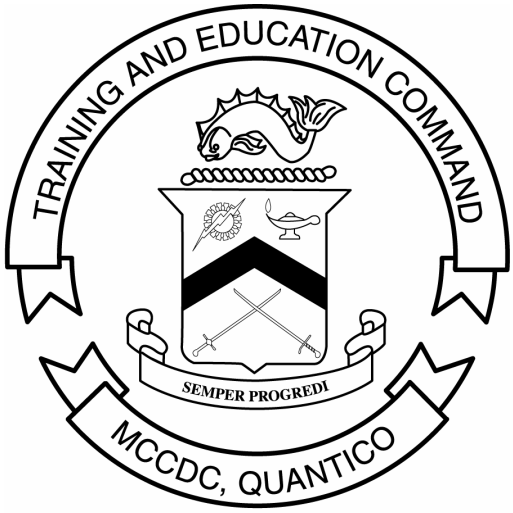
MCI 0357

MARINE CORPS INSTITUTE



M98A1 JAVELIN WEAPON SYSTEM FOR MARINES

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 0357
20 June 05

From: Director
To: Marine Corps Institute Student

Subj: M98A1 JAVELIN WEAPON SYSTEM FOR MARINES (MCI 0357)

1. Purpose. The subject course provides instruction on the description and operation of the Javelin Weapon System.

2. Scope. This course teaches operation of the Javelin, immediate actions as they pertain to the weapon, and Javelin role in antiarmor warfare.

3. Applicability. This course is intended for instructional purposes only. The primary audience for this course is Marines ranked private through sergeant in MOS 0352 that have or have not attended the formal school. Secondary audience is staff noncommissioned officers and commissioned officers in MOS 03xx.

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.

Terry M. Franus

T.M. FRANUS
By direction

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Table of Contents

Continued on next page

Table of Contents, Continued

Student Information

Number and Title	MCI 0357 M98A1 Javelin Weapon System for Marines..
Study Hours	6 hours
Course Materials	Text
Review Agency	School of Infantry, East, Camp Lejuene, N.C.
Reserve Retirement Credits	2
ACE	Not applicable to civilian training/education.
Assistance	For administrative assistance, have your training officer or NCO log on to the MCI home page 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 Technology Department (DLTD) of Marine Corps Institute (MCI). Since 1920, MCI has helped tens of thousands of dedicated Marines like you. Our goal is to assist you in improving your technical job performance skills through distance learning.

By enrolling in this course, you have shown a desire to improve the skills you already have and to master new skills to enhance your job performance. The distance learning course you have chosen—MCI 0357, *M98A1 Javelin Weapon System for Marines*, provides instruction on assembling and operating the Javelin weapon.

Your Personal Characteristics

- **YOU ARE PROPERLY MOTIVATED.** You have made a positive decision to get training on your own. 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 abilities 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 resources necessary to set and accomplish your goals. These professional traits will help you successfully complete this distance learning course.

Continued on next page

Study Guide, Continued

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 content. One way to do this is to read the table of contents. Notice the table of contents covers general areas of study and the order in which they are presented. You will find the text divided into study units. Each study unit is composed of at least two lessons, and each lesson ends with a lesson exercise.

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.

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 content, and exercises.

Reading the Learning Objectives

Learning objectives describe in concise terms what the successful learner 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 content, complete the exercises developed for you. Exercises are at the end of each lesson. Without referring to the text, complete the exercise questions and then check your response 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 procedure 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 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 two 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

CHARACTERISTICS AND NOMENCLATURE

Overview

Scenario

The recent lateral move to 0352, as part of your reenlistment option, increases the urgency for you to learn as much as you can about the Javelin weapon system prior to your impending reassignment. More importantly, as an NCO, you are aware that a thorough knowledge of the weapon system is paramount if you are to properly and successfully lead and train the Marines of your section.

Scope

This study unit covers the nomenclature of the M98A1 Javelin weapon system. It also examines major components and the general characteristics of parts and their functions.

In This Study Unit

This study unit will cover the following lessons:

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LESSON 1

PARTS AND FUNCTIONS

Introduction

Scope

The scope of this lesson is the Javelin parts and functions, with an emphasis on its two main parts.

Learning Objectives

Upon completion of this lesson, you should be able to

- Identify the definition of the Javelin weapon system.
- Identify the parts of the Javelin weapon system.
- Identify the range of the Javelin missile.

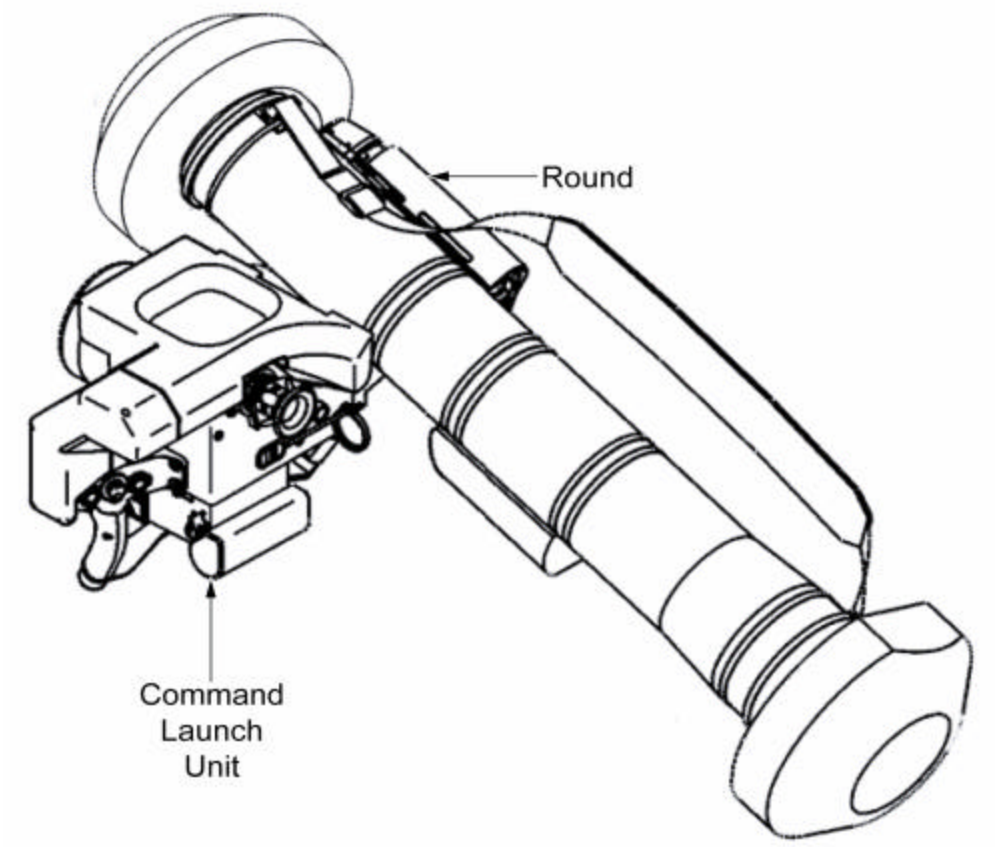
In This Lesson

This lesson includes the following topics.

