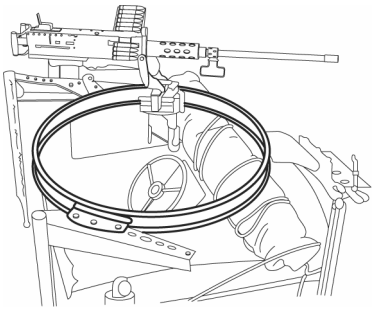
M66 Ring Mount

The M66 ring mount is installed on trucks and other combat vehicles. A truck mounted version is shown below.

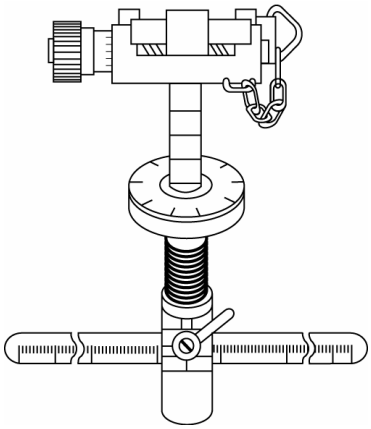


T&E Mechanism

The T&E mechanism for the M2 HB .50-caliber machinegun is used on both ground and vehicle mounts to

- Use the "2-2-2" rule.
- Secure the rear of the machinegun to its mount.
- Permit fire control adjustment.
- Traverse 400 mils to the left or right of the 0 index on the traversing bar on the M3 tripod mount.

The T&E mechanism allows the elevation of the machinegun to range from 100 mils in elevation to 250 mils in depression.



Ammunition

Types

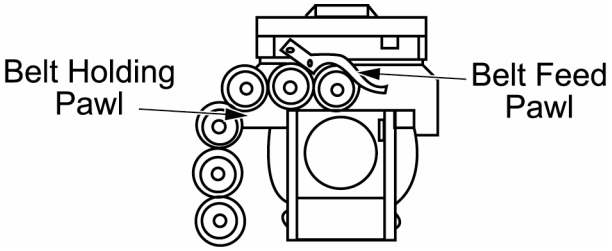
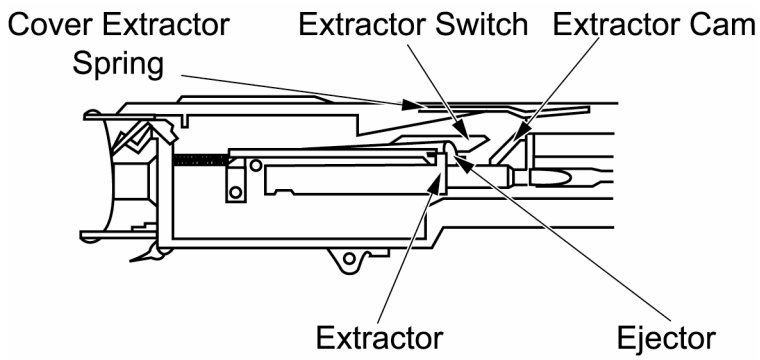
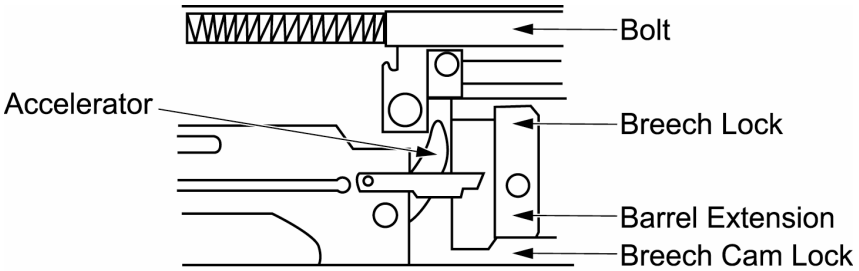
The M2 HB .50-caliber machinegun cartridge consists of a cartridge case, primer, propelling charge, and bullet. The table below describes the different types of ammunition and their uses.

Type	Color of tip	Used for
M2, M33, Ball	No color	• Marksmanship training • Anti-personnel • Light material targets
M1, M10, M17,Tracer	Red, maroon, or orange	• Aiding in observing fire by marking target • Incendiary effect • Signaling
M2, Armor-piercing	Black	• Armored aircraft • Lightly armored vehicles • Concrete shelters • Other bullet-resisting targets
M1, M23, Incendiary	Blue or light blue	Incendiary effect, especially against aircraft
M8, Armor-piercing incendiary	Aluminum-colored	Combined armor-piercing and incendiary effect
M1, M1A1, Blank	No bullet	Simulated firing
M2, Dummy	No color on tip; holes are in the cartridge case	Instructional purposes (completely inert)
M903, Sabot light armor penetrator	A plastic sleeve is on the projectile	Armor piercing
M20 Armor-piercing	Red aluminum ring	Incendiary tracer
M962 Light armor	Red-tinted sabot	Penetrator tracer
M858 Ball	Blue plastic	Used for practice
M680 Tracer	Red	Practice

Cycle of Operation

Eight Stages

The cycle of operation of the M2 HB .50-caliber machinegun consists of the following eight stages:

Stages	Action
1	**Feeding**. During feeding, the cartridge is placed in the receiver. 
2	**Chambering**. During chambering, the cartridge is placed into the chamber of the weapon. 
3	**Locking**. The bolt is locked to the barrel and barrel extension. 

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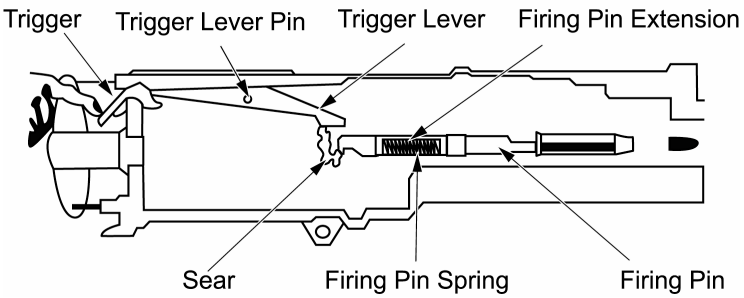
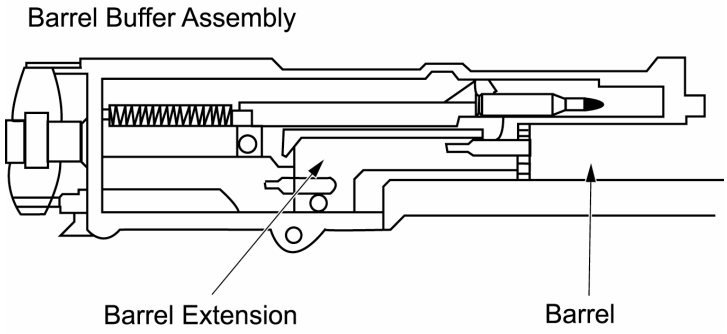
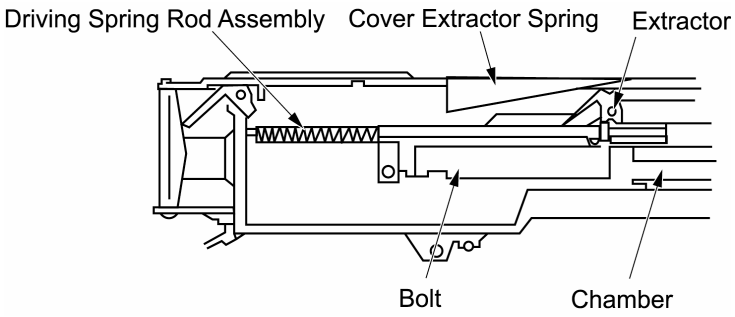
Eight Stages, continued

Stages	Action
4	**Firing**. The firing pin is released, igniting the primer of the cartridge. 
5	**Unlocking**. The bolt is unlocked from the barrel and barrel extension. 
6	**Extracting**. The empty cartridge case is pulled from the chamber. 
7	**Ejecting**. The empty cartridge case is expelled from the receiver.
8	**Cocking**. The firing pin is withdrawn into the cocked position.

Lesson 1 Exercise

Directions Complete exercise items 1 through 8 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 The Browning M2 HB .50-caliber machinegun is a belt-fed, recoil-operated, closed-bolt, _____ machinegun.

a. water-cooled
b. air-cooled
c. semiautomatic
d. gas-operated

Item 2 The M2 HB .50-caliber machinegun receiver weighs _____ pounds.

a. 40
b. 55.5
c. 60
d. 65.5

Item 3 The M2 HB .50-caliber machinegun cyclic rate of fire is _____ rounds per minute.

a. 50–150
b. 200–300
c. 450–550
d. 450–600

Item 4 What is the purpose of the barrel buffer assembly?

a. Secures the barrel to the recoiling of the bolt group.
b. Provides feeding, chambering, firing and extracting, using the propellant gases and recoil spring for power.
c. Assists in recoil and counter-recoil of the bolt group.
d. Provides a means to move the bolt to the rear with the retracting slide handle.

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Item 5

The _____ is the principal ground mount for the M2 HB .50-caliber machinegun.

a. M2 tripod
b. M3 tripod
c. M29 bipod
d. M66 bipod

Item 6

What are tracer rounds used for?

a. Signal, incendiary effect, armor piercing
b. Simulated firing, signaling, armor piercing
c. Lightly armored vehicles, armor piercing, incendiary effect
d. Signaling, incendiary effect, marking targets

Item 7

During the _____ stage of the cycle of operation, the cartridge is placed into the receiver.

a. firing
b. ejecting
c. feeding
a. loading

Item 8

What is happening during the unlocking stage of the cycle of operation for the M2 HB .50-caliber machinegun?

a. The bolt is unlocked from the barrel and barrel extension.
b. The bolt is unlocked from the chamber.
c. The empty cartridge case is pulled from chamber.
d. The safety selection switch jumps into single shot mode.

Answers

The table below lists the answers to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	b	1-4
2	c	1-4
3	c	1-5
4	c	1-6
5	b	1-7
6	d	1-10
7	c	1-12
8	a	1-11

Lesson Summary

In this lesson, you learned about the characteristics and general data associated with the M2 HB .50-caliber machinegun. You also identified the major components, and their purpose.

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LESSON 2

MAINTENANCE

Introduction

Scope

This lesson discusses how to clear, disassemble, clean, and inspect the M2 HB .50-caliber machinegun.

Learning Objectives

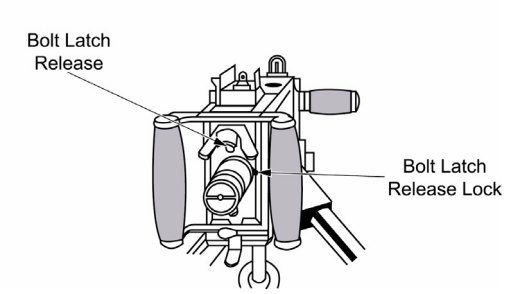
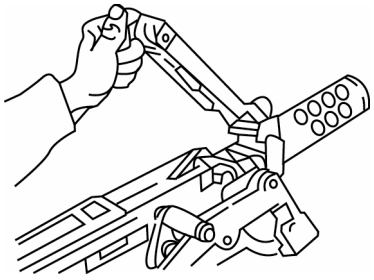
After completing this lesson, you should be able to

- Identify the steps to clear the M2 HB .50-caliber machinegun.
- Identify the steps to disassemble the M2 HB .50-caliber machinegun.
- Identify the maintenance schedule for the M2 HB .50-caliber machinegun.
- Identify the cleaners and lubricants for the M2 HB .50-caliber machinegun.
- Identify the steps to clean the M2 HB .50-caliber machinegun.
- Identify the steps for inspecting the M2 HB .50-caliber machinegun.

Clearing

Procedures

Before you disassemble the M2 HB .50-caliber machinegun, you must clear it to make sure it is completely safe. The steps to clear the weapon are listed in the table below.

Step	Action
1	Place the gun in the single-shot mode by rotating the buffer tube sleeve to the right and releasing the bolt latch to the up position. 
2	Raise the feed cover by rotating the cover latch forward and lifting straight up. 
3	Remove ammunition if present.
4	Close the feed cover assembly.
5	Grasp with palms up the slide handle and lock the bolt to the rear.
6	Open the feed cover assembly.
7	Inspect the T-slot on the face of the bolt and chamber.
8	Press the bolt latch release and ride the bolt forward.
9	Close the feed cover assembly. Note: Never close the cover with the bolt to the rear because it engages the bolt and could cause weapon to malfunction.

Disassembling

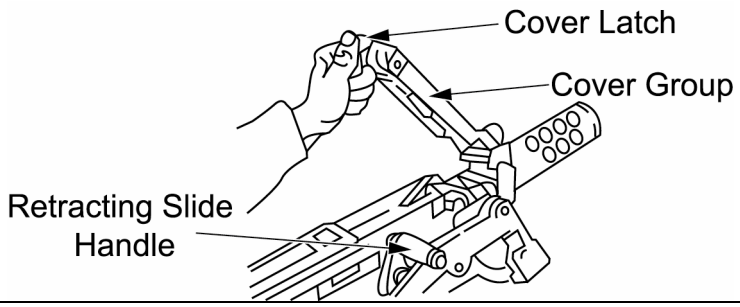
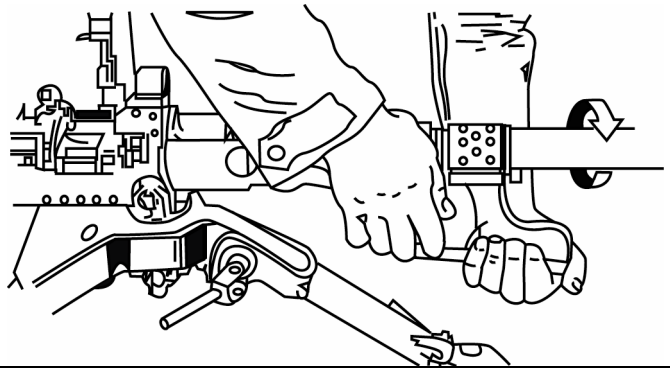
Groups

After clearing the M2 HB .50-caliber machinegun, disassemble the weapon into the six groups listed below by using the sequential steps that follow.

- Barrel
- Receiver
- Bolt
- Cover
- Barrel extension
- Barrel buffer body

Barrel Group

To remove the barrel group, follow the steps below.

Step	Action
1	Turn the cover latch and raise the cover group, as shown below. 
2	Pull the retracting handle back until the lug on the barrel locking spring aligns with the 3/8-inch hole on the right side of the receiver. Hold handle; turn counterclockwise.
3	Turn the barrel counter clockwise until it disengages. 
4	Set the barrel aside, being careful not to damage the threaded end.

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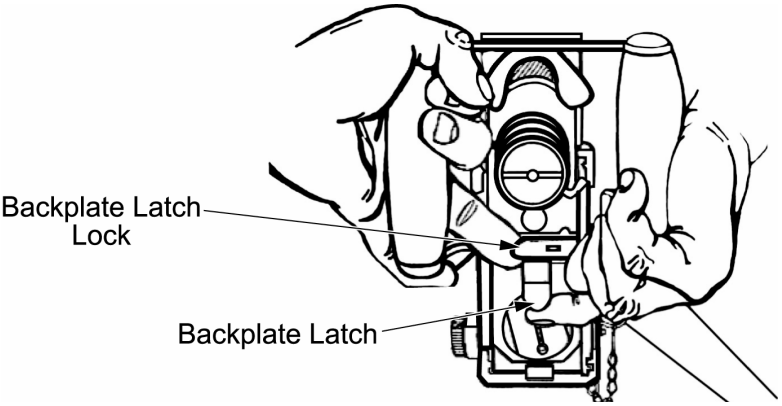
Backplate

To remove the backplate, follow the steps listed in the table below.

Step	Action
1	Pull out on the backplate latch lock and up on the backplate latch, as shown in the picture below. Note: Look at the placement of the hands in the picture. Ensure that the bolt is forward. 
2	Lift the entire backplate straight up.
3	Set the backplate aside with the handles and spades down..

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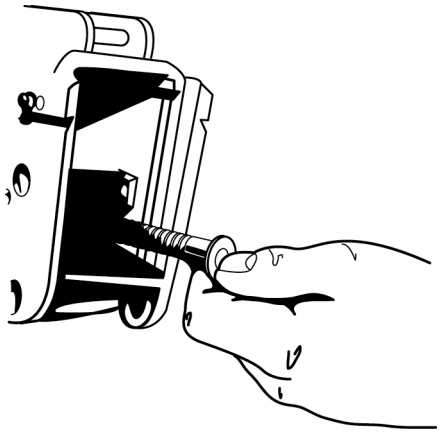
Drive Spring Rod Assembly

The drive spring on the M2 HB .50-caliber machinegun is located on the right side of the receiver, as shown in the picture below.