M98A1 Javelin

Definition

The M98A1 Javelin weapon system is a man-portable, fire-and-forget, medium-range antiarmor weapon. The dual attack modes, 2,000-meter range, and powerful warhead enable this weapon to defeat all current and projected enemy armor threats. It is composed of two main parts: a round and a command launch unit (CLU). The Javelin can be used during the day or night and in limited visibility.



Characteristics

Parts and Functions

The Javelin system consists of two main parts: the round and the M98A1 CLU. System type is fire-and-forget, and its operation requires a crew of two.

Missile

The Javelin missile is capable of two modes of attack: top and direct.

Range	Top	Direct
Minimum Range of Target	150 meters	65 meters
Maximum Range of both Targets	2,000 meters	2,000 meters
Flight Time at Maximum Range	14 seconds	14 seconds

Propulsion

Missile propulsion comes from a two-stage motor. The launch stage ejects the missile from the LTA, and the flight stage propels the missile.

Backblast

Backblast is flying debris produced by firing the missile. The backblast area consists of two zones: primary danger and caution. The primary danger zone extends 25 meters and the caution zone extends an additional 75 meters.

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 study unit.

Item 1 The Javelin weapon system is a man-portable, _____, and medium-range antiarmor weapon.

a. light weight
b. armor-piercing
c. fire-and-forget
d. indirect fire

Item 2 The Javelin consists of two main parts; the round and the

a. carrying case.
b. transport assembly.
c. tripod.
d. command launch unit.

Item 3 The minimum range for the Javelin missile in the top attack mode is

a. 150 meters.
b. 100 meters.
c. 80 meters.
d. 65 meters.

Continued on next page

Answers

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

Item Number	Answer	Reference
1	c	1-4
2	d	1-4
3	a	1-5

Lesson Summary

In this lesson, you have learned the weapon systems' definition and the characteristics associated with the Javelin. In the next lesson, you will learn the technical data, major components, and the sights of the command launch unit.

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LESSON 2

COMMAND LAUNCH UNIT

Introduction

Scope

The Javelin weapon system is fired by using the M98A1 command launch unit (CLU). This lesson provides the student with an understanding of the components of the CLU. In this lesson, you will learn how to identify the major parts of the CLU and their functions.

Learning Objectives

At the end of this lesson, you will be able to

- Identify characteristics of the CLU.
- Identify major components of the CLU.

In This Lesson

This lesson contains the following topics.

Data

Weight	The M98A1 CLU with battery, carrying bag, and cleaning kit weighs 14.16 lbs.
Dimensions	Length: 13.71 in., Height: 13.34 in., Width: 19.65 in.
Daysight	The daysight magnification is 4×, with a field of view that is 4.8° × 6.4°.
Night Vision Sight	The night vision sight in the wide field of view setting has a magnification of 4.2× with a field of view that is 4.58° × 6.11°. In the narrow field of view setting the magnification is 9.2×, with a field of view of 2° × 3°.
Battery	The M98A1 CLU takes a lithium sulfur dioxide ($LiSO_2$) non-rechargeable BA 5590/U battery. The CLU battery life is approximately 4 hours depending on temperature conditions.
Filter	The M98A1 CLU is equipped with an IR filter that limits the enemy's ability to detect the weapon system with IR searchlight or spotlight.

Major Components

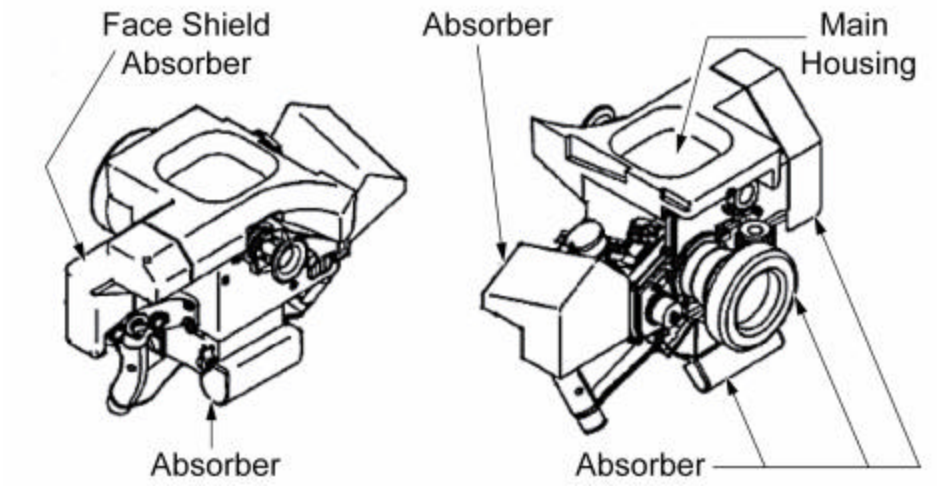
Introduction

The CLU consists of the following major components:

- Main Housing
- Absorber
- Handgrips
- Battery Compartment
- Status Indicators
- Display
- Eyepiece
- Test connector
- Round Interface Connector
- Humidity Indicator

Main Housing

The main housing (body) of the CLU contains the weapon system's electronics and optics.



Absorbers

The absorbers protect the main housing from damage and the gunner from injuries while the weapon is in operation.