Removing the Drive Spring

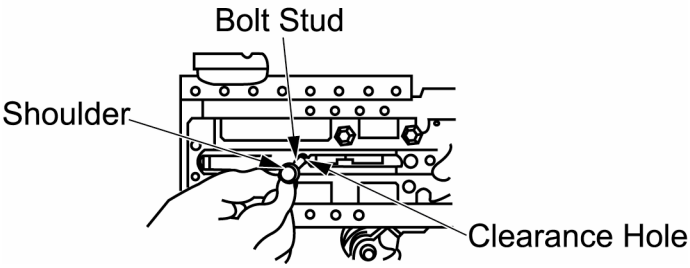
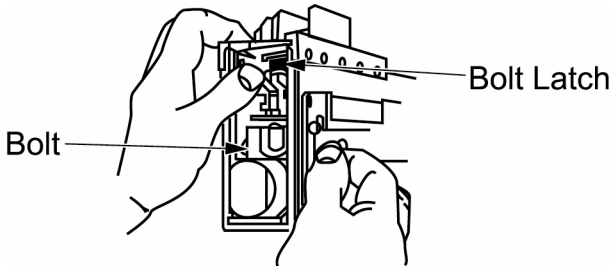
The table below lists the steps to remove the drive spring.

Step	Action
1	Push in on the head of the drive spring and then slightly to the left to unseat it from the right side plate. **WARNING**: Never attempt to cock the gun while the backplate is off and the drive spring is in place. The drive spring can seriously injure you if it is compressed and slips from its seat in the sideplate.
2	Pull the drive spring to the rear and out of the receiver.

Continued on next page

Bolt Group

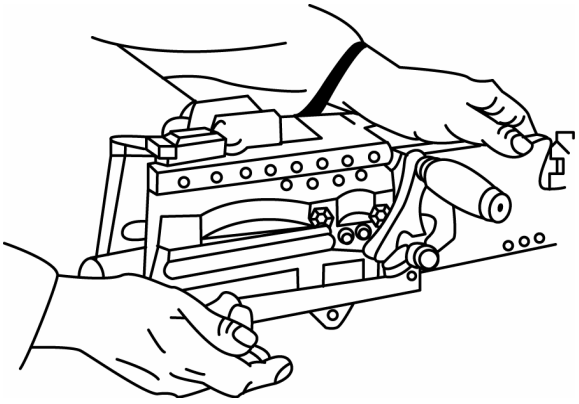
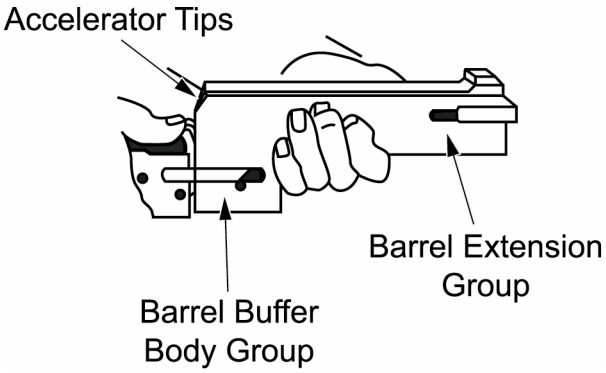
Remove the bolt group from the receiver by following the steps listed in the table below.

Step	Action
1	Grasp the retracting slide handle and give it a quick jerk, freeing the bolt from the barrel extension.
2	Align the collar of the bolt stud with the clearance hole in the bolt slot on the right sideplate and remove the bolt stud, as shown below. 
3	Slide the bolt to the rear and out of receiver, as shown below. 
4	Place the bolt down on its right side (with the extractor arm up) so that the extractor will not fall from the bolt.

Continued on next page

Barrel Extension and Buffer Body Group

Follow the steps below to remove the barrel buffer body group and the barrel extension group from the M2 HB .50-caliber machinegun.

Step	Action
1	Insert a combination tool (or pointed instrument) through the hole in the lower rear corner of the right sideplate.
2	Push in on the barrel buffer body lock. At the same time, place one hand on the receiver and push the barrel extension and barrel buffer body groups to the rear, as shown in the picture below. 
3	Remove both groups from the receiver.
4	Separate the two groups by pushing forward on the tips of the accelerator, as shown below. 

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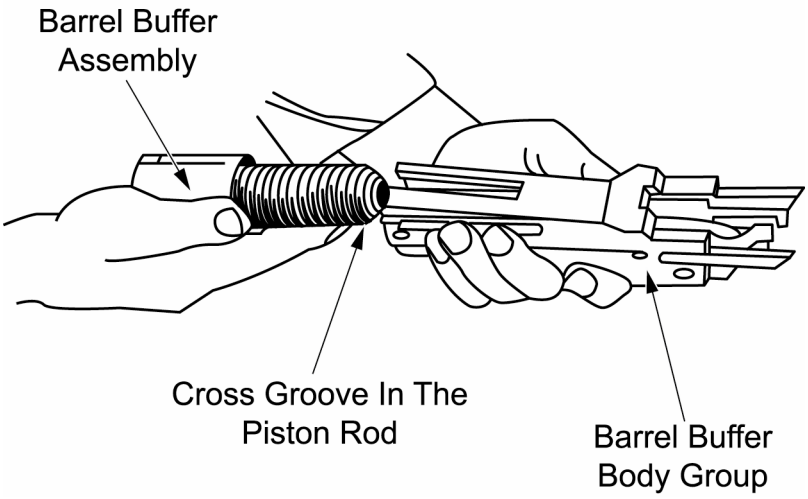
Barrel Buffer Assembly

The last disassembly step is to pull the barrel buffer assembly from the rear of the barrel buffer body group, as shown below.



Cleaning

Maintenance Schedule

Care, cleaning, and maintenance determine whether or not your machinegun will function properly when you need it. You should maintain your M2 HB .50-caliber machinegun on a regular basis. As a general rule, you should clean your machinegun:

- After firing
- At least daily when under combat/field conditions
- Several times per day when under extreme climatic conditions
- For three consecutive days upon returning from the field
- Every five days when the gun is in storage

Cleaners and Lubricants

The table below lists several types and functions of cleaners and lubricants you can use on the M2 HB .50-caliber machinegun.

Type	Function
Cleaner and lubricant-preservative (CLP)	Cleans, lubricates, and preserves. Note: This is the preferred cleaner and lubricant for the .50-caliber machinegun.
Rifle bore cleaner (RBC)	Cleans powder residue, carbon, and dirt. Note: You must lubricate the weapon after using RBC.
PL special (lubricating oil, general purpose)	Lubricates and preserves. Note: The thin oil may be used as a temporary measure to lubricate entire weapon if you do not have CLP.
Lubricant, semi-fluid, automatic weapons (LSA)	Used on friction-producing parts and on the exterior of the weapon. Note: This thicker oil lasts longer than CLP and will not burn off by firing or wash away with rain.
Lubricant, arctic weather (LAW)	Used for extremely cold weather (below 0^{o} Fahrenheit).
Hot soapy water	Used on the barrel when RBC or CLP are not available. Note: Dry barrel and apply a thin coat of PL special after using hot, soapy water.
Dry cleaning solvent	Do not use on handguards; keep away from plastic parts.

Continued on next page

Procedure

After you disassemble the weapon into its major components, you can begin to clean the different parts.

The following table lists the steps to properly clean the M2 HB .50-caliber machinegun.

Step	Action
1	Inspect all parts for cracks, burrs, wear, or rust.
2	Clean the bore and chamber with RBC and lightly oil with PL special.
3	Clean metal parts thoroughly and apply a light coat of CLP. Notes: Do not apply CLP to the metal parts that may come in contact with the ammunition. Do not use cleaning agents or CLP on plastic or wooden parts.
4	Reassemble the weapon. Be sure the exterior is lightly oiled.
5	Clean and lubricate the mount and accessories.

Inspecting

Procedure

When you conduct an inspection, the machinegun should be completely assembled and mounted with the headspace and timing properly set. The following table lists the steps to inspect the M2 HB .50-caliber machinegun.

Step	Action
1	Inspect the bore and chamber for rust. Be sure they are clean and lightly lubricated.
2	Operate the retracting slide handle and the bolt latch release several times to see if the parts function without excessive friction. Be sure that moving parts are lightly lubricated.
3	Check headspace and timing with gauges.
4	Be sure the rear sight is in good condition, clean, and lightly lubricated. Set the elevation to 1000 and windage to zero.
5	Inspect the mount to be sure it is clean and lightly lubricated and that all clamps are securely tightened.
6	Inspect spare parts and tools to be sure they are clean.

Lesson 2 Exercise

Directions Complete items 1 though 6 by performing the actions required. Check your answers against those listed at the end of this lesson.

Item 1 What is the last step you must accomplish to clear the M2 HB .50-caliber machinegun?

a. Close the feed cover and pull the bolt to the rear.
b. Close the feed cover assembly.
c. Place the machinegun in the single shot mode.
d. Pull the retracting slide handle to the rear.

Item 2 After removing the barrel from the receiver of the M2 HB .50-caliber machinegun, what is the next part/item for disassembling?

a. Backplate
b. T-block
c. Bolt
d. Drive spring

Item 3 Clean your M2 HB .50-caliber machinegun _____ to ensure it is in proper working order while deployed in a desert environment with constant high winds and sand storms.

a. after firing
b. several times per day
c. at least daily
d. for three consecutive days

Continued on next page

Item 4 What is the preferred cleaner and lubricant for use on your M2 HB .50-caliber machinegun?

a. RBC
b. CLP
c. PL special
d. Hot soapy water

Item 5 After ensuring the exterior is lightly oiled, what is the next step in cleaning?

a. Remove the backplate.
b. Remove the T-block.
c. Use CLP to clean all metal parts that may contact ammunition.
d. Clean and lubricate the mount and accessories.

Item 6 What is the first step in inspecting the M2 HB .50-caliber machinegun?

a. Check headspace and timing with gauge.
b. Inspect spare parts and tools to be sure the are clean.
c. Inspect the bore and chamber for rust and be sure they are clean and lightly lubricated.
d. Inspect the mount to be sure it is clean, lightly lubricated, and that all clamps are securely tightened.

Continued on next page

Answers

The table below provides the answers to the exercise items. If you have any questions, refer to the reference page listed for each item.

Item Number	Answer	Reference Page
1	b	1-18
2	a	1-20
3	b	1-25
4	b	1-25
5	d	1-26
6	c	1-27

LESSON 3

OPERATIONS

Introduction

Scope

This lesson covers the procedures to assemble and perform a function check on the M2 HB .50-caliber machinegun.

Learning Objectives

After completing this lesson you should be able to

- Identify the steps to assemble the M2 HB .50-caliber machinegun.
- Identify when/why you should perform a function check on the M2 HB .50-caliber machinegun.
- Identify the procedure to set headspace and adjust timing on the M2 HB .50-caliber machinegun.
- Identify the steps to perform a function check on the M2 HB .50-caliber machinegun.

In This Lesson

This lesson contains the following topics:

Assembling

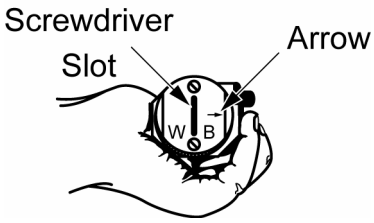
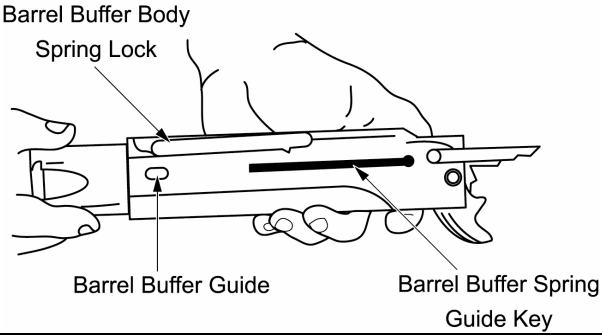
Procedure

To assemble the .50-caliber machinegun, replace the groups in the reverse order of disassembly. Assembly is accomplished by completing the procedures below.

Step	Action
1	Connect the barrel buffer group.
2	Install the barrel buffer and extension groups.
3	Install the bolt stud.
4	Assemble the drive spring.
5	Reassemble the backplate.
6	Reassemble the barrel.

Connecting the Barrel Buffer Group

The following table lists the steps to connect the barrel buffer assembly and the barrel buffer body.

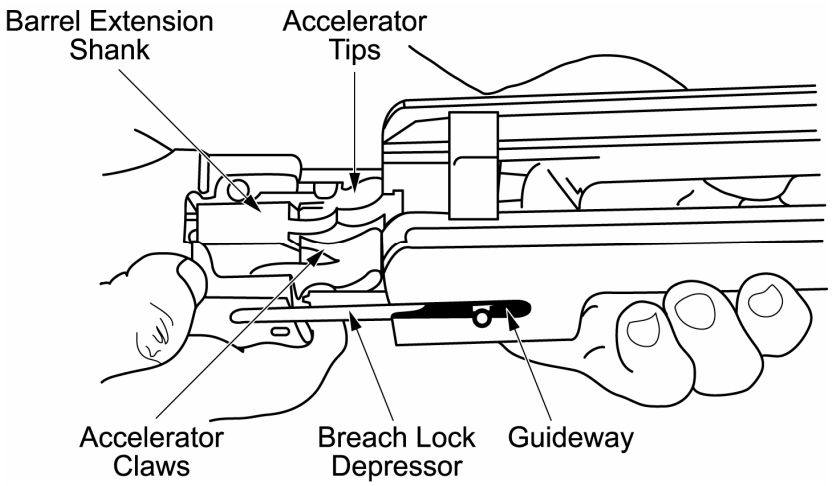
Step	Action
1	Turn the barrel buffer tube until the screwdriver slot in the rear of the tube is vertical and the arrow points to the right, as shown below. 
2	Push the barrel buffer assembly fully forward, as shown below. Ensure the barrel buffer guide is aligned with the barrel buffer spring guide key. 

Note: Pick up barrel buffer assembly carefully so it does not fall apart.

Continued on next page

Installing the Barrel Buffer and Extension Groups

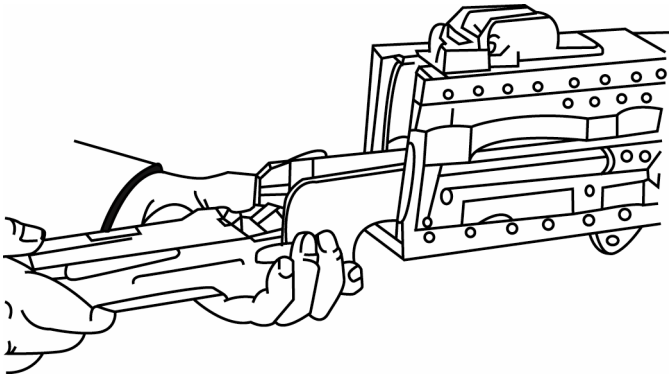
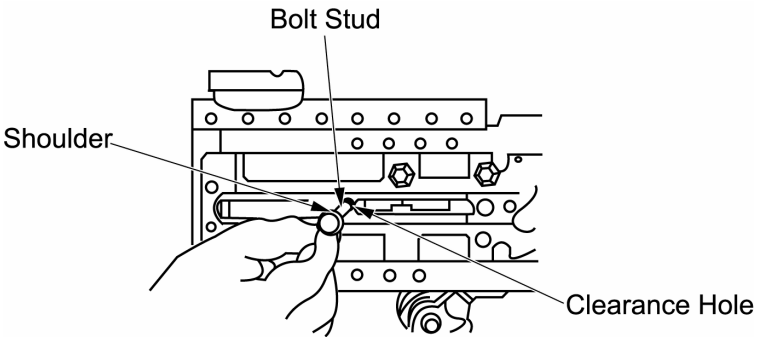
The following table lists the steps to join the barrel buffer and the barrel extension groups.

Step	Action
1	Hold the barrel buffer group in your right hand with your index finger supporting the accelerator.
2	Join the notch on the shank of the barrel extension group with the cross-groove in the piston rod of the barrel buffer assembly. At the same time, align the breech lock depressors with the guideways in the sides of the barrel extension, as shown below. 
3	Push the groups together. Note: The accelerator should rotate rearward.
4	Place the groups in the receiver and push them forward until the barrel buffer body spring lock snaps into position. Note: The barrel buffer tube should protrude about 1 1/8 inches from the rear of the barrel buffer body group.