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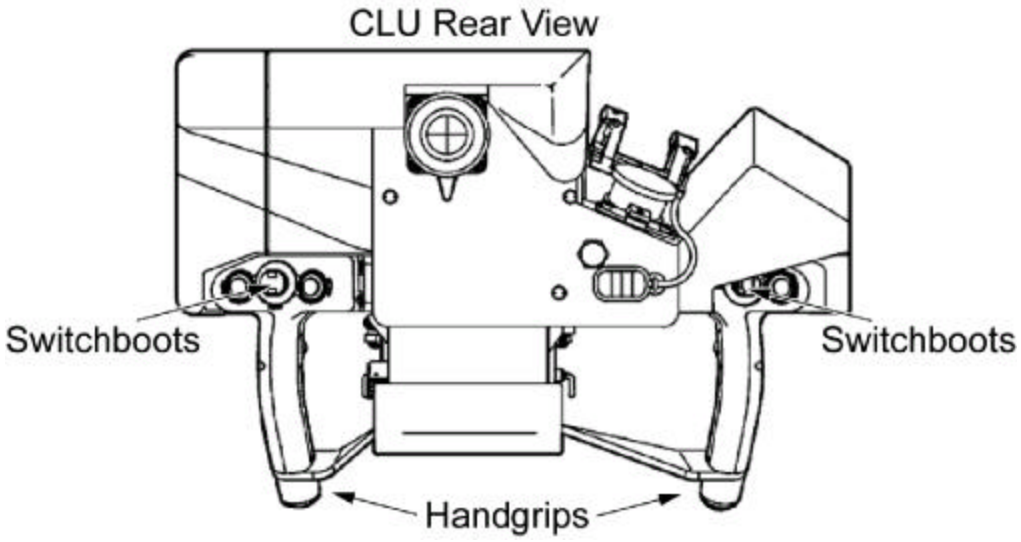
Handgrips

The gunner uses the handgrips to hold the CLU. The handgrips house the triggers and unit controls. Rubber coverings, called switchboots, protect the control buttons.



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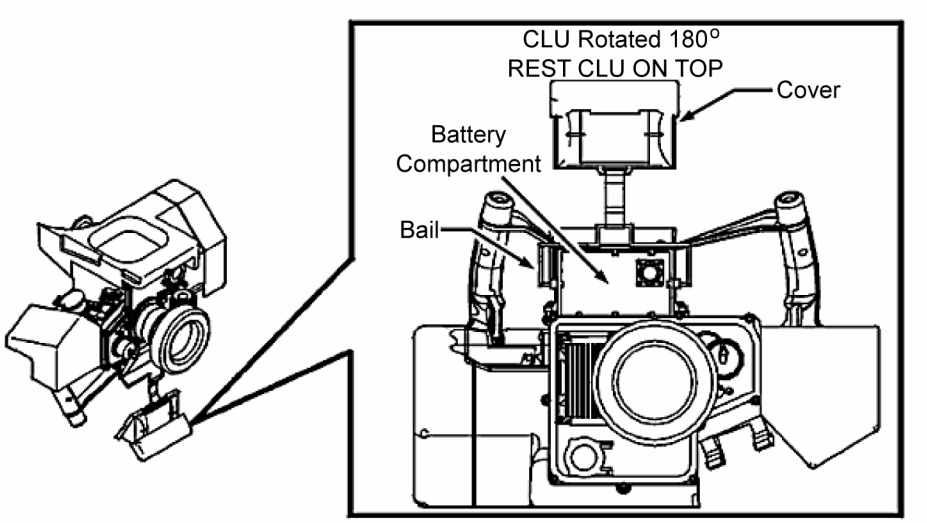
Battery Compartment

The battery compartment is located on the bottom of the main housing; it houses either the non-rechargeable BA-5590/U or the rechargeable BB390A battery (for training only). The same battery is used with the PRC 119 (SINCGARS) radio system and can be interchanged with the CLU. A connector on the battery compartment joins to a corresponding connector on the battery. A wire bail holds the detachable battery compartment cover in place.



Status Indicators

The CLU status indicators are 14 icons that surround the CLU display. The icons identify operational modes, conditions, and malfunctions, coded in green, amber, and red. The icons give the gunner instant feedback about the current weapon readiness or possible system malfunctions. These indicators are visible during day or night.

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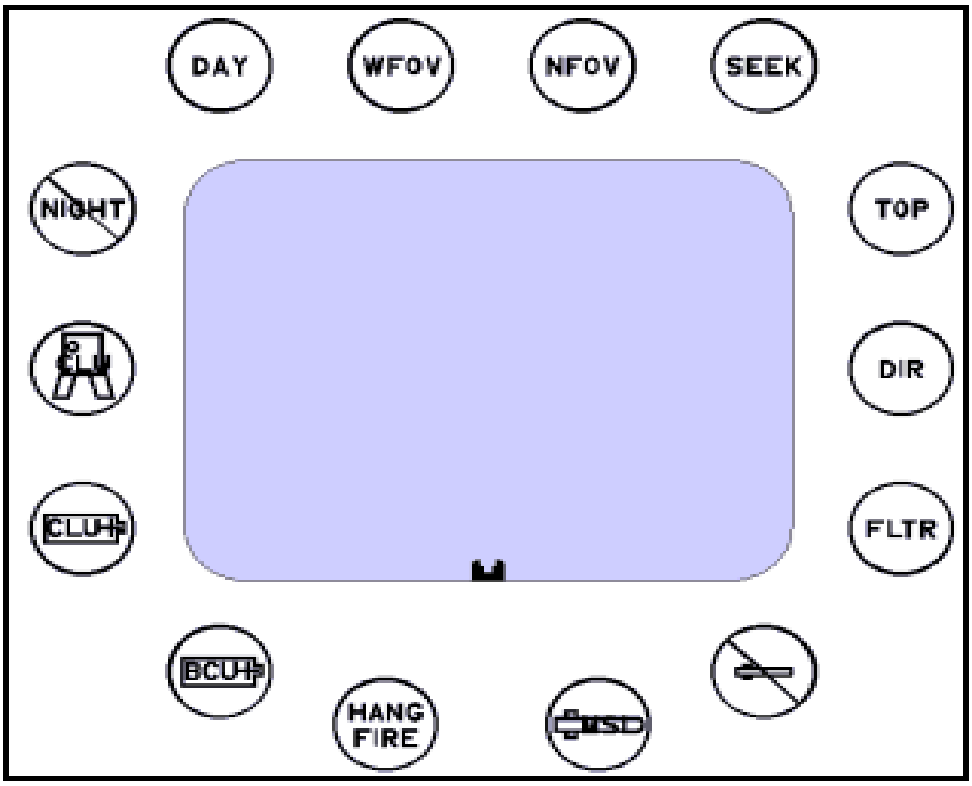
Major Components, Continued

Display

The CLU display is like a miniature television that is used to make the wide field of view (WFOV), narrow field of view (NFOV), and seeker infrared images visible to the gunner. The cathode ray tube (CRT) converts electrical signals from the signal processor into visible images for the gunner. This is what you see when you look through the eyepiece.