Continued on next page

Install Bolt Stud

The following table lists the steps to install the bolt stud and lock the barrel buffer, barrel extension group, and bolt into the receiver.

Step	Action
1	Look at the bolt to be sure the extractor assembly is down and the cocking lever is inclined to the front.
2	Align the rails on the bolt with the grooves on the barrel extension and slide the bolt about halfway onto the barrel extension.
3	Insert the barrel buffer, barrel extension, and bolt into the back of the receiver, as shown below.  Note: You should hear two clicks: One for the body lock snapping in and another for the bolt latch connecting with the top of the receiver.
4	Press up on the bolt latch and push the bolt forward until the hole is aligned with the clearance hole on the right side of the receiver.
5	Reassemble the bolt stud and push the bolt as far forward as you can. 

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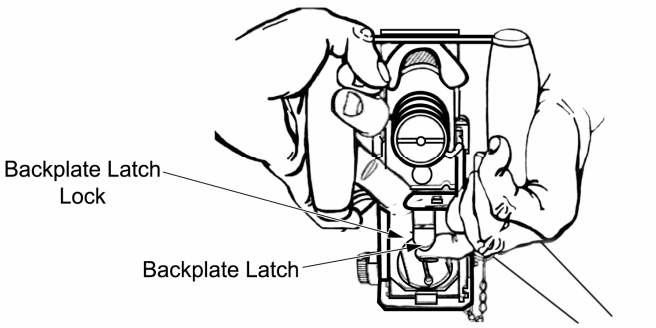
Reassemble the Drive Spring

The following table lists the steps to reassemble the drive spring.

Step	Action
1	Insert the spring into the hole, near the rear of the bolt, and push it in.
2	Press in and to the right until the retaining pin slips into the hole on the right sideplate. Note: The spring will be slightly compressed.
3	If the buffer does not go all the way into the receiver with the bolt, take the barrel buffer, barrel extension, and bolt out of the receiver and repeat the previous steps.

Replace the Backplate

The following table lists the steps to replace the backplate.

Step	Action
1	Pull the backplate latch lock out and slide the backplate onto the back of the receiver.
2	Continue to hold the backplate latch lock out, and lightly tap the backplate down with your hand, until it is all the way down, as shown in the picture below. 
3	Release the latch.

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Replace the Barrel

The following table lists the steps to replace the barrel.

Step	Action
1	Pull back the retracting slide handle until the lug on the barrel locking spring is visible through the 3/8-inch hole in the right sideplate.
2	Place the barrel into the front of the receiver and carefully start the threads.
3	Screw the barrel all the way in, then back it off two clicks.
4	Close the cover.

Summary

Assembling the components of the M2 HB .50-caliber machinegun is just the first step of operator maintenance. The next step is to ensure the weapon is properly assembled.

Performing a Function Check

Frequency

Conducting a function check of the M2 HB .50-caliber machinegun is to ensure the weapon is correctly assembled before firing. This ensures the weapon is in working order.

Note: You must set headspace and adjust the timing before conducting a function check.

Headspace Definition

Headspace is the distance between the face of the bolt and the chamber when a round is fully seated in the chamber.

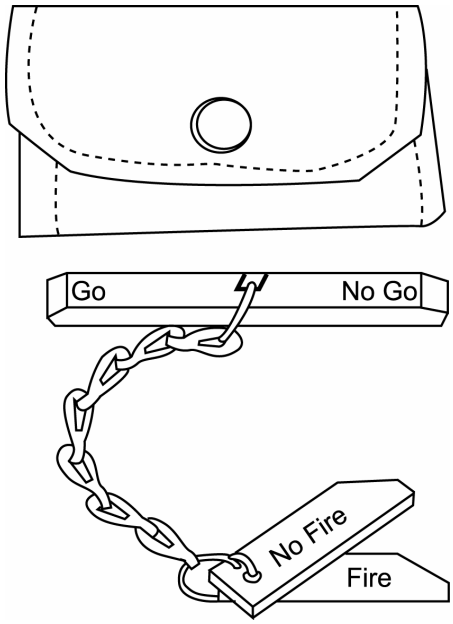
Setting Headspace

Setting proper headspace is critical to the operation of the M2 HB .50-caliber machinegun. The correct headspace allows room for the rim of the round when chambered. The following table describes the results of incorrect headspace.

IF the headspace is set too…	THEN…
Tight	Firing will be sluggish and slow.
Loose	Cartridge cases may bulge or even explode in the receiver.

Headspace Gauge

To set headspace on the M2 HB .50-caliber machinegun the operator needs the gauges shown below.



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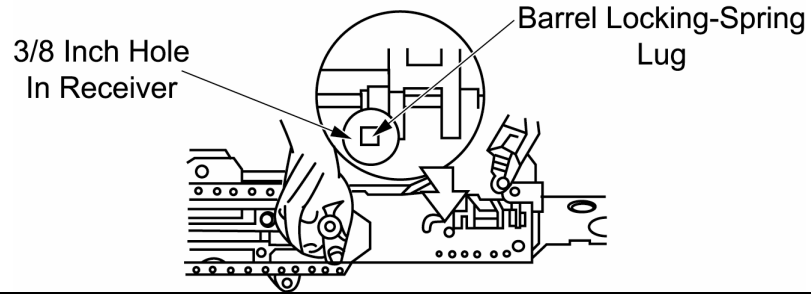
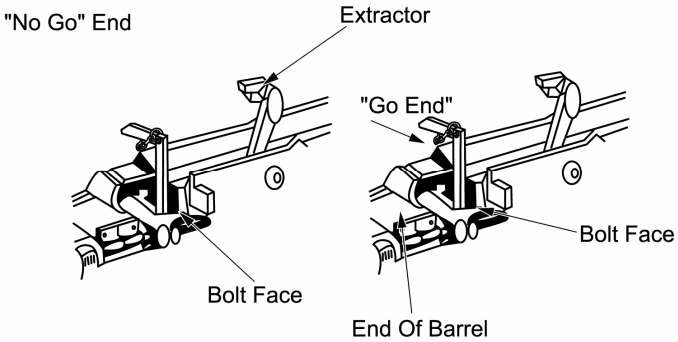
Setting Headspace

Follow the steps in the table below to set headspace.

Step	Action
1	Ensure the gun cleared, bolt is forward, and cover is open.
2	Pull back on the retracting slide handle until the locking spring lug aligns with the 3/8-inch hole on the right sideplate, as shown in the picture below. Back barrel off two clicks from the right. 
3	With palms up, grasp the retracting slide handle and pull the bolt to the rear.
4	Pull the bolt back 1/16-inch and raise the extractor arm up.
5	Insert the GO end of the headspace gauge between the face of the bolt and the chamber, as shown below. 
6	**IF the GO end...** / **THEN…** Fits → Go to step 7. Does not fit → Go to step 8.
7	Turn the gauge over and try to insert the NO GO end. **IF the NO GO end…** / **THEN…** Does not fit → The headspace is correct and you have completed setting headspace. Fits → Go to step 9.
8	Unscrew the barrel one click and repeat step 5.
9	Screw the barrel in one click and try to insert the GO end of the headspace gauge and repeat step 6.

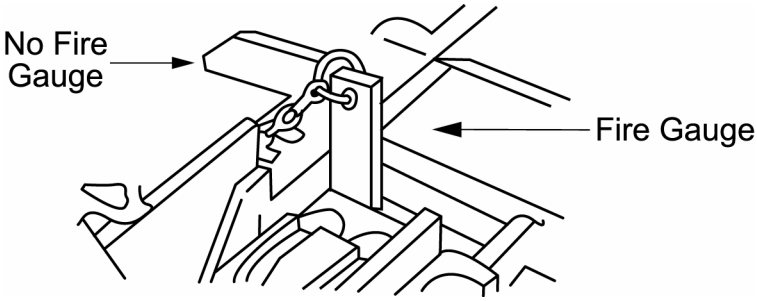
Continued on next page

Timing

Timing is achieved by adjusting the machinegun so the moving parts do the right thing at the right time during the cycle of operation. Firing actually takes place just before the bolt is completely forward. The machinegun must be adjusted to be sure this happens. Timing must be checked and adjusted each time headspace is set or when timing is questionable and after assembly and cleaning.

Timing Gauges

The picture below shows the placement of the timing gauges between the bolt and barrel assembly. In this case, the fire gauge has been inserted.



Preparing the Machinegun

The operator must ensure the following items from the table below are completed before adjusting timing.

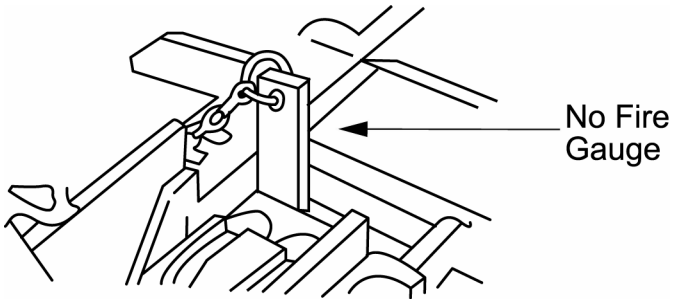
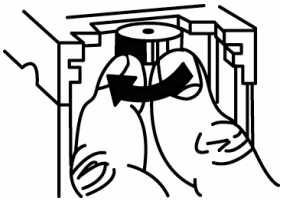
Note: Timing must be checked every time headspace adjustment is completed.

Step	Action
1	Cock the machinegun.
2	Ride the bolt slowly home.
3	Raise the feed cover.
4	Raise the extractor.

Continued on next page

Adjusting Timing

After ensuring the weapon is prepared, perform the following steps from the table below to adjust timing.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Pull the retracting handle back until you have a ¼-inch space between the barrel extension and the trunnion block.</td></tr>
<tr><td>2</td><td>Insert the “No Fire” gauge between the barrel extension and the trunnion block with the beveled edge of the gauge resting on the barrel notches, as shown below:
 
</td></tr>
<tr><td>3</td><td>Slowly let the barrel extension close by releasing the retracting slide handle.</td></tr>
<tr><td>4</td><td>Depress the trigger then and refer to the table below:
<table><tr><th>IF weapon does…</th><th>THEN go to…</th></tr><tr><td>Not fire</td><td>Step 16.</td></tr><tr><td>Fire</td><td>Step 5.</td></tr></table></td></tr>
<tr><td>5</td><td>Remove gauge and cock weapon.</td></tr>
<tr><td>6</td><td>Insert the “Fire” gauge, as stated in step 2.</td></tr>
<tr><td>7</td><td>Remove the backplate, ensuring that the bolt is forward and spades are down.</td></tr>
<tr><td>8</td><td>Screw the timing adjustment nut, as shown in the picture below, to the left until it rests lightly on the trigger lever.
  </td></tr>
</table>

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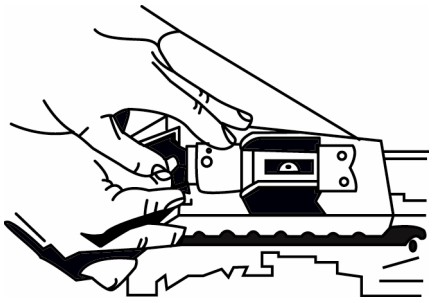
Adjusting Timing, continued

Step	Action
9	Turn the adjustment nut to the right with one click.
10	With firm upward pressure, push up on the trigger lever, as shown in the picture below. 
11	Repeat steps 9 and 10 until the firing pin releases (fires).
12	When the firing pin releases, turn the timing adjustment nut two additional clicks to the right.
13	Replace the backplate and remove the Fire gauge. **WARNING**: Never attempt to cock the machinegun with the backplate off.
14	With palms up, grasp the retracting slide handle, pull the handle back, and release it to cock weapon.
15	Repeat steps 2 through 4.
16	Insert the "Fire" gauge.
17	Try to fire the machinegun by pressing the trigger. **IF the machinegun…** / **THEN…** Fires / Timing is correct, stop. Does not fire / Go to step 6.

Continued on next page

Performing a Function Check, Continued

Procedure The table below lists the procedure to perform a function check.

Step	Action
1	Place the weapon in single-shot mode.
2	Open the cover and lock the bolt to the rear.
3	Return the retracting slide handle to full forward position and press the bolt latch release.
4	Press down on the trigger. The weapon should fire.
5	Place the weapon in the automatic-fire mode.
6	With palms up, pull the retracting slide handle to the rear and release.
7	Make sure the firing pin does not protrude.
8	Press down on the trigger. The weapon should fire.
9	Make sure the firing pin does protrude.

Lesson 3 Exercise

Directions Complete items 1 through 4 by performing the actions required. Check your answers against those listed at the end of this lesson.

Item 1 What is the next step in assembling the M2 HB .50-caliber machinegun after installing the barrel buffer and extension group?

a. Replace the drive spring and T-block.
b. Replace the barrel buffer group only.
c. Install the bolt stud.
d. Replace the T-block and barrel buffer and barrel extension groups.

Item 2 When and why should function checks of the M2 HB .50-caliber machinegun be performed?

a. After firing and to ensure correct assembly
b. After firing and to determine if headspace needs to be timed
c. Before firing and to determine if the timing needs adjusting
d. Before firing and to ensure weapon is in working order

Item 3 You are setting headspace and have just inserted the GO end of the headspace gauge. The GO end did not fit. What is your next step?

a. Insert the NO GO end of the headspace gauge.
b. Unscrew the barrel one click and insert the GO end of the headspace gauge between the face of the bolt and chamber.
c. Your headspace is correct. Continue with the function check.
d. Take the machinegun to armory for maintenance check.

Item 4 What is the first step in performing a function check on the M2 HB .50-caliber machinegun.

a. Return the retracting slide handles to the fall forward position.
b. Pull the retractor slide handle to the rear and release it.
c. Place the weapon in single shot mode.
d. Make sure firing pin does not protrude.

Continued on next page

Answers

The table below provides the answers to the exercise items. If you have any questions, refer to the reference page listed for each item.

Item Number	Answer	Reference Page
1	c	1-32
2	d	1-37
3	b	1-38
4	c	1-42

LESSON 4

FIRING

Introduction

Scope

The objective of this lesson is to discuss how to sight, fire, identify a malfunction or stoppage, and apply immediate action to the M2 HB .50-caliber machinegun.

Learning Objectives

After completing this lesson, you should be able to

- Identify correct sight alignment for the M2 HB .50-caliber machinegun.
- Identify the procedures for each firing mode for the M2 HB .50-caliber machinegun.
- Identify firing positions for the M2 HB .50-caliber machinegun.
- Identify the types of malfunctions, causes, and corrective actions for the M2 HB .50-caliber machinegun.
- Identify common stoppages for the M2 HB .50-caliber machinegun.
- Identify the steps of immediate action for the M2 HB .50-caliber machinegun.

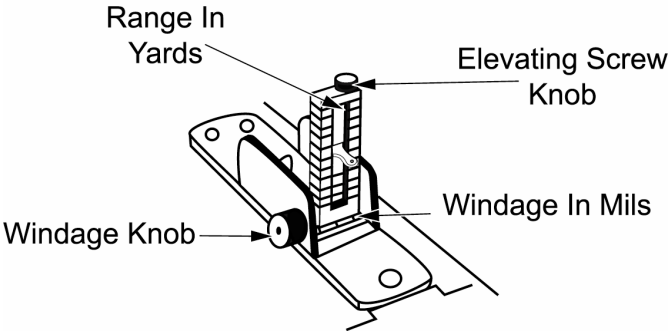
In This Lesson

This lesson contains the following topics:

Sighting

Rear Sight

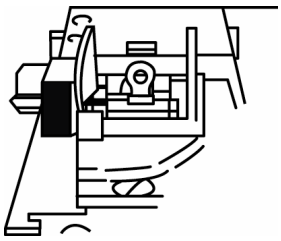
The M2 HB .50-caliber machinegun has a leaf-type rear sight, as shown in the picture below:



The rear sight is graduated in both yards and mils from 100 to 2,600 yards and from 0 to 62 mils and has two positions, down and up.

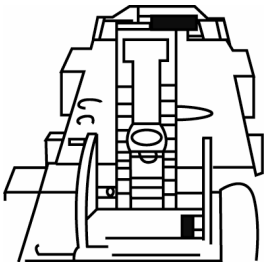
Down

When in the down position, as shown in the picture below, it is used for ranges from 0 to 400 yards.



Up

When in the up position, as shown in the picture below, it is used for ranges from 400 to 2600 yards.



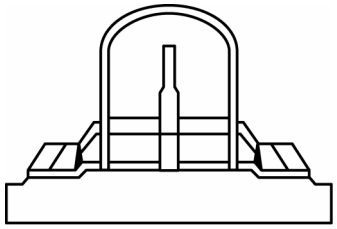
The rear sight aperture should be in the up position; the peep sight should be in the down position.

Continued on next page

Sighting, Continued

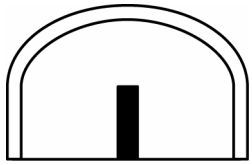
Front Sight

The front sight is a semi-fixed blade type with cover, as shown in the picture below.



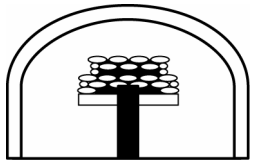
Sight Alignment

Using the rear sight aperture and the front sight blade in combination is called sight alignment. Correct sight alignment for the .50-caliber machinegun occurs when the front sight blade is centered and halfway up in the rear sight aperture, as shown in the picture below.



Sight Picture

A proper sight picture occurs when the top edge of the front sight is at the center base of the target while maintaining sight alignment, as shown in the picture below.

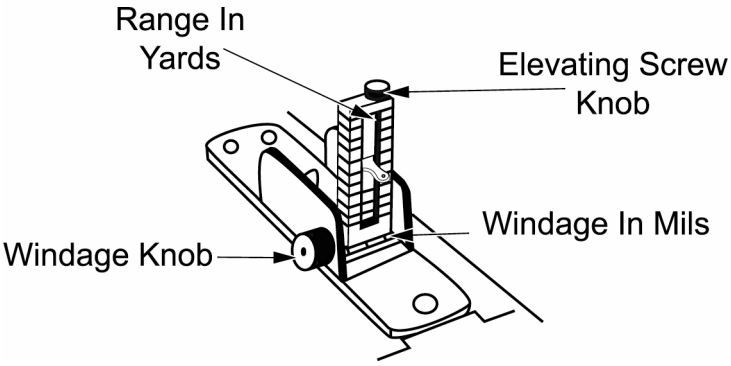


Note: Center base to assess impact of rounds.

Continued on next page

Adjusting Sights

You can adjust the rear sight for both elevation and windage as shown in the picture below.



Elevation

To change elevation, turn the elevation knob (on the top of the sight) so the index line moves to the required elevation scale line. The odd-numbered elevation scale is on the left and the even-numbered scale is on the right in increments of 100.

Windage

To change windage, turn the windage knob (at the bottom on the left side of the sight) forward or back. The windage knob permits a change of five mils left or right of center.

Firing

Two Modes

Firing the M2 HB .50-caliber machinegun is not complicated. You must load the gun differently for both modes which are the

- Automatic firing mode
- Single shot mode

Automatic Firing Mode

The table lists the steps to load the M2 HB .50-caliber machinegun for the automatic firing mode.

Step	Action
1	Clear the machinegun.
2	Close the bolt by pressing the bolt latch release. Use the retracting slide handle to slowly ride the bolt home.
3	Close the feed cover.
4	Lock down the bolt latch release by pressing down on the bolt latch release and rotating it to the left until it is locked in the down position. This sets the gun for automatic fire.
5	Insert the belt of ammunition into the feedway until you hear the click of the belt-holding pawl engaging the belt of ammunition.
6	Cock the gun by vigorously pulling back the retracting slide handle "palms up" and then releasing it, allowing the drive spring to carry the handle and bolt group forward. This is called half-loading. If the trigger is pushed, the gun will not fire.
7	Be sure to re-cock the gun as you did in step 6 so the gun is fully loaded. Now, when you push the trigger, the machinegun will fire in the automatic mode.

Continued on next page

Single-Shot Mode

The following table lists the steps to load the .50-caliber machinegun so that it fires one round at a time.

Step	Action
1	Clear the machinegun.
2	Close the bolt by pressing the bolt latch release. Use the retracting slide handle to slowly ride the bolt home.
3	Close the feed cover.
4	Make sure the bolt latch release is in the up position and the bolt latch release lock is to the right. The gun is now set for single shot firing.
5	Insert the belt of ammunition into the feedway until you hear a click.
6	Cock the gun by vigorously pulling back the retracting slide handle. The bolt will lock to the rear.
7	Push the bolt latch release allowing the drive spring to carry the bolt group forward. The gun is now half-loaded.
8	Repeat steps 6 and 7 to fully load the gun. When the trigger is pushed, the gun will fire one round and then the bolt will lock to the rear.
9	To fire another round, you must first push down on the bolt release, allowing the bolt to go home under the power of the drive spring.

Continued on next page

Firing, Continued

Firing Positions

When the M2 HB.50-caliber machinegun is mounted on the M3 tripod, you can use the

- Prone position
- Sitting with legs folded
- Sitting with legs extended (over tripod)
- Standing
- Dug-in fighting positions

Hand Placement

In any of these five positions, your grip will be the same. With your right hand on the spade grip and your thumb in position to press the trigger, use a light grip with a slight downward pressure. Your left hand should be palm down on the elevating hand wheel and applying a slight downward pressure. When you fire, use long bursts (8–10 rounds) and watch for the impact to make adjustments.

When Mounted

When the machinegun is mounted on a vehicle mount, place both hands on the spade grips with your thumbs in position to press the trigger. Keep your elbows tucked to your sides and lean forward until your chest touches your hands. Brace your body and arms firmly during firing.

Continued on next page

Field Zeroing

Field zeroing involves the adjustment of the sights so that the rounds will hit where you are aiming. The following table lists the steps to field zero the M2 HB .50-caliber machinegun.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Use the “2-2-2” rule.</td></tr>
<tr><td>2</td><td>Determine the range to the target.</td></tr>
<tr><td>3</td><td>Adjust the rear sight for elevation according to the range you just determined in step 1.</td></tr>
<tr><td>4</td><td>Center the windage scale by turning the windage knob until the centerlines are aligned. Be sure the bolt is forward now with a round in the chamber.</td></tr>
<tr><td>5</td><td>Obtain proper sight alignment and sight picture on the target using the T&E handwheels.</td></tr>
<tr><td>6</td><td>Fire one round and observe the strike.
<table>
<tr><th>IF the round…</th><th>THEN…</th></tr>
<tr><td>Hits where you are aiming</td><td>The gun is zeroed.</td></tr>
<tr><td>Does not hit where you are aiming</td><td>Go to step 6.</td></tr>
</table></td></tr>
<tr><td>7</td><td>Without moving the gun, sight in on the point of impact.

<u>Note</u>: Move the rear sight elevation and windage knobs, not the T&E handwheels!</td></tr>
<tr><td>8</td><td>Press the bolt latch release to send the bolt forward, chambering another round.</td></tr>
<tr><td>9</td><td>Obtain sight alignment and sight picture on the original target by using the T&E handwheels.</td></tr>
<tr><td>10</td><td>Fire one round and observe where the round hits.
<table>
<tr><th>IF the round…</th><th>THEN…</th></tr>
<tr><td>Hits where you were aiming</td><td>The gun is zeroed.</td></tr>
<tr><td>Does not hit where you were aiming</td><td>Repeat steps 6 through 9 until a round hits the target.</td></tr>
</table></td></tr>
</table>

Malfunctions and Stoppages

Malfunctions

Malfunctions and stoppages can occur at any time when you fire the M2 HB .50-caliber machinegun. You and your crew must know what the problem is and how to correct it. A malfunction is any failure of the gun to function satisfactorily. The table below contains the two types of malfunctions that normally occur, the cause of the malfunction and the corrective action.

Type of Malfunctions	Cause	Corrective Action
Failure to function freely (sluggish operation)	Human failure to eliminate excessive friction caused by dirt, lack of proper lubrication, burred parts, tight headspace adjustment, or incorrect timing	Clean, lubricate, and reset headspace and timing.
Uncontrollable automatic fire (runaway gun)	Defective parts	Keep gun laid in on target and twisting the ammunition belt, so the gun jams. If only a few rounds are on the belt, let the gun fire them out. Report the problem to your armorer.

Continued on next page

Stoppages

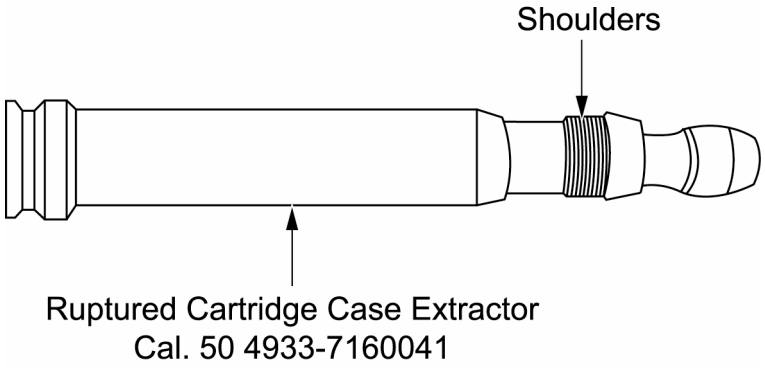
A stoppage is any interruption in the cycle of operation caused by the faulty action of the gun or ammunition. The following table lists the common stoppages, their causes, and steps to correct them.

Type of Stoppage	Cause	Corrective Action
Failure to feed	Defective ammunition belt • Defective feed mechanism • Improperly loaded belt	Change ammunition belt. Check the feedway by pushing down on the feed pawls to be sure enough spring tension exists to hold the belt place.
Failure to chamber	Obstruction in T-slot or chamber	Inspect the chamber and the T-slot for an obstruction or dirt, and then clear them. You may use a cleaning rod or other tool to help push the obstruction (usually a cartridge case) out of the bottom of the receiver.
	Ruptured case	If a ruptured cartridge case is stuck in the chamber, try to force it out by inserting a cleaning rod into the muzzle of the weapon and pushing. If this fails, you must use a ruptured cartridge case extractor.
Failure to fire	• Defective ammunition • Defective parts in firing mechanism	Change the ammunition belt. Inspect parts of firing mechanism for defects.

Continued on next page

Using the Ruptured Cartridge Case Extractor

The following table lists the steps for using the ruptured cartridge case extractor shown in the picture below.



Step	Action
1	With palms up, raise the cover and pull bolt to the rear.
2	Place the ruptured case extractor in the T-slot of the bolt, as you would a cartridge. The ejector of the extractor assembly will hold the extractor in line with the bore.
3	With the ruptured cartridge extractor aligned, let the bolt go forward. This forces the extractor through the ruptured case, and the shoulders will spring out in front of the case.
4	With palms up, pull the bolt to rear and remove the ruptured case and the extractor.

Immediate Action

Procedure

Immediate action is the procedure you use when a stoppage of fire occurs and you cannot stop to analyze its cause. The gunner usually performs immediate action; however, every crewmember must know how to apply it. The following table lists the steps to take immediate action.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Call “Misfire.” Wait 5 seconds. A hang-fire may be causing the misfire. If the gun is very hot, it may “cook off” the round.</td></tr>
<tr><td>2</td><td>Cock the gun and observe for feeding and ejecting.</td></tr>
<tr><td>3</td><td>Re-lay on target.</td></tr>
<tr><td>4</td><td>Try to fire.
<table>
<tr><th>IF the gun…</th><th>THEN…</th></tr>
<tr><td>Fires</td><td>Continue with your mission.</td></tr>
<tr><td>Does not fire</td><td>Clear the gun and inspect it to determine the cause of the stoppage.</td></tr>
</table>
</td></tr>
</table>

Lesson 4 Exercise

Directions Complete items 1 through 10 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 The front sight blade _____ when the sight alignment for the M2 HB .50-caliber machinegun is correct.

a. is at the bottom of the rear sight aperture
b. is at the top of the rear sight aperture
c. blocks out the entire rear sight aperture
d. is centered and halfway up in the rear sight aperture

Item 2 You are loading your M2 HB .50-caliber machinegun to fire in the automatic firing mode. You have cleared the gun, closed the bolt, and closed the feed cover. Which step will you perform next?

a. Cock the gun.
b. Press the trigger.
c. Press down on the bolt latch release and rotate the bolt latch release lock until the bolt latch release is locked in the down position.
d. Insert the belt of ammunition into the feedway.

Item 3 Which one of the following is a firing position for the M2 HB .50-caliber machinegun when mounted on the M3 tripod?

a. Bent leg prone
b. Sitting with legs folded
c. Kneeling
d. Supported standing

Continued on next page

Item 4

You have been on the range firing your M2 HB .50-caliber machinegun and you notice that it is not functioning freely and is operating sluggishly. What corrective action should you take?

a. Change the belt of ammunition.
b. Inspect the chamber and the T-slot for an obstruction.
c. Keep the machinegun laid on target and twist the ammunition belt.
d. Clean and lubricate your machinegun, and then reset headspace and timing.

Item 5 Through Item 9

Matching: For items 5 through 9 match the failure identification from column 2 that best describes the failure item in column 1. The answers in column 2 may be used more than once.

Column 1	**Column 2**
Failure Item	**Failure Identification**
___ 5. Failure to function freely	a. Malfunction
___ 6. Failure to fire	b. Stoppage
___ 7. Failure to feed	
___ 8. Failure to chamber	
___ 9. Uncontrollable automatic fire	

Item 10

What is the first thing the gunner must do while performing immediate action?

a. Clear the gun and inspect it to determine the cause of the stoppage.
b. Attempt to fire again.
c. Re-lay on target.
d. Wait 5 seconds to see if the round will "cook off."

Continued on next page

Answers

The following table provides the answers to the items on the previous page. If you have any questions concerning this summary check, refer back to the reference page listed for each item.

Item Number	Answer	Reference Page
1	d	1-47
2	c	1-49
3	b	1-51
4	d	1-53
5	a	1-53
6	b	1-54
7	b	1-54
8	b	1-54
9	a	1-53
10	d	1-56

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STUDY UNIT 2

MK19 MACHINEGUN

Overview

Scope

This study unit will cover the characteristics, operation, maintenance, immediate action, care and cleaning techniques, and firing procedures for the MK19 machinegun.

In This Study Unit

This study unit contains the following lessons:

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LESSON 1

GENERAL INFORMATION

Introduction

Scope

This lesson discusses the basic characteristics, capabilities, and operation of the MK19 machinegun and the ammunition it uses.

Learning Objectives

After completing this lesson, you should be able to

- Identify the capabilities of the MK19.
- Identify the cycle of operation for the MK19.
- Identify the standard types of ammunition for the MK19 based on use.

In This Lesson

This lesson contains the following topics:

Role and Capabilities

Role

The MK19 provides a high volume of fire that is effective against lightly armored vehicles, structures, and personnel.

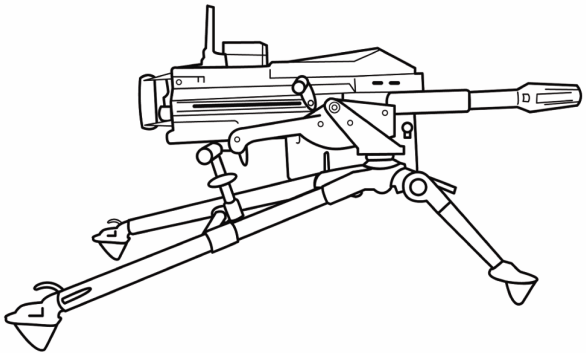
Capabilities

The capabilities of the MK19 are to

- Support the infantry in the attack or defense
- Provide a heavy volume of destructive/suppressive fire
- Provide fires for the final protective fire (FPF)
- Provide protection for motorized movement
- Destroy lightly armored vehicles
- Perform reconnaissance by fire

Characteristics

Appearance Below is an illustration of the MK19 mounted on a tripod.



Weight The approximate weight of the MK19 is 75.6 pounds.

Length The length of the MK19 is 43.1 inches.

Range The following table lists the range (in meters) for the MK19.

Type of Range	Distance, Meters
Maximum	2,212
Maximum effective-area target	2,212
Maximum effective-point target	1,500
Minimum safe distance-training	310
Minimum safe distance combat	75

Rates of Fire The following table lists the rate of fire (in rounds per minute) for the MK19.

Rate	Rounds per Minute
Sustained (3–5)	40
Rapid (5–10)	60
Cyclic (Continuous burst)	325–375

Muzzle Velocity The muzzle velocity of the MK19 is 790 feet per second.