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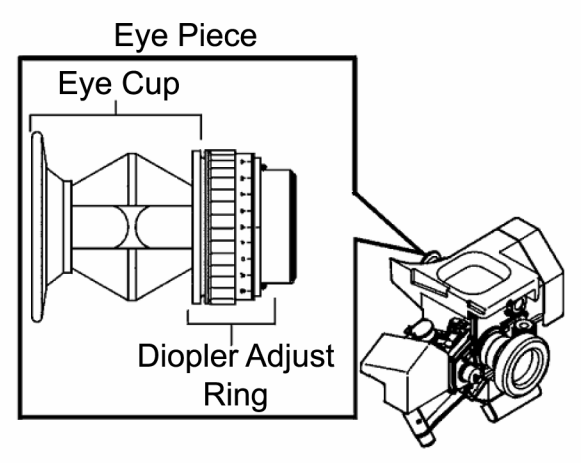
Major Components, Continued

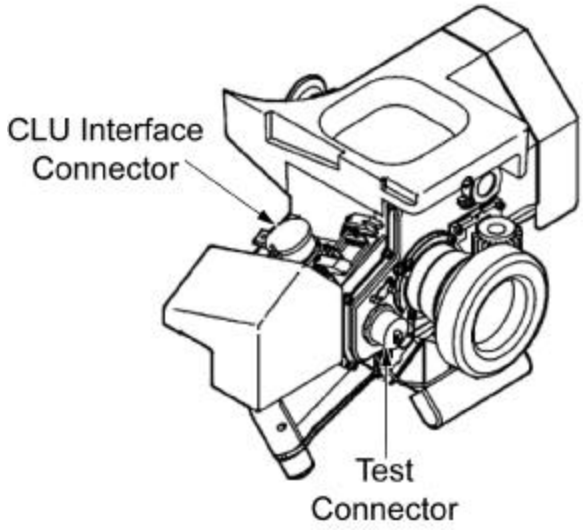
Eyepiece

The eyepiece allows the gunner to see the CLU display. Through the eyepiece, the gunner sees the Day FOV, WFOV, NFOV, seeker FOV, and the status indicators. The eyepiece consists of a lens assembly, eyecup, and diopler adjust ring.



Test Connector

The test connector is used to perform higher-echelon maintenance and to interface with the field tactical trainer.



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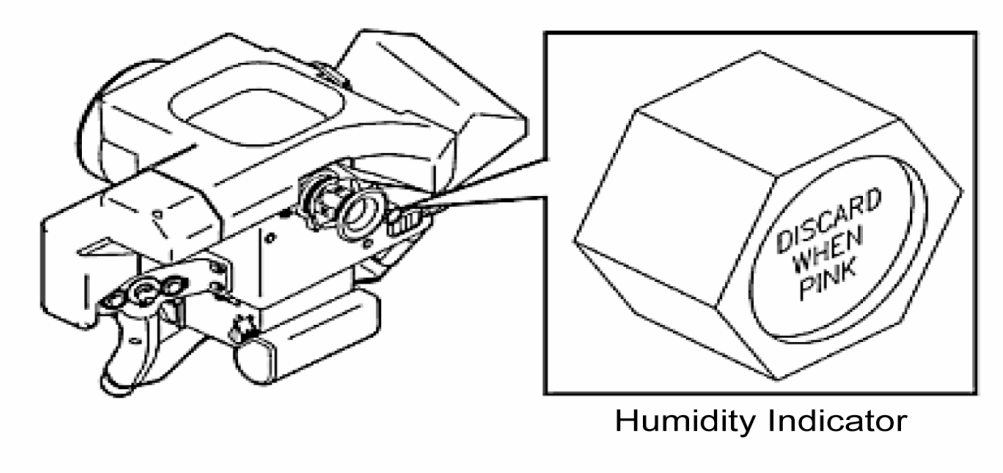
Round Interface Connector

The round interface connector provides the electrical connection between the CLU and the round.

Humidity Indicator

The humidity indicator displays the quality of air inside the CLU. White or blue color means the humidity indicator is within acceptable levels; pink means it requires maintenance.



Humidity Indicator

Sights

Types of CLU Sights

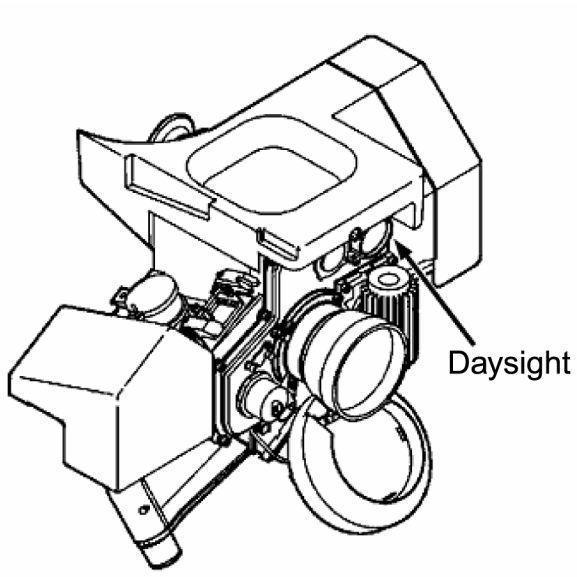
There are two types of CLU sights:

- Daysight
- Nightsight

Daysight

The daysight works much like a telescope and consists of a lens, status indicators, and an eyepiece. In the illustration below, the daysight

- Provides the gunner with a visible light image with four-power magnification for target viewing and battlefield surveillance.
- Can be used with the power off to save battery life.
- Is not affected by infrared clutter.



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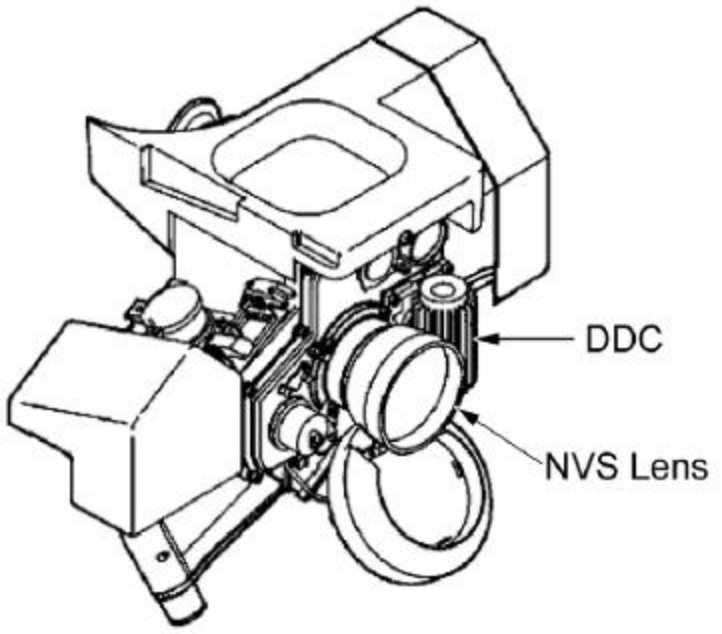
Night Vision Sight

The night vision sight (NVS) is the primary sight used by the gunners. The NVS is an imaging infrared (IR) system used during the day or night. It allows the gunner to see during conditions of limited visibility, to include

- Darkness
- Smoke
- Fog
- Rain
- Snow
- Image infrared (IR) clutter

The NVS operates by converting an IR target image to a visible light image for the gunner. The NVS consists of the lens, detector Dewar cooler (DDC), CLU display, and eyepiece. This sight provides the gunner with either a 4x WFOV or a 9x NFOV magnification for scanning and detecting targets.