Continued on next page

Characteristics, Continued

Descriptive Characteristics

The table below describes the three descriptive characteristics of the MK19.

Operation	Description
Belt-fed, closed-bolt	When the rounds of ammunition are linked together, they form a belt. During firing, the links disengage but remain on the cartridge case. Feeding is continuous throughout the cycle.
Air-cooled	The MK19 is an air-cooled weapon. No special cooling measures are required. Air circulation at normal outside air temperatures provides adequate cooling in any climate.
Blowback-operated	This term is used for weapons that are directly operated by the exploding propellant charge.

Cycle of Operation

Stages

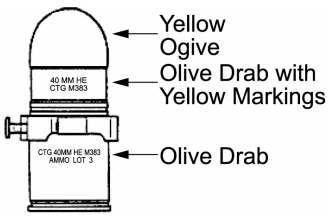
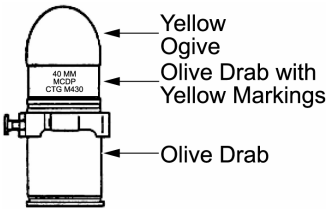
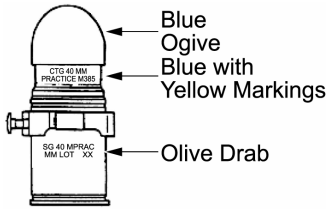
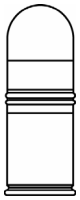
The cycle of operation for the MK19 consists of the stages shown in the table below.

Stage	Action
1	Feeding: When the bolt moves forward it forces the pawls of the feed slide assembly to position a new round in the feeder. As the bolt moves to the rear it forces the round from the feeder into the extractors and in position to chamber.
2	Chambering: The bolt moves forward on the rail and seats the round in the chamber.
3	Locking: Locking takes place when the bolt reaches the forward-most position by the recoil springs and held in place by spring tension and the weight of the bolt.
4	Firing: As locking occurs, the cocking lever is moved to the rear and allows the firing pin mechanism to strike into the primer of the round.
5	Unlocking: As the round fires the pressure from the gas overcomes the tension of the spring, and moves the bolt to the rear.
6	Extracting: The rearward movement of the bolt along the rails pulls the casing out of the chamber.
7	Ejecting: The vertical cam forces a new round into position and ejects the spent casing out through the ejection port.
8	Cocking: Simultaneously with ejection, the cocking lever is moved forward, cocking the firing pin.

Ammunition

Types

The MK19 fires 40mm ammunition. Each type is designed for a specific situation or mission. The table below shows the name, type, and characteristics of each round.

Name	Type	Characteristics
M383/M384 	High explosive, anti-personnel (HE)	• Point detonating • Inflicts personnel casualties with ground burst • Casualty radius, 15 meters
M430 	High explosive, dual purpose (HEDP)	• Standard round for MK19 • Impact detonating • Used against lightly armored vehicles, fortifications and personnel • Casualty producing radius, 15 meters
M918/M385 	Practice Note: The M385 round is inert and has no blast effect in the target area.	• Solid aluminum projectile • Simulates explosion upon impact • Used in range gunnery practice
M922 	Dummy	• Completely inert • Used in training • Green with gold ogive and black markings

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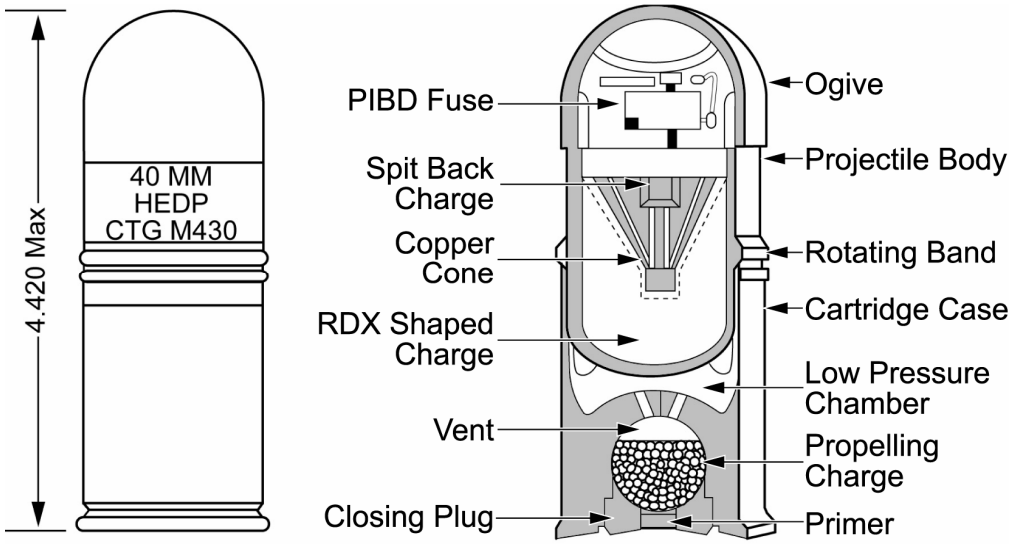
Internal Components

The pictures below show the internal components of the round.



Note: The 40mm ammunition used with the MK19 cannot be used in the M203 grenade launcher: different propellant charge.

Lesson 1 Exercise

Directions Complete exercise items 1 through 3 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 What is the MK19 capable of when you are part of a perimeter defense?

a. Destroying enemy tanks
b. Providing anti-aircraft fire
c. Providing fires for the FPF
d. Supplementing mortar fires using indirect fire

Item 2 Proper sequence for the cycle of operation of the MK19 is, feeding, chambering, locking, _____, _____, _____, _____, and cocking.

a. firing, unlocking, ejecting, extracting
b. firing, unlocking, extracting, ejecting
c. firing, extracting, unlocking, ejecting
d. firing, releasing, extracting, ejecting

Item 3 Which 40mm ammunition is the practice round used with the MK19?

a. M383
b. M384
c. M385
d. M430

Continued on next page

Answers

The table below provides the answers to the exercise items. If you have any questions, refer to the reference page listed for each item.

Item Number	Answer	Reference Page
1	c	2-4
2	b	2-7
3	c	2-8

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LESSON 2

CLEARING, DISASSEMBLING, AND CLEANING

Introduction

Scope

The objective of this lesson is to provide you with the knowledge needed to clear, disassemble, and clean the MK19 machinegun.

Learning Objectives

After completing this lesson, you should be able to

- Identify the steps to clear the MK19.
- Identify the steps to disassemble the MK19.
- Identify steps for the care and cleaning of the MK19.

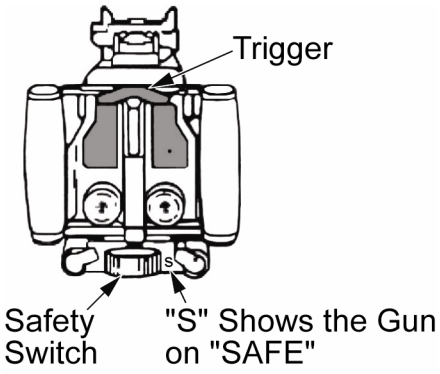
In This Lesson

This lesson contains the following topics:

Clearing

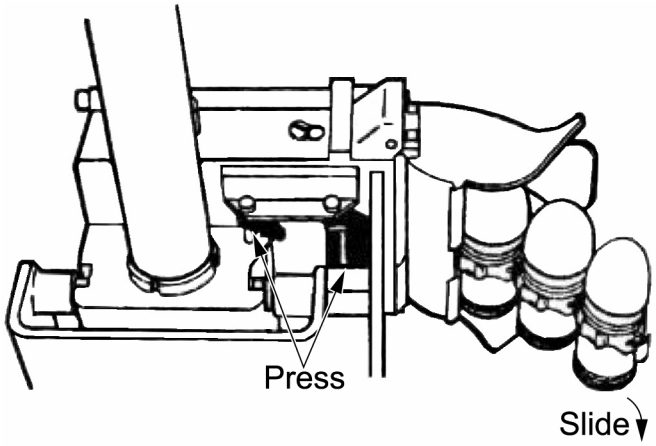
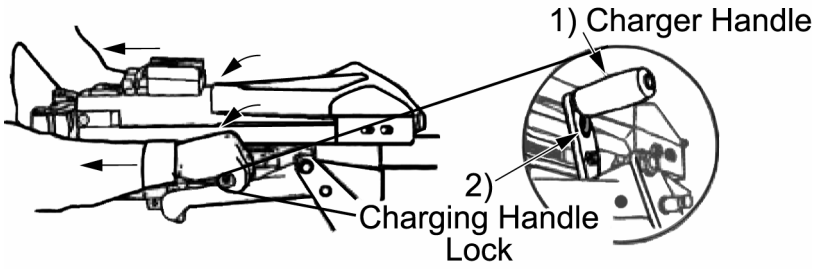
Procedure

Before you begin to disassemble any weapon, you must first clear it. The following table lists the steps for clearing the MK19.

Step	Action
1	Point the gun in a safe direction.
2	Place the fire/safe switch on the "S" (safe) position, as shown. 
3	Open the top cover assembly, as shown. 

Continued on next page

Procedure, continued

Step	Action
4	If ammunition is loaded in the gun, reach beneath the feeder and press the primary and secondary positioning pawls, as shown. At the same time, slide the linked rounds out of the feeder and feed tray. 
5	If a round is on the face of the bolt, insert a section of the cleaning rod through either side of the receiver rail. • Place it on top of the live round or cartridge case as close to the bolt face as possible. • Pull up on the cleaning rod to force the round out through the bottom.
6	Lower and pull the charging handles to the rear, as shown. 

Continued on next page

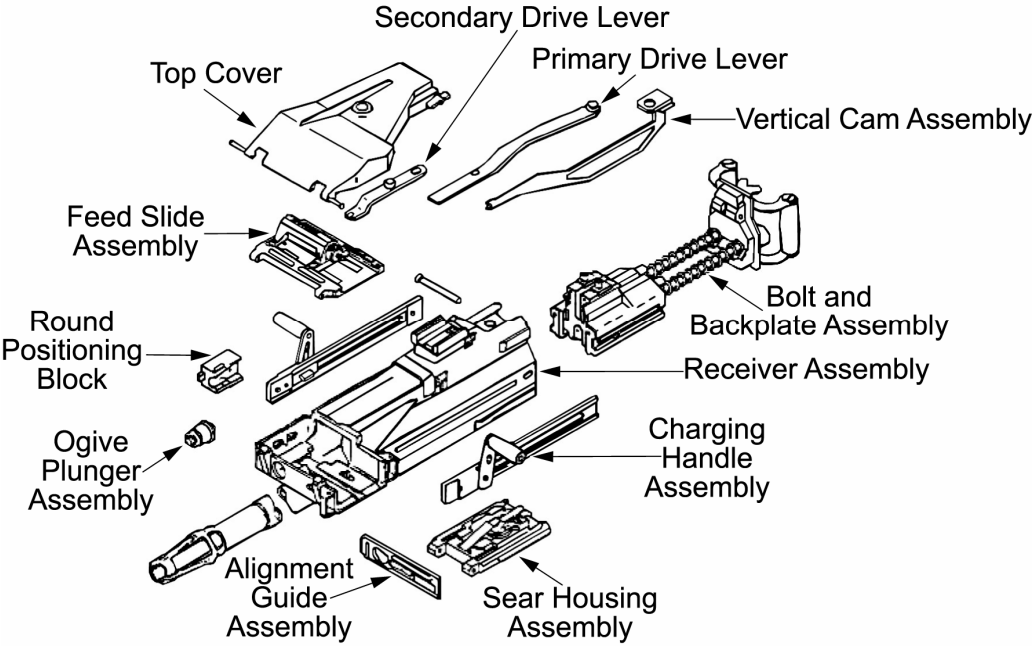
Procedure, continued

Step	Action
7	Inspect the chamber and bolt face again to ensure that no live rounds are in the weapon.
8	Place the fire/safe switch on “F” (fire). 
9	Press the trigger and ease the bolt forward. Return the charging handles to their original position.

Components

Exploded View

After you clear the MK19, you are ready to disassemble it. The MK19 machinegun can be disassembled into the major components, shown below.



Disassembling

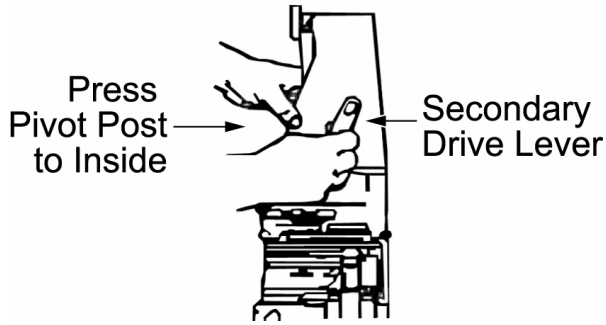
Procedure

Disassemble the machinegun by removing the following in sequence:

- Secondary drive lever
- Top cover assembly
- Feed slide assembly and feed tray
- Bolt and backplate assembly
- Primary drive lever and vertical cam assembly
- Sear assembly
- Alignment guide assembly and ogive plunger
- Round positioning block and charging assemblies

Secondary Drive Lever

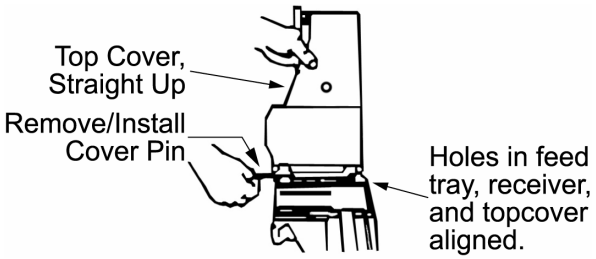
The secondary drive lever can be removed by following the steps in the table below.

Step	Action
1	Raise the cover and push down on the pivot post from the outside of the cover assembly, as shown. 
2	Separate the secondary drive lever from the top cover assembly.
3	Remove the secondary drive lever from slide assembly.

Continued on next page

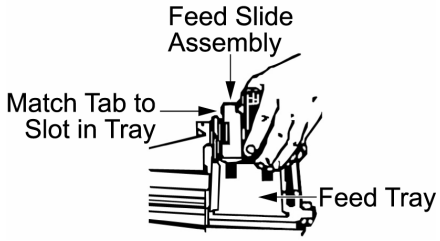
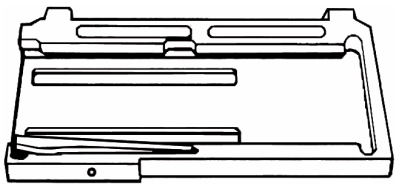
Top Cover Assembly

The top cover assembly can be removed by following the steps in the table below.

Step	Action
1	Hold the top cover straight up with one hand and pull the top cover pins from both sides, as shown. 
2	Lift the top cover assembly straight up and off.

Feed Slide Assembly and Feed Tray

The feed slide assembly and feed tray can be removed by following the steps in the table below.

Step	Action
1	Align the tabs on the feed slide assembly with the slots in the feed tray and lift them straight up, as shown. 
2	Lift the feed tray straight up, as shown. 

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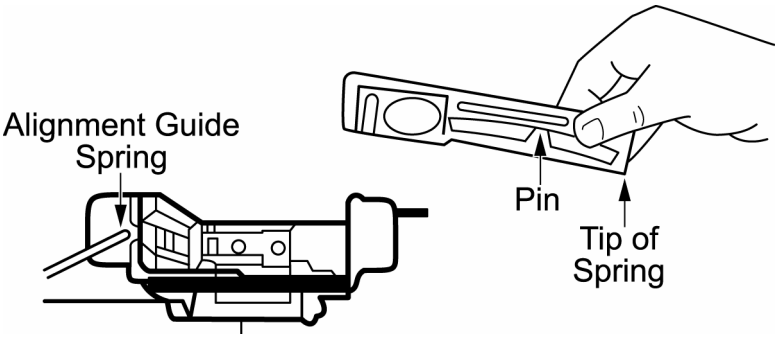
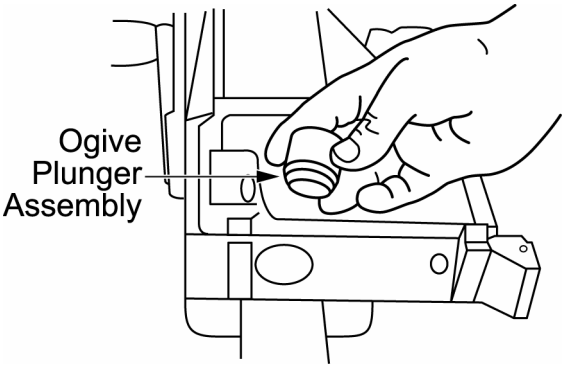
Alignment Guide Assembly and the Ogive Plunger

The alignment guide assembly and ogive plunger can be removed by following the steps in the table below:

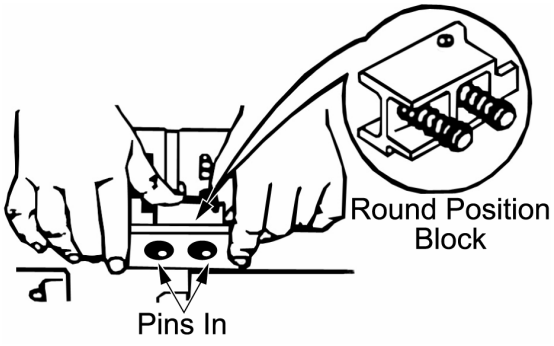
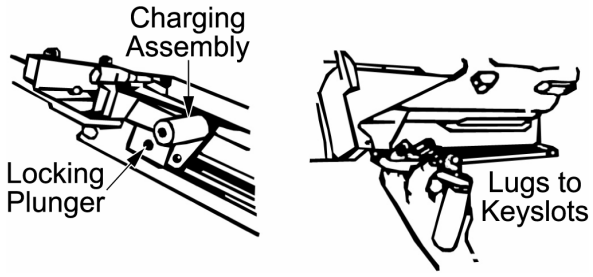
Step	Action
1	Depress the alignment guide spring by inserting a cartridge link or small tool into the slot in the feeder mouth.  Note: View from side of feed throat.
2	Slide the alignment guide towards the feeder mouth, pulling the assembly slightly rearward.
3	Pull the ogive plunger assembly out through the inside wall of the receiver, as shown. 

Continued on next page

Disassembling, Continued

Round Positioning Block and Charger Assemblies

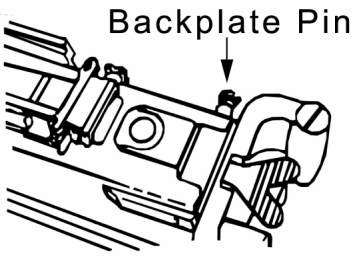
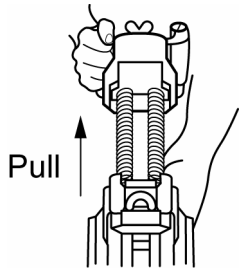
The table below lists the steps to remove the round positioning block and the charger assemblies.

Step	Action
1	Depress the round positioning block and slide it towards the muzzle end of the gun, as shown. 
2	Pull the round positioning block away from the wall of the receiver.
3	Place the charger assemblies in the upright position.
4	Retract the locking plunger at the base of the charging arm. 
5	Slide the charger housing rearward to disengage the lugs from the key slots in the receiver as shown above.
6	Lift the charger assembly away from the receiver.

Continued on next page

Bolt and Backplate Assembly

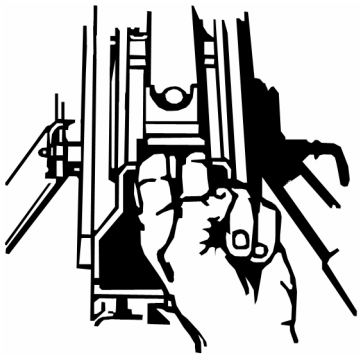
The bolt and backplate assembly can be removed by following the steps in the table below.

Step	Action
1	Take out the backplate pin.  Note: Ensure that the safety switch is in the fire position and the bolt is forward.
2	Grasp the control grips with both hands and lift up slightly to disengage the backplate from the locking lugs in the receiver.
3	Pull the bolt and backplate assembly to the rear, as shown.  Note: Stand bolt up; lay parts down on poncho, etc.

Continued on next page

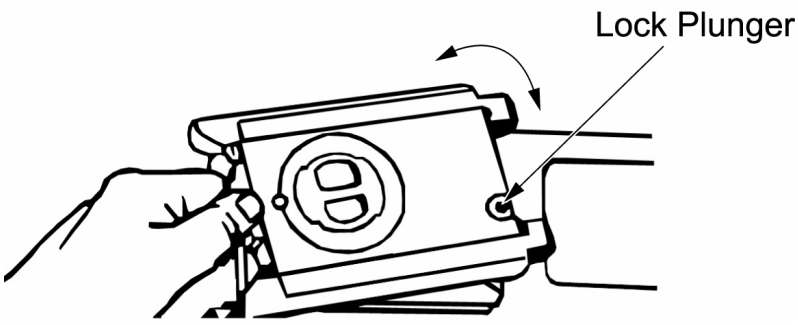
Primary Drive Lever and the Vertical Cam Assembly

The primary drive lever and vertical cam can be removed by following the steps in the table below.

Step	Action
1	Reach under the top of the receiver to locate the drive lever lock on the vertical cam assembly. Slide the lock to the rear about 1/4 inch, as shown. 
2	Press down on the primary drive lever pivot post. (This releases the primary drive lever and the vertical cam assembly.)
3	Pull the primary drive lever and the vertical cam assembly out of the receiver.

Continued on next page

Sear Assembly The sear assembly can be removed by following the steps in the table below.

Step	Action
1	Lift the lock pin with a cartridge link or with your hand, as shown. 
2	Press the receiver sear (underneath the safety) and rotate the sear housing assembly 90 degrees in either direction.
3	Place the safety switch in the safe position. **WARNING**: If the fire/safe switch is on the "F" (fire) position when you remove the sear housing assembly, parts from the sear housing assembly can fall out and become lost.
4	Keep pressure on the sear and lift the sear assembly off the weapon.

Continued on next page

Care and Cleaning

When to Clean

Care and cleaning consists of three actions: cleaning, inspecting, and lubricating. You need to conduct care and cleaning on a regular basis.

- After firing
- At least daily under combat/field conditions
- Weekly when the gun is in storage
- Three consecutive days upon returning from the field

Cleaning and Lubricating Materials

The table below describes the five types of cleaning and lubricating materials that you can use on the MK19.

Cleaner/Lubricant	Use
Lubricant, weapons, semi-fluid with Teflon (LSA-T)	Lubricates the weapon. Note: This is the preferred material for lubricating the MK19.
Cleaner, lubricant, preservative (CLP)	Cleans, lubricates, and preserves the weapon. Note: CLP is used as a lubricant only if LSA-T is not available.
Lubricant, arctic weather (LAW)	Lubricates the weapon in extremely cold weather (below 0^{o} Fahrenheit).
Rifle bore cleaner (RBC)	Cleans the bore and the chamber.
Dry cleaning solvent (P-D-680)	Cleans the weapon; do not get on plastic parts.

Continued on next page

Cleaning

The table below lists the steps to clean the MK19.

Step	Action
1	Disassemble the weapon into its components.
2	Inspect all parts for cracks, burrs, wear, and rust.
3	Clean the bore and chamber with RBC or CLP.
4	Immerse the parts in dry cleaning solvent or apply dry cleaning solvent to a rag or brush and scrub the parts. CAUTION: Do not immerse the sear housing assembly, charging handle, control grips, backplate, ogive plunger, and the bolt assembly in the solvent. Solvent can dilute the lubricant and grease in these parts.
5	Lubricate and then reassemble the weapon.

Inspecting

Inspections are usually conducted in conjunction with cleaning. The table below lists the steps to inspect the MK19.

Step	Action
1	Disassemble the weapon into its components.
2	Inspect the barrel for carbon buildup in the bore or chamber.
3	Inspect all parts for cracks, wear, burrs, and rust.
4	Inspect all pins to be sure they are not loose or missing.
5	Inspect all springs for weak spring action.
6	Inspect all moving parts for binding.
7	Reassemble the weapon.
8	Inspect the mount, spare parts, and tools.

Continued on next page

Lubricating

The MK19 must be lubricated to reduce wear and to prevent rust and malfunctions. The table below lists the steps to lubricate the MK19.

Step	Action
1	Apply a light coat of lubricant to all parts.
2	Apply several drops of lubricant to moving parts (feeder pawls, pivot posts, and latch mechanism) and work the parts to spread the lubricant.

Extreme Environments

In extreme environments, you must take extra precautions to be sure your MK19 operates trouble free. The following table shows the precautions you must take for each environmental condition.

Environment	Precautions
Hot, humid climate	• Inspect the weapon frequently for rust. • Keep the weapon as moisture free as possible. • Field strip, clean, and lubricate the weapon more often. • Use a generous coat of lubricant.
Hot, dry, and sandy climate	• Clean and lubricate daily. • Wipe the weapon dry. Do not use extra lubricant because the grit and dust will stick to the parts. • Cover the weapon when not in use.
Cold climates	• Cover the weapon when outside. • Keep the weapon free of excess lubrication and moisture. • If the metal sweats, dry and lubricate the parts before taking the weapon outdoors again.

Lesson 2 Exercise

Directions Complete exercise items 1 through 4 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Which of the following is the first step in the procedure for clearing the MK19?

a. Open the top cover assembly.
b. Place the fire/safe switch on the "S" position.
c. Inspect the chamber for ammunition.
d. Point the gun in a safe direction.

Item 2 The _____ is the first item you remove to begin disassembling the MK19.

a. top cover and feed tray
b. sear assembly
c. secondary drive lever
d. bolt and backplate assembly

Item 3 What is the preferred lubricant for the MK19 machinegun?

a. LSA-T
b. CLP
c. LAW
d. RBC

Item 4 How often do you conduct care and cleaning of the MK19 when it is in storage?

a. Daily
b. Weekly
c. Bi-weekly
d. Monthly

Continued on next page

Answers

The table below provides the answers to the exercise items. If you have any questions, refer to the reference page listed for each item.

Item Number	Answer	Reference Page
1	d	2-14
2	c	2-18
3	a	2-**Error! Bookmark not defined.**
4	b	2-25

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LESSON 3

ASSEMBLING, CONDUCTING FUNCTION CHECKS, AND MOUNTS AND ACCESSORIES

Introduction

Scope

This lesson covers the procedures to assemble and perform a function check and identify the mount and accessories for the MK19 machinegun.

Learning Objectives

After completing this lesson, you should be able to

- Identify the steps to assemble the MK19.
- Identify the steps to perform a function check on the MK19.
- Identify the mounts and accessories for the MK19.

In This Lesson

This lesson contains the following topics:

Assembling

Procedure

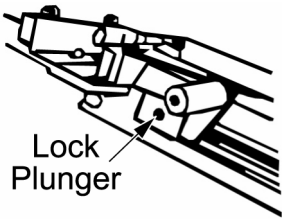
After you have cleaned and inspected your MK19, you are ready to begin assembly. To assemble the MK19, replace the parts in the reverse order of disassembly by attaching the

- Sear assembly
- Vertical cam assembly and the primary drive lever
- Bolt and backplate assembly
- Charger and round positioning block assemblies
- Ogive plunger and the alignment guide assembly
- Feed tray and the feed slide assembly
- Secondary drive lever

Continued on next page

Charger and Round Positioning Block Assemblies

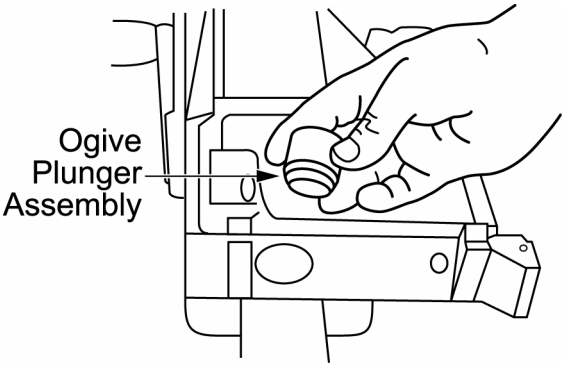
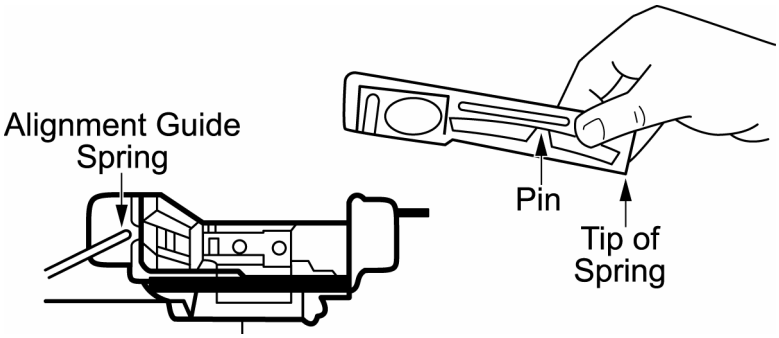
The table below lists the steps to attach the charger and round positioning block assemblies to the MK19.

Step	Action
1	Rotate the charger handle to the up position.
2	Line up the lugs on the charger with the slots in the receiver rail. 
3	Insert the charger lugs into the slots.
4	Hold the charger tightly against the rail.
5	Slide the charger forward until it locks in place. 
6	Insert the round positioning block into the slots in the receiver.
7	Push against the block and slide it toward the rear until it locks in place.

Continued on next page

Ogive Plunger and Alignment Guide Assembly

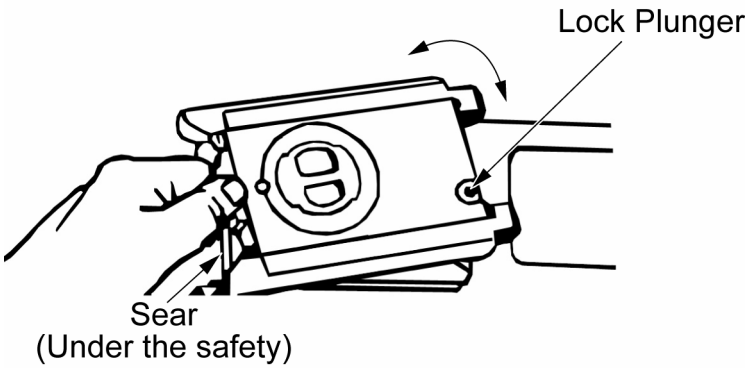
The table below lists the steps to attach the ogive plunger and the alignment guide assembly to the MK19 machinegun.

Step	Action
1	Insert the ogive plunger into the feeder wall. 
2	Position the alignment guide assembly so that the pin is lined up with the slot in the feeder wall.  Note: View from side of feed throat.
3	Depress the leaf spring.
4	Slide the alignment guide toward the ogive plunger until you hear a click.

Continued on next page

Sear Assembly

The table below lists the steps to attach the sear assembly.

Step	Action
1	Turn the receiver right side up.
2	Place the sear on the receiver and squeeze the sear lock and rotate the assembly 45 degrees to the right or left until it locks in place. 

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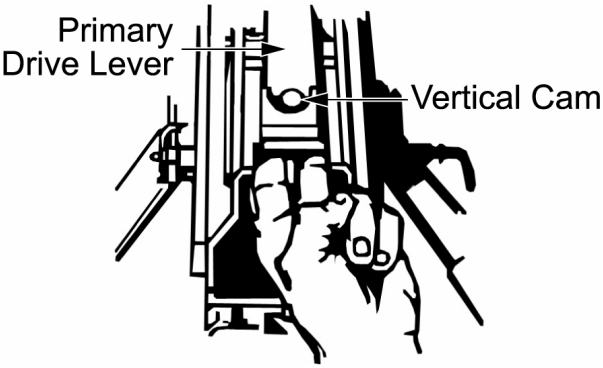
Vertical Cam Assembly and the Primary Drive Lever

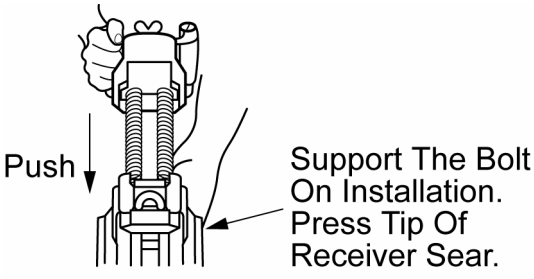
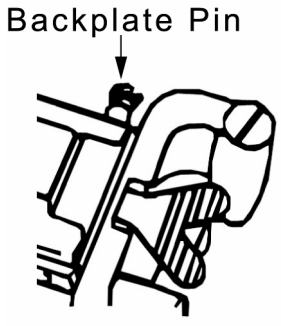
The table below lists the steps to attach the charger and round positioning block assemblies to the MK19.