Detector Dewar Cooler

The DDC cools the NVS to the proper operating temperature and converts IR energy into electrical signals. These signals are sent to the CLU display by way of the signal processor to provide the gunner a picture of the target area.

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 The daysight magnification is

a. 4×.
b. 3×.
c. 2×.
d. 1.5×.

Item 2 The _____ of the command launch unit contain(s) the system's electronics and optics.

a. absorbers
b. handgrips
c. main housing
d. eyepiece

Item 3 The _____ protect(s) the main housing from damage and the gunner from injuries while the weapon is in operation.

a. absorbers
b. handgrips
c. main housing
d. eyepiece

Item 4 What major component is used to perform higher echelon maintenance and to interface with the field tactical trainer?

a. Round interface connector
b. Bypass connector
c. Test connector
d. CLU connector

Continued on next page

Answers

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

Item Number	Answer	Reference
1	a	1-10
2	c	1-11
3	a	1-11
4	c	1-15

Lesson Summary

In this lesson, you have learned the major components of the CLU, the sights, and the characteristics of the CLU. The CLU is the brain of the weapon system. In the next lesson, you will learn about the Javelin round.

LESSON 3

JAVELIN ROUND

Introduction

Scope

In this lesson, you will learn about the Javelin round and its data.

Learning Objective

At the end of this lesson, you will be able to

- Identify the parts of the Javelin round.
- Identify the parts of the launch tube assembly (LTA).
- Identify the characteristics of the battery coolant unit (BCU).

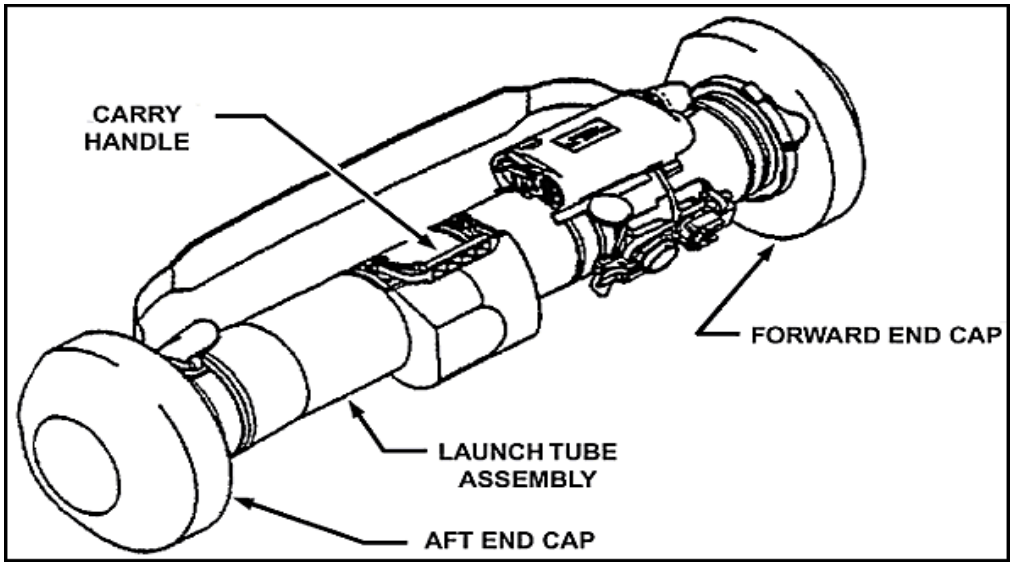
In This Lesson

This lesson contains the following topics:

Launch Tube Assembly

Launch Tube

The launch tube assembly houses the missile. It is a single-piece, composite graphite/epoxy design. The launch tube protects the missile from the environment before the missile is launched. All other LTA components mount externally on the tube. Once the missile is launched, the LTA is discarded.



Dimensions

The following are the dimensions (in inches) of the Javelin round. Length is 47.6 in., diameter with end cap is 11.75 in., and inside diameter is 5.52 in.

Weight

The Javelin round, which includes the launch tube assembly (LTA), missile, and battery coolant unit (BCU), weighs 35.14 lbs.

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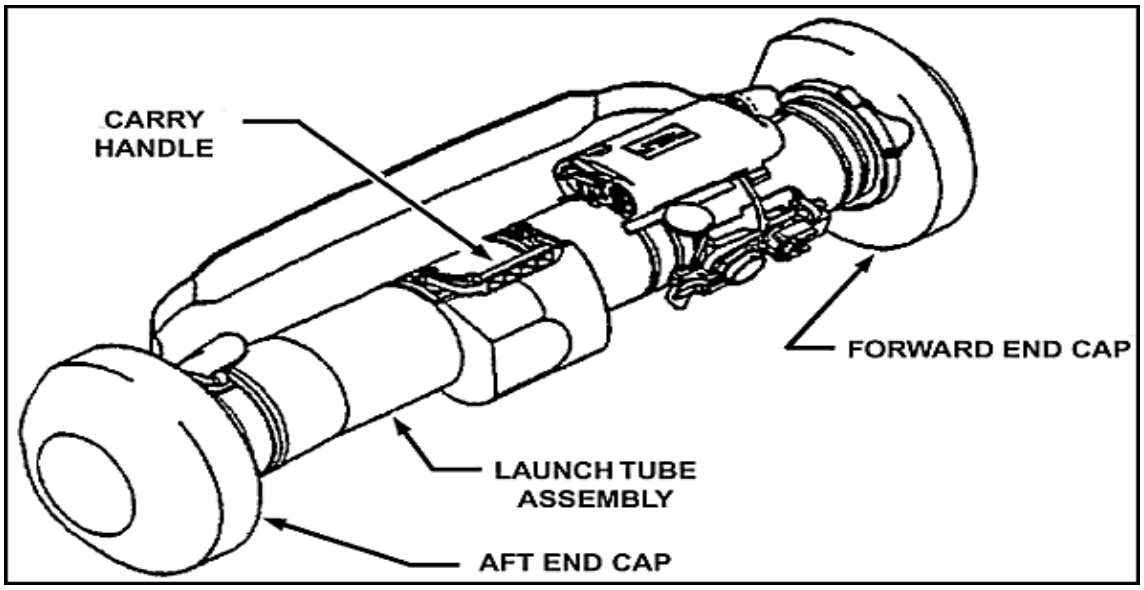
Launch Tube Assembly, Continued

End Caps

The two end caps (forward and aft) protect the missile from damage during transport and handling.