Step	Action
1	Slide the vertical cam assembly through the rear of the receiver. The raised portion slides over the hole in the receiver. The drive lever lock is underneath. 
2	Engage the forked end in the notch in the receiver.
3	Hold the vertical cam assembly in place while you slide the primary drive lever into the receiver.
4	Engage the pivot post of the lever through the holes in the receiver and the vertical cam.
5	Slide the drive lever lock on the vertical cam forward.

Continued on next page

Bolt and Backplate Assembly

The table below lists the steps to attach the bolt and backplate assembly to the MK19.

Step	Action
1	Note: Be sure the cocking lever is cocked and forward. Place the fire/safe switch in the "F" position.
2	Insert the bolt and backplate assembly into the receiver.  **WARNING**: Watch for thumb pressing receiver slot!
3	When the bolt and backplate assembly stops, press the receiver sear and slide the bolt and backplate assembly all the way forward.
4	Insert the backplate pin to lock the assembly in place. 

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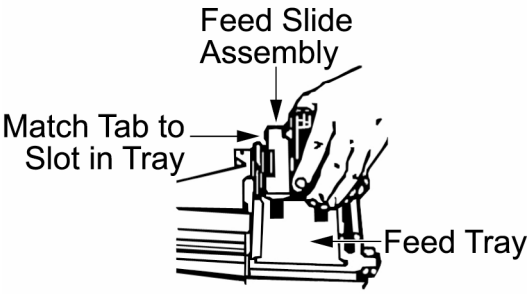
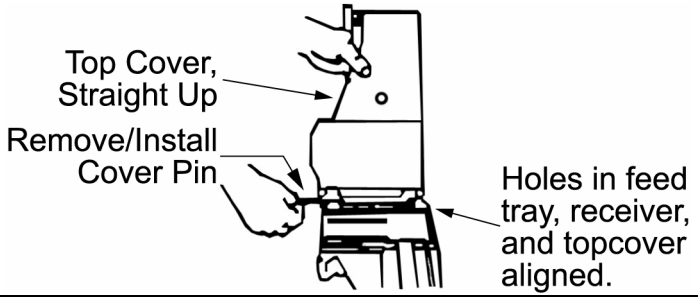
Feed Tray and the Feed Slide Assembly

The table below lists the steps to attach the feed tray and the feed slide assembly to the MK19.

Step	Action
1	Carefully place the feed tray into the top of the feeder, recessed side up. The pinholes on the tray should line up with the lugs on the receiver.
2	Position the feed slide assembly so that the tabs are lined up with the slots in the tray. Insert the tabs into the slots. 
3	Slide the feed slide assembly to the right side of the feed tray.
4	Line up the pinholes in the feed tray, top cover, and the receiver lugs.
5	Hold the top cover straight up. Insert the top cover pins on both sides. Be sure the crosspin enters the receiver. 

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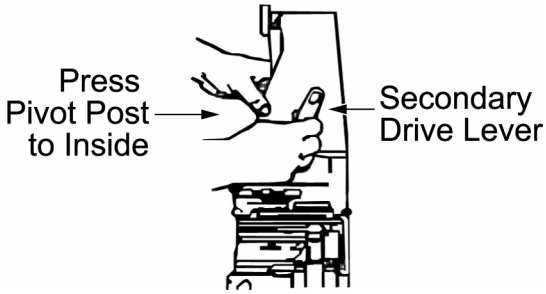
Secondary Drive Lever

The table below lists the steps to attach the secondary drive lever to the MK19.

Step	Action
1	Lift the feed slide assembly and tray.
2	Engage the forked end of the secondary drive lever with the feed slide pin. 
3	Press the raised pivot post through the hole in the top cover.
4	Press the tray firmly against the top cover.

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After-Assembly Check

After assembling the MK19, conduct a check to ensure proper assembly. The table below lists the steps to conduct an after-assembly check.

Step	Action
1	Be sure the secondary drive lever is properly engaged with the feed slide pin.
2	Be sure the feed slide assembly is all the way to the left.
3	Be sure the bolt is forward and the charger handles are up.
4	Close the top cover.
5	Be sure the top cover pins are flush.

WARNING: If the secondary drive lever is not properly engaged with the feed slide pin, the gun will not fire and can be dangerous.

Performing a Function Check

Purpose

You should conduct a function check immediately after assembly and before preparing to fire. Before conducting a function check, be sure the

- Secondary drive lever is properly engaged with the feed slide pin.
- Feed slide assembly is all the way to the left.
- Bolt is forward.

Procedure

The table below lists the steps to perform a function check.

Step	Action
1	With palms down, charge the gun. If weapon charges successfully, go to step 3. If the bolt jams midway • Hold the bolt back while opening the top cover. • Slowly ride the bolt forward. • Close the top cover and charge again.
2	Place the fire/safe switch on "S" and depress the trigger. (Nothing should happen.)
3	Place the fire/safe switch on F and depress the trigger: bolt should go forward.

Mounts and Accessories

Mounts

The following mounts are used with the MK19.

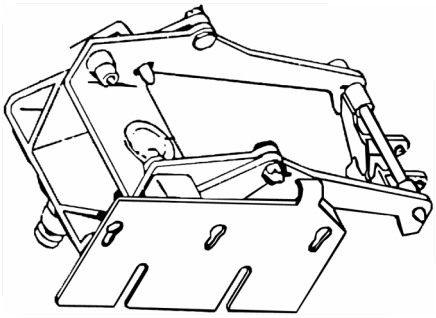
- M3 tripod
- Vehicle

Accessories

The MK19 must be mounted to fire. Along with one of the mounts listed above, you need the accessories listed in the blocks below. These include the MK 64 cradle, a traversing and elevating mechanism, and a pintle. To aid in night firing, you may need to use a night vision sight. There is also a feed throat that can be attached to guide ammunition into the feeder.

MK64 Cradle

The MK64 gun cradle, shown in the picture below, is used to support the MK19. The cradle permits mounting on the M3 tripod and vehicle mounts. The T&E mechanism is attached to the cradle to permit accurate delivery of fire.



Procedures to Mount the MK64 Cradle

To mount the MK19 on the gun cradle

- Remove the retaining pin.
- Place the gun in the cradle.
- Reinsert the retaining pin.

T&E Mechanism

The MK19 uses the same mounts (M3 tripod, M4 pedestal, M66 ring, HMMWV weapons station) and the same T&E mechanism as the M2 HB .50-caliber heavy machinegun.

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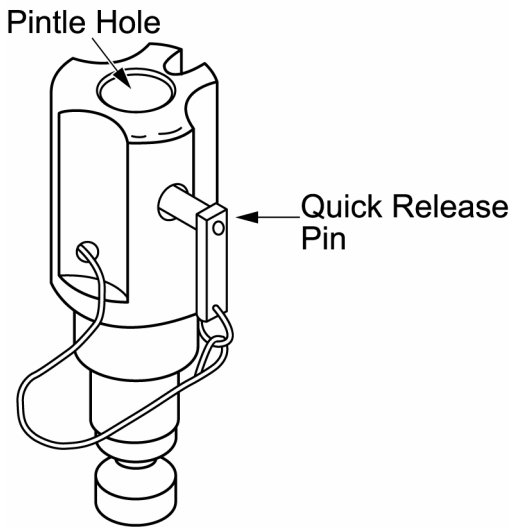
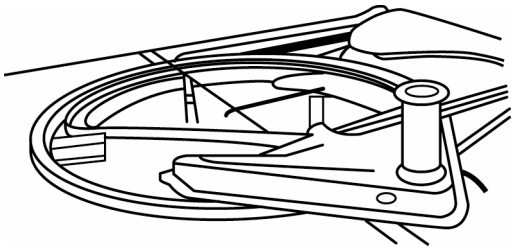
Pintle Adapter

The pintle adapter is needed to mount the MK19 to the mounting well of a HMMWV weapons platform and M3A2 ring mount with the M66 ring. A picture of the adapter is shown below:





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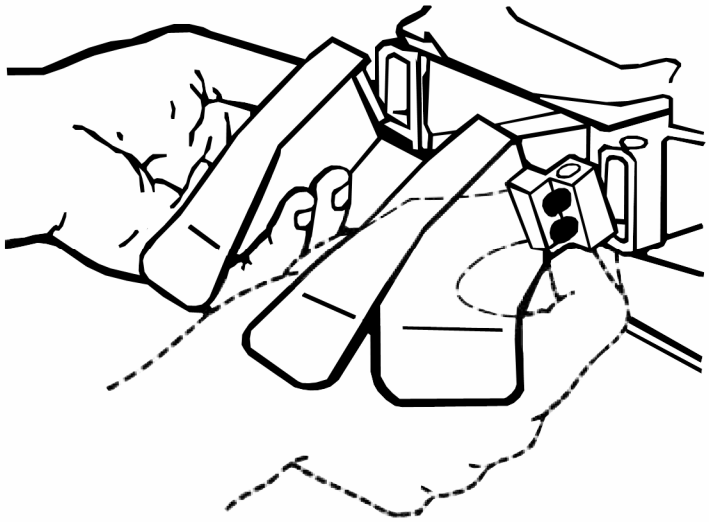
AN/TVS-5 Night Vision Sight

Night vision sight can be installed on the MK19 for passive night observation and fire. Portable and battery operated, the AN/TVS-5 amplifies natural light such as moonlight, starlight, and skyglow. AN/TVS-5 does not emit visible or infrared light that could be detected by the enemy.

Feed Throat

The MK19 has a feed throat that can be attached to the weapon to guide the ammunition belt into the feeder. The table below lists the steps to attach the feed throat to the MK19 machinegun.

Step	Action
1	Squeeze the spring-loaded pins on the feed throat as shown in the picture below. 
2	Insert the feed throat into the slots on both sides of the feeder.

Lesson 3 Exercise

Directions Complete exercise items 1 through 3 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 What is the next step to attach in assembling the MK19 after attaching the top cover assembly?

a. Secondary drive lever
b. Feed tray and the top cover assembly
c. Sear assembly
d. Ogive plunger and the alignment guide assembly

Item 2 While performing a function check on the MK19, the operator depresses the trigger with the fire/safe switch in the F position. What should happen?

a. Nothing
b. A click should be heard
c. The bolt should slam forward
d. A round should eject

Item 3 Which night vision sight can be installed on the MK19 to aid in night observation and fire?

a. AN/PVS-4
b. AN/PVS-5
c. AN/TVS-4
d. AN/TVS-5

Continued on next page

Answers

The table below provides the answers to the exercise items. If you have any questions, refer to the reference page listed for each item.

Item Number	Answer`	Reference Page
1	a	2-32
2	b	2-41
3	d	2-44

LESSON 4

SIGHTING, FIRING, MALFUNCTIONS, STOPPAGES, AND IMMEDIATE ACTION

Introduction

Scope

This lesson discusses how to set the sights, fire, handle malfunctions and stoppages, and apply immediate action for the MK19 machinegun.

Learning Objectives

After completing this lesson, you should be able to

- Identify the parts of the sights on the MK19.
- Identify the steps to prepare the MK19 to engage a target.
- Identify the malfunctions on the MK19.
- Identify stoppages on the MK19.
- Identify the steps for applying immediate action to reduce a stoppage on the MK19.

In This Lesson

This lesson contains the following topic:

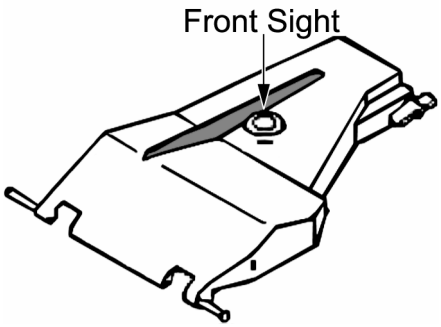
Sights

Introduction

The MK40 sight is the rear sight assembly on the MK19. The sight is a ladder type design with graduated range indications from 300 to 1,500 meters. The strengthening rib on the gun's top cover is used as the front sight blade.

Front Sight

The front sight is a raised ridge on the top cover assembly, as shown:



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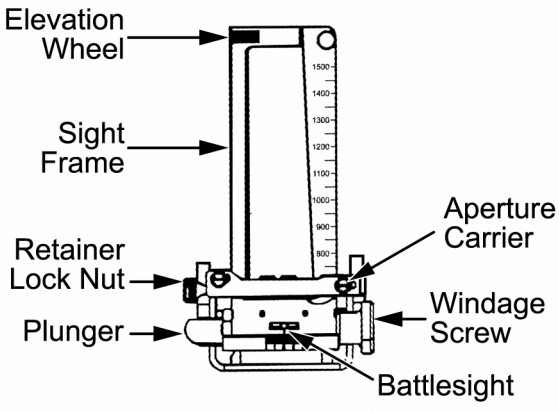
MK40 Parts

The illustration below lists the parts of the rear sight assembly for the MK19.



Function

The table below lists the function of the parts located on the front sight assembly.

Part	Function
Plunger	Releases the sight frame
Retainer lock nut	Locks the aperture carrier in place
Sight frame	Contains the graduated range indications
Elevation wheel	Adjusts the degrees of elevation
Aperture carrier	Sets the elevation
Windage screw	Adjusts the windage
Battlesight	Sight used with sight assembly folded down to engage targets within battlesight range

Before Firing

Prepare Sights

When the rear sight frame is down, use the battlesight to engage snap targets. The table below lists the steps to sight in on a target with the rear sight frame up.

Step	Action
1	Use the "2-2-2" rule.
2	Estimate the range to the target.
3	Push in on the lock nut and move the aperture carrier up or down to the range indication that corresponds to your estimated range.
4	Adjust the T&E mechanism to obtain a sight picture on the target.

Prepare Weapon

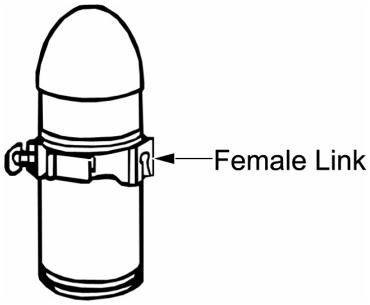
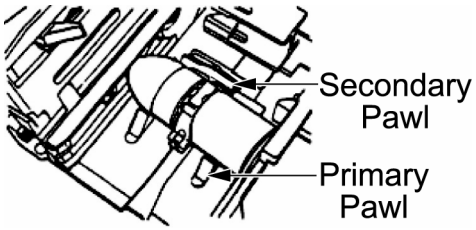
To engage targets with the MK19, you must perform the following steps in sequence.

- Feed the ammunition into the weapon.
- Charge the weapon twice: once to half load; once to full load.
- Load the first round.
- Aim and fire.

Continued on next page

Feeding the Ammunition

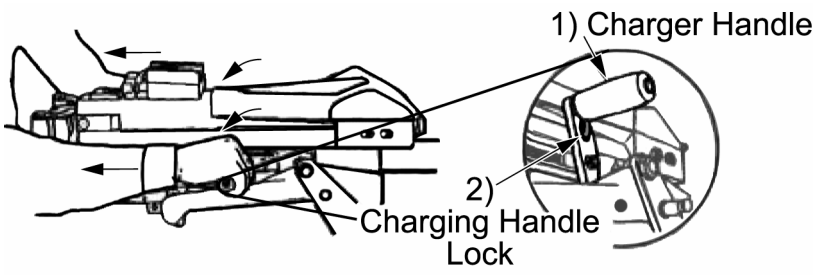
The following table lists the steps to feed ammunition into the MK19.

Step	Action
1	Clear the MK19; ensure the bolt is forward.
2	Insert the first round, female link first, into the feeder as shown in the picture below. 
3	Push the round across the primary feed pawl as shown in the picture below until you hear a click. 
4	Move the secondary drive lever (inside the top cover) to the right. 
5	Close the top cover.

Continued on next page

Charging

After feeding, charging the gun manually moves the round into position to be fired. The table below lists the steps to charge the MK19. Be sure the top cover is closed before charging.

Step	Action
1	Grasp the charging handles.
2	Press the charging handle locks as shown and rotate the handles down, with palms down. 
3	Pull the charging handles to the rear.
4	Return the charging handles forward and rotate them up to the locked position.

Loading the First Round

The table below lists the steps to load the first round onto the face of the bolt.

Step	Action
1	Place the fire/safe switch on the “F” (fire) position.
2	Press the trigger, allowing the bolt to slam forward. Shout “Half load!”
3	Charge the gun again. Shout “Full load; gun up!”
4	Return the fire/safe switch to the “S” (safe) position. The gun is now loaded, charged, and ready to fire.

Firing

Release

The table below lists the steps to aim and fire the MK19.

Step	Action
1	Place the fire/safe switch on the "F" (fire) position. (Be sure the charging handles are forward and up.)
2	Place your hands on the control grips with your thumbs on the trigger.
3	Press the trigger to fire. (Fire in 3- to 5-round bursts.)

Zeroing

The table below lists the steps to zero the MK19.

Step	Action
1	Locate a target at a known distance. (Recommended distance is 400 – 600 meters).
2	Adjust the rear sight setting to the range to the target.
3	Center the windage scale by turning the windage screw until the center index lines are aligned.
4	Adjust the T&E mechanism until the correct sight picture is obtained at the base of the target.
5	Fire a single round and observe the impact. If the round • Impacts within five meters of the target, fire another round to confirm zero. If this round impacts within five meters of the target, your MK19 is zeroed. • Is not within five meters of the target, go to step 6.
6	Adjust the windage screw and elevation wheel on the sight to obtain a sight picture on the impact. Note: Do not move the gun. Move the sight.
7	Adjust the T&E mechanism to regain the correct sight picture on the target.
8	Go back to step 5. Note: Repeat steps 5–8 until your MK19 is zeroed.

Malfunctions

Introduction

Malfunctions and stoppages can occur any time you are firing the MK19. You must be able to identify and correct the problem quickly and continue your mission.

Definition

A malfunction is a failure of the weapon to function properly not due to defective ammunition or operational error by the gunner.

Common Malfunctions

The table below lists the most common types of malfunctions, their causes, and the corrective action to take.

Malfunction	Cause	Corrective Action
Sluggish action	• Friction from dirt • Carbon buildup • Lack of lubrication • Burred parts	• Clean • Lubricate • Tighten or replace parts
Runaway gun	• Worn parts • Short recoil of the bolt assembly	• Keep rounds on target, until all rounds on the belt have been fired. • Press the charger handle locks and lower one charger handle. Note: Do not try to break the ammunition belt.

Stoppages

Definition

A stoppage is any interruption in the cycle of operation caused by faulty action of the gun or defective ammunition.

Common Stoppages

The table below lists the most common types of stoppages, their causes, and the corrective action to take.

Stoppage	Cause	Corrective Action
Failure to feed	• Rounds not lined up • Male end of link is first • Broken links	• Align the rounds. • Replace the rounds. Place the female link first. • Replace with new linked rounds.
Failure to fire	• Defective ammunition • Defective parts in the firing mechanism	• Replace with new ammunition. • Inspect the parts and replace worn, burred, or broken parts.

Immediate Action

Definition

Immediate action is the action taken to reduce a stoppage without investigating the cause.

Procedure

The table below lists the steps to perform immediate action.

<table>
<tr><th>Step</th><th>Training Action</th><th>Combat Action</th></tr>
<tr><td>1</td><td>Shout “Misfire!”</td><td>Shout “Misfire!” Press charging handle locks and rotate charging handles down.</td></tr>
<tr><td>2</td><td>Clear the area of nonessential personnel.</td><td>Pull and lock the bolt to the rear.</td></tr>
<tr><td>3</td><td>Wait 10 seconds for possible hangfire.</td><td>Push the charging handles forward and lock them in the up position.</td></tr>
<tr><td>4</td><td>Pull the bolt to rear and observe for feeding and ejecting.

Note: Catch round as it ejects.</td><td>Relay gun on target and attempt to fire.</td></tr>
<tr><td>5</td><td>Push charging handles forward and up.</td><td>Same</td></tr>
<tr><td>6</td><td>Observe for feeding and ejecting.

<table><tr><th>Takes Place</th><th>Does Not</th></tr><tr><td>• Go to step 7</td><td>• Unload and clear
• Remedial action</td></tr></table></td><td>Same</td></tr>
<tr><td>7</td><td>Attempt to fire.

Note: If the weapon does not fire, wait 10 seconds for possible hangfire, clear, and perform remedial action.</td><td>Same</td></tr>
</table>

Lesson 4 Exercise

Directions Complete exercise items 1 through 5 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Which of the parts below contain the graduated sight indications scale on the MK40 sight?

a. Sight frame
b. Elevation wheel
c. Aperture carrier
d. Elevation screw

Item 2 After sighting in on a target, what is the first step to preparing the MK19 for firing?

a. Loading the first round onto the face of the bolt
b. Charge the weapon
c. Aim and fire
d. Feed the ammunition into the weapon

Item 3 Which of the following is a corrective action if you have a runaway gun with the MK19?

a. Break the belt.
b. Let it fire until the ammunition is expended or drop the charging handle.
c. Open the top cover.
d. Place the fire/safe switch in the "S" position.

Item 4 Which of the following is a cause of a failure to fire on a MK19?

a. Defective parts in the firing mechanism
b. Rounds not lined up straight
c. Male end of link is first
d. Broken links

Continued on next page

Item 5

After observing for feeding and ejecting while performing immediate action on the MK19, a round is ejected. What is the next step the gunner performs?

a. Wait 10 seconds and clear machinegun.
b. Unload and clear machinegun.
c. Attempt to fire machinegun.
d. Troubleshoot the machinegun.

Continued on next page

Answers

The table below provides the answers to the exercise items. If you have any questions, refer to the reference page listed for each item.

Item Number	Answer	Reference Page
1	a	2-49
2	d	2-50
3	b	2-54
4	a	2-55
5	c	2-56

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HEAVY MACHINEGUN CREWMAN

REVIEW LESSON EXAMINATION

Review Lesson

Introduction

The purpose of the review lesson examination is to prepare you for your final examination. We recommend that you try to complete your review lesson examination without referring to the text. However, for those items (questions) you are unsure of, restudy the text. When you finish your review lesson and are satisfied with your responses, check your responses against the answers provided at the end of this review lesson examination.

Directions

Select the ONE answer that BEST completes the statement or that answers the item. For multiple choice items, circle your response. For matching items, place the letter of your response in the space provided.

Item 1

What are some characteristics of the M2 HB .50-caliber machinegun?

a. Belt-fed, air cooled, recoil-operated
b. Smooth bore, muzzle load, single shot
c. Light weight, air cooled, vehicle mounted only
d. Belt-fed, air cooled, high angle fired weapon

Item 2

What is the weight in lbs. of the barrel of the M2 HB .50-caliber machinegun?

a. 20
b. 24
c. 34
d. 44

Item 3

The approximate maximum effective range for the M2 HB .50-caliber machinegun is _____ meters at a point target.

a. 700
b. 1,500
c. 1,900
d. 7,000

Continued on next page

Item 4 Through Item 8

Matching: For items 4 through 8, place the letter of the function from column 2 that best matches the component item in column 1.

Column 1 **Component**	**Column 2** **Function**
___ 4. Barrel group	a. Houses the barrel buffer assembly.
___ 5. Backplate assembly	b. Drives the bolt forward when the bolt latch release is depressed.
___ 6. Barrel buffer body group	c. Houses cartridges for firing; directs projectile.
___ 7. Bolt group	d. Houses the trigger, bolt latch release, buffer tube sleeve, and the left and right spade grips.
___ 8. Drive spring rod assembly	e. Provides feeding, chambering, firing and extracting, using the propellant gases and recoil spring for power.

Item 9

The M66 ring mount is installed on

a. the pintle.
b. trucks only.
c. M3 tripod mount.
d. trucks and other combat vehicles.

Item 10

The T & E mechanism is used with

a. M66 ring mount.
b. ground mounts.
c. vehicle mounts.
d. both ground and vehicle mounts.

Continued on next page

Item 11

What is the color of the tip of an armor-piercing round?

a. White
b. Yellow
c. Red
d. Black

Item 12 Through 16

Matching: For items 12 through 16, match the cycle of operation in column 1 with the description in column 2.

Column 1	**Column 2**
Cycle of Operation	**Description**
___ 12. Unlocking	a. Firing pin is withdrawn into the cocked position.
___ 13. Extracting	b. Bolt is secured to the barrel and barrel extension.
___ 14. Cocking	c. Empty cartridge case is pulled from the chamber.
___ 15. Chambering	d. Cartridge is placed into the chamber of the weapon.
___ 16. Locking	e. Bolt is unsecured from the barrel and the barrel extension.

Item 17

Identify the fourth step in the cycle of operation for the M2 HB .50-caliber machinegun.

a. The bolt is locked to the barrel and barrel extension.
b. The empty cartridge case is expelled from the receiver.
c. The firing pin is released, igniting the primer of the cartridge.
d. During chambering, the cartridge is placed into the chamber of the weapon.

Continued on next page

Item 18 Which is the fifth step in clearing the M2 HB .50-caliber machinegun?

a. Close the feed tray cover.
b. Remove ammunition if present.
c. Grasp the slide handle and lock the bolt to the rear.
d. Inspect the T-slot on the face of the bolt and chamber.

Item 19 When disassembling the M2 HB .50-caliber machinegun, the _____ is the third group to be removed.

a. bolt
b. cover
c. barrel
d. receiver

Item 20 How often should you maintain/clean your M2 HB .50-caliber machinegun?

a. After deployment
b. Every eight days after storage
c. For three consecutive days upon returning from the field
d. Several times per week when under extreme climatic conditions

Item 21 Which of the following are cleaners and lubricants you can use on the M2 HB .50-caliber machinegun?

a. SAE-30, Grease, SAE-50
b. WAL, TP, MC, water, Simple Green
c. CLP, RBC, PL, LSA, LAW, hot soapy water
d. TLC, RBB, SAL, water, simple green, breach cleaner

Continued on next page

Item 22 Which of the following is a step to properly clean the M2 HB .50-caliber machinegun?

a. Apply thick layer of semi-fluid lubricant.
b. Rinse weapon in the solvent tank.
c. Inspect all parts for cracks, burrs, wear, or rust.
d. Clean bore with CLP.

Item 23 When you conduct an inspection of your M2 HB .50-caliber machinegun, you need to ensure it is

a. broken down by the gunner.
b. completely disassembled
c. completely assembled.
d. partially field stripped.

Item 24 What is the first step in assembling the M2 HB .50-caliber machinegun?

a. Install the bolt stud.
b. Replace the drive spring.
c. Connect the barrel buffer group.
d. Install the barrel buffer and extension groups.

Item 25 A function check should be performed on the M2 HB .50-caliber machinegun

a. before firing and to determine if the headspace needs to be timed.
b. before firing and to ensure the weapon is working order.
c. after firing and to ensure the weapon is correctly assembled.
d. after firing and to determine if the timing needs to be adjusted.

Continued on next page

Item 26 When adjusting the timing on the M2 HB .50-caliber machinegun, the timing gauge is inserted between the

a. barrel extension and the trunnion block.
b. face of the bolt and the chamber.
c. backing plate and the buffer.
d. receiver and the bolt.

Item 27 When the bolt latch release is locked down, the M2 HB .50-caliber machinegun is in the _____ mode.

a. prone
b. single shot
c. automatic firing
d. standing to prone

Item 28 Which action places the M2 HB .50-caliber machinegun in the single shot mode?

a. Make sure the bolt latch release is in the up position, and the bolt latch release lock is to the right.
b. Be sure to re-cock the gun as you did in step 6, so the gun is fully loaded and ready to be fired at the target.
c. Push the bolt latch release allowing the drive spring to carry the bolt group forward. The gun is now half loaded.
d. To fire another round, you must first push down on the bolt release, allowing the bolt to go home under the power of the drive spring.

Continued on next page

Item 29 The prone position is one of the firing positions for the M2 HB .50-caliber machinegun. What are the other two?

a. Sitting with legs folded, sitting with legs extended
b. Off-hand, kneeling
c. Kneeling to prone, standing to prone
d. Sitting, standing

Item 30 When the M2 HB .50-caliber machinegun fails to function freely it is classified as a

a. stoppage.
b. malfunction.
c. defective parts.
d. immediate action.

Item 31 A failure to feed in the cycle of operation is commonly known as a _____ for the M2 HB .50-caliber machinegun.

a. chamber
b. stoppage
c. ruptured case
d. defective ammunition

Item 32 After waiting for 5 seconds, the next procedure in immediate action for the M2 HB .50-caliber machinegun is to

a. sight in on the target and wait 5 seconds.
b. clear the area and wait for the armorer.
c. clear the gun and observe feeding and ejecting.
d. cock the gun and observe feeding and ejecting.

Continued on next page

Item 33 Which of the following is a capability of the MK19 machinegun?

a. Support the administrators in the defense.
b. Provides fires for the final protective fire (FPF).
c. Disables lightly armored HMMWVs during convoys.
d. Fires at the sustained, rapid, cyclic rate, reconnaissance by fire.

Item 34 When the bolt moves forward on the rail and seats the round in the chamber, the weapon is considered to be in the _____ cycle.

a. cocking
b. ejecting
c. unlocking
d. chambering

Item 35 Which ammunition is impact detonating, used against lightly armored vehicles, fortifications and personnel, and has a casualty producing radius 15 meters?

a. 5.56 armor piercing
b. F-10 thunder tomahawk
c. M383/384 high explosive antipersonnel
d. M430 high explosive, dual purpose (HEDP)

Item 36 What is the third action in clearing a MK19 machinegun?

a. Open the top cover assembly.
b. Point the gun in a safe direction.
c. Lower and pull the charger handles to the rear.
d. Push down to force the round out through the bottom.

Continued on next page

Item 37 Identify the first step in removing the secondary driver lever in the MK19 machinegun.

a. Lift the top cover assembly straight up and off.
b. Separate the secondary drive lever from the top cover assembly.
c. Pull the top cover pins from both sides of the cover assembly.
d. Raise the cover and push down on the pivot post from the outside of the cover assembly.

Item 38 Which of the following is the third step in care and cleaning of the MK19 machinegun?

a. Inspect all moving parts for binding.
b. Clean the bore chamber with RBC or CLP.
c. Inspect all pins to be sure they are not loose or missing.
d. Inspect the barrel for carbon buildup in the bore or chamber.

Item 39 What is the first step in replacing the sear assembly on the MK19?

a. Watch your thumbs.
b. Place the fire/safe switch in the "F" position.
c. Keep receiver rightside up.
d. Be sure the cocking lever is cocked and forward.

Item 40 Placing the fire/safe switch on S and depressing the trigger is step _____ of the function check for the MK-19 machinegun?

a. 1
b. 2
c. 4
d. 6

Continued on next page

Item 41 Which of the following mounts is used for the MK19 machinegun?

a. M2 bipod
b. M3 tripod
c. M4 tripod
d. M66 ring pedestal

Item 42 Which part of the MK40 rear sight releases the sight frame?

a. Plunger
b. Retainer locknut
c. Windage screw
d. Aperture carrier

Item 43 Adjusting the T&E mechanism to obtain a sight picture on the target is the third step in preparing the sights for the MK19 machinegun. To engage a target, what is the first step?

a. Estimate the range to the target.
b. Feed the ammunition into the weapon.
c. Push round across the secondary pawl.
d. Insert the first round, female link first into the feeder.

Item 44 Sluggish action is a _____ of the MK19 machinegun.

a. breakage
b. defect
c. malfunction
d. stoppage

Continued on next page

Item 45 Which of the following is a stoppage of the MK19 machinegun?

a. Broken links
b. Failure to fire
c. Replace rounds
d. Defective ammunition

Item 46 What is the first step in immediate action for the MK19 machinegun?

a. Clear the area.
b. Wait 10 seconds.
c. Pull the bolt to the rear.
d. Shout "Misfire!"

Answers

The table below lists the answers to the exercise items. If you have any questions about these items, refer to the reference page.

Item Number	Answer	Reference Page
1	a	1-4
2	b	1-4
3	b	1-5
4	c	1-6
5	d	1-6
6	a	1-6
7	e	1-6
8	b	1-6
9	d	1-9
10	d	1-9
11	d	1-10
12	e	1-11
13	c	1-11
14	a	1-12
15	d	1-12
16	b	1-12
17	b	1-12
18	c	1-18
19	a	1-19
20	c	1-25
21	c	1-25
22	c	1-26
23	c	1-27
24	c	1-32
25	b	1-37
26	a	1-40
27	c	1-49
28	a	1-50
29	a	1-51
30	b	1-53
31	b	1-54
32	d	1-56
33	b	2-4
34	d	2-7

Continued on next page

Answers, continued

Item Number	Answer	Reference Page
35	d	2-8
36	a	2-14
37	d	2-18
38	b	2-26
39	c	2-35
40	b	2-41
41	b	2-42
42	a	2-49
43	b	2-50
44	c	2-54
45	b	2-55
46	d	2-56