The forward end cap protects the seeker head section from moisture, dust, and other elements that could harm it. The forward end cap is removed when preparing to launch.

The aft end cap is permanently attached to the LTA. The center of the cap is blown out when the missile is launched.



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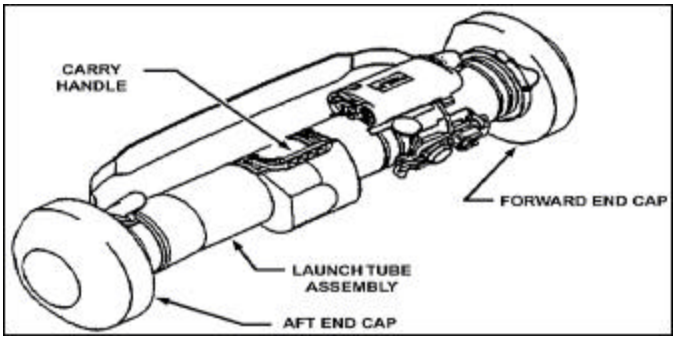
Launch Tube Assembly, Continued

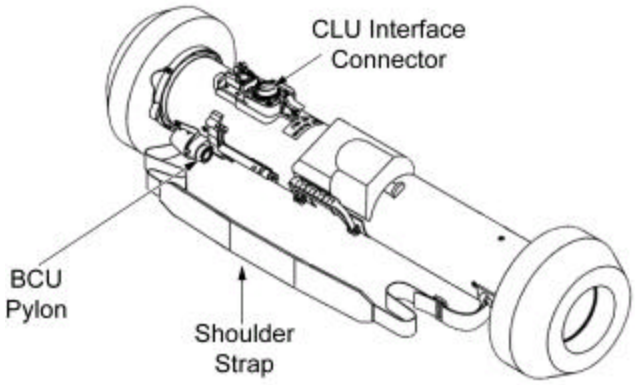
Carry Handle

The carry handle is used to lift and carry the round.

Shoulder Straps

The adjustable shoulder strap provides a means of transporting the round.





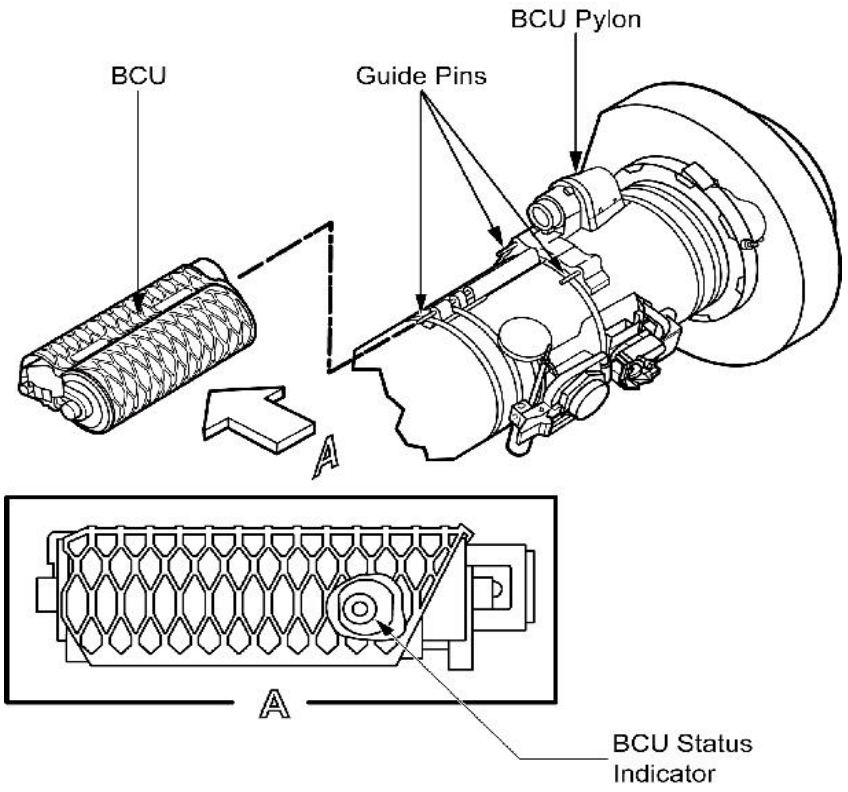
CLU Interface Connector

The CLU interface connector provides the electrical interface between the round and the CLU. Signals passed through the connector between the CLU and round include digital information, power, and seeker image signals.

Battery Coolant Unit

Description

The battery coolant unit (BCU) houses the battery section and compressed-gas coolant section and connects to the BCU Pylon. The battery section powers the missile electronics before missile launch. The coolant section cools the missile seeker to its operating temperature before missile launch. The BCU is a single-use unit with 4 minutes of operating time and is not rechargeable. The BCU status indicator shows the operational status of the BCU. Once the missile has been fired, the spent BCU is discarded with the LTA.



Lesson 3 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 The _____ houses the missile.

a. carrying case
b. command launch unit
c. packing case
d. launch tube assembly

Item 2 The Javelin round with battery coolant unit weighs _____ lbs.

a. 24.55
b. 35.14
c. 42.12
d. 43.24

Item 3 The Javelin round includes the launch tube assembly,

a. command launch unit, and battery coolant unit.
b. command launch unit, and missile.
c. transport case, and command launch unit.
d. missile, and battery coolant unit.

Item 4 The battery coolant unit houses the

a. battery section and compressed gas coolant section.
b. battery section, and electronics section.
c. guidance section, and coolant section.
d. seeker section, and guidance section.

Continued on next page

Answers

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

Item Number	Answer	Reference
1	d	1-22
2	b	1-22
3	d	1-22
4	a	1-25

Lesson Summary

In this lesson, you have learned how to identify the Javelin round, the launch tube assembly, and the battery coolant unit. In the next lesson, you will learn about the components of the Javelin missile.

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LESSON 4

JAVELIN MISSILE

Introduction

Scope

In this lesson, you will learn the components of the Javelin missile.

Learning Objective

At the end of this lesson, you will be able to identify the components of the Javelin missile.

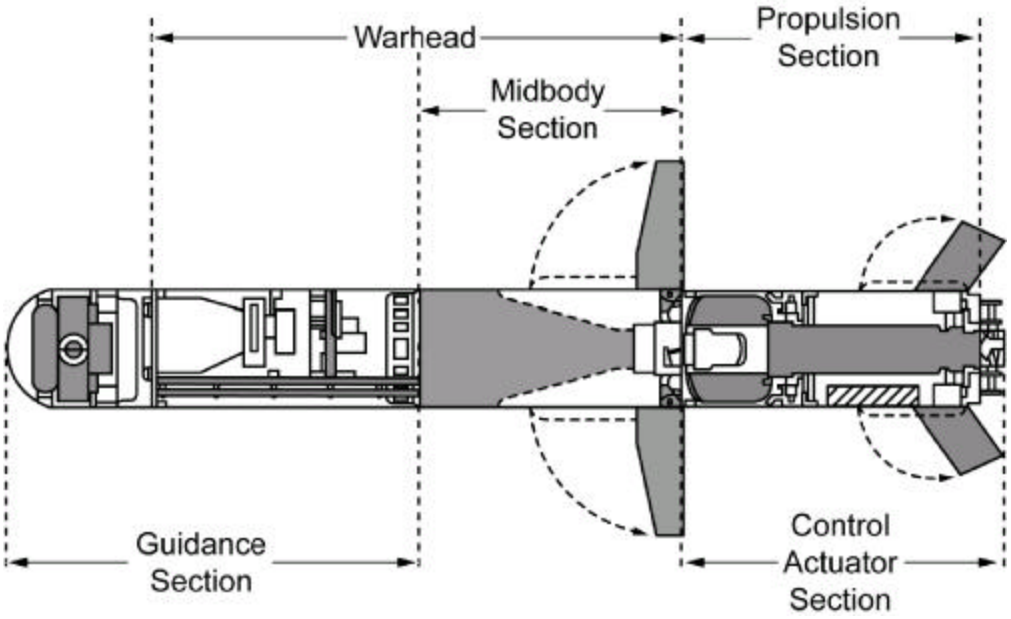
In This Lesson

This lesson contains the following topics:

Missile

Description

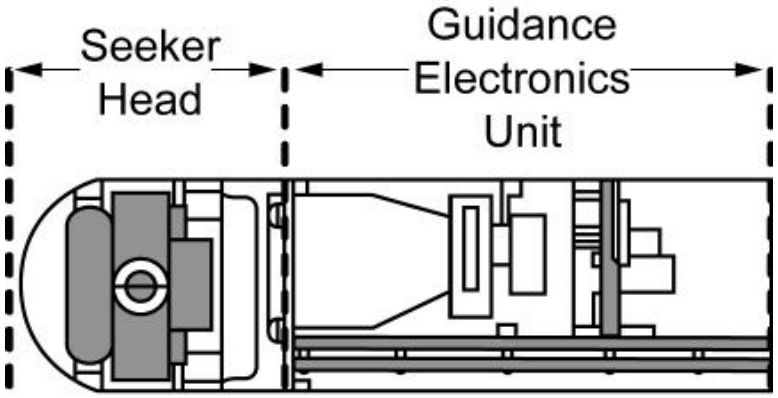
The missile provides the means to deliver a high explosive, shaped charge to the target. It acquires a target selected by the gunner, tracks the target during flight, directs itself to intercept the target, and detonates the warhead on impact with the target. The missile consists of the missile guidance section, midbody section, warhead section, propulsion section, and control actuator section. The illustration below depicts the Javelin missile.



Missile Guidance Section

Elements of Guidance Section

The missile guidance section provides target tracking and flight control signals. It is the forward section of the missile and includes the seeker head section and the guidance electronics unit. The illustration below depicts the missile guidance section.



Seeker Head Section

The seeker head section, known as the seeker, contains the missile imaging infrared (I^2R) system and the contact switches to detonate the warhead. The I^2R system gives the missile its "fire-and forget" capability. During flight to the target, the missile I^2R system tracks the target and sends target location information to the onboard guidance electronics unit (GEU).

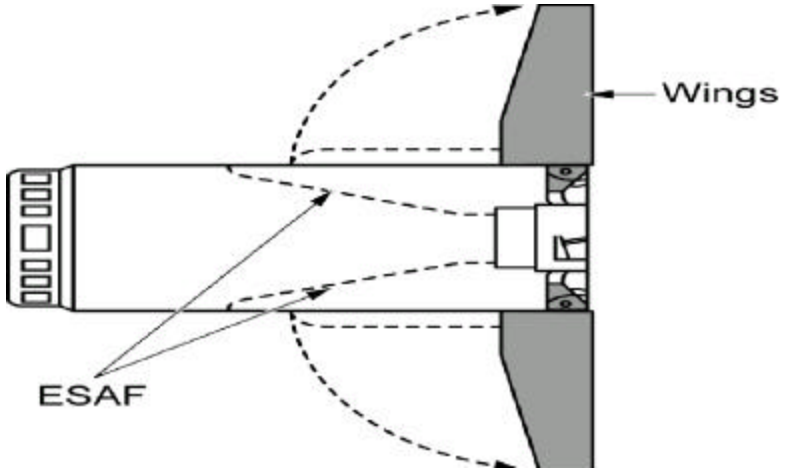
Guidance Electronics Unit (GEU)

The guidance electronics unit (GEU) serves two functions. It controls the seeker head so it looks at the target and sends signals to the control actuator section to guide the missile to the target during flight.

Mid-Body Section

Mid-Body Section

The mid-body section includes the missile skin, electronic safe arm and fire unit, wings, and the main charge of the warhead. The illustration below depicts the missile mid-body section.



Missile Skin

The missile skin is a structural part of the missile and provides environmental protection for the internal components during flight.

Electronic Safe, Arm, and, Fire (ESAF)

The electronic safe, arm, and fire (ESAF) is the principal safety device that prevents accidental ignition of the motors and accidental warhead detonation. The ESAF consists of circuits and two detonators (one for the precursor and one for the main charge). The ESAF controls missile launch sequence and warhead detonation. It also permits the rocket motors to start in the proper sequence when the gunner pulls the trigger. When the missile hits the target, the ESAF detonates each warhead charge in sequence.

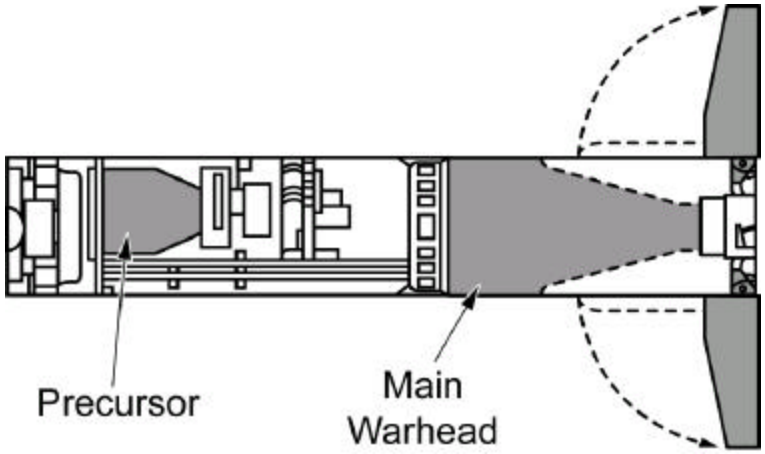
Wings

The wings provide lift and keep the missile stabilized during flight. The wings fold into slots in the missile skin when the missile is in the LTA and deploy into flight position after clearing the LTA.

Warhead Section

Description

The Javelin missile uses a dual charged warhead. The two charges are the precursor charge and a main charge. The illustration below depicts the warhead section.



Precursor Charge

The precursor charge is a high-explosive (HE) antitank shaped charge. Its purpose is to cause reactive armor on the target to detonate before the main charge reaches the armor. Once the reactive armor is penetrated, the target's main hull is exposed to the warhead's main charge. If the target is not equipped with reactive armor, the precursor charge provides additional explosive power to the main charge.

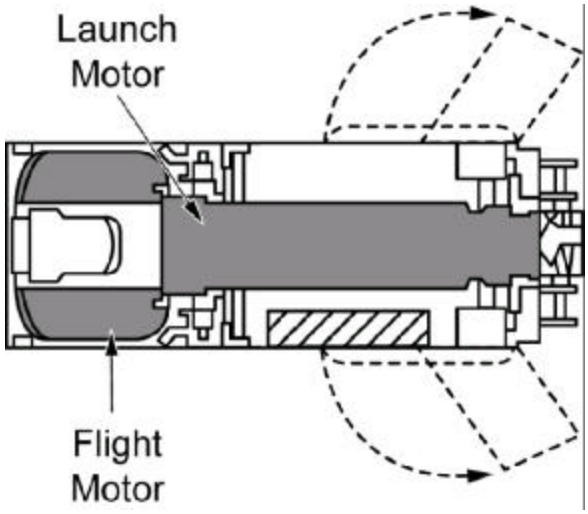
Main Charge

The main charge is the second charge of a dual-charge warhead and is also an HE antitank shaped charge. The main charge is designed to penetrate the targets main armor to achieve a target kill.

Propulsion Section

Description

The propulsion section provides the thrust for the missile to clear the LTA and reach the target. It also forms a subsection of the middle airframe. The propulsion section consists of the launch and flight motors. The illustration below depicts the propulsion section



Launch Motor

The launch motor propels the missile out of the LTA. It provides the initial force to push the missile a safe distance from the gunner before the flight motor ignites to ensure gunner's safety. The launch motor is completely spent by the time the missile clears the LTA, this accounts for the low signature after launch.

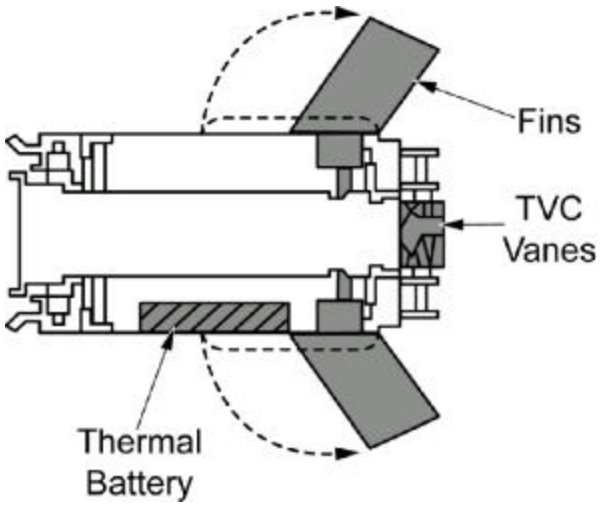
Flight Motor

The flight motor powers the missile to the target during flight. It ignites when the missile is a safe distance from the gunner, protecting the gunner from hot exhaust gases generated when the motor fires.

Control Actuator Section

Description

The control actuator section maneuvers the missile during flight and provides internal electrical power. The control actuator section consists of four control fins, four thrust vector control (TVC) vanes, and a thermal battery. The illustration below depicts the control actuator section.



Control Fins

The control fins maneuver the missile during flight. The fins are spring loaded, automatically deploy, and lock into position after the missile clears the LTA. During flight, they adjust automatically to guide the missile to the target.

Thrust Vector Control (TVC)

The TVC vanes aid the control fins in maneuvering the missile during flight by deflecting the flight motor exhaust. This control changes the angle of thrust from the flight motor, resulting in a change to the missile's flight path.

Thermal Battery

The thermal battery provides internal electrical power for the missile during flight. It is sealed in the body of the missile.

Lesson 4 Exercise

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

Item 1 The _____ provides target tracking and flight control signals.

a. guidance section
b. control actuator section
c. propulsion section
d. mid-body section

Item 2 The _____ includes the missile skin, electronic safe arm and fire unit, wings, and main charge of the warhead.

a. warhead section
b. control actuator section
c. mid-body section
d. propulsion section

Item 3 The _____ consists of the launch and flight motors.

a. warhead section
b. control actuator section
c. mid-body section
d. propulsion section

Item 4 The _____ maneuvers the missile during flight and provides internal electrical power.

a. warhead section
b. control actuator section
c. mid-body section
d. propulsion section

Continued on next page

Answers

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

Item Number	Answer	Reference
1	a	1-31
2	c	1-32
3	d	1-34
4	b	1-35

Lesson Summary

In this lesson, you have identified the components of the Javelin missile. These parts are the guidance, mid-body, warhead, propulsion, and control actuator sections.

In the next study unit, you will learn how to prepare the Javelin for firing.

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STUDY UNIT 2

JAVELIN PREPARATION

Overview

Scenario

Imagine that you're in a combat environment. The Javelin gunner and his assistant are casualties. You are facing an armored threat. The Javelin round is on the ground and the command launch unit (CLU) is in the carrying bag on the gunner. Will you be able to assemble this weapon and prepare it for firing?

Scope

This study unit will teach you how to assemble the weapon system and how to prepare the Javelin for firing.

In This Study Unit

This study unit will cover the following lessons:

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LESSON 1

ASSEMBLY OF THE JAVELIN

Introduction

Scope

The Javelin weapon system is comprised of the command launch unit (CLU) and the round. To employ this weapon system, it will need to be assembled. In this lesson, you will learn how to assemble the Javelin weapon system.

Learning Objective

Upon completion of this lesson, you should be able to identify the steps to assemble the Javelin weapon system.

In This Lesson

This lesson contains the following topics:

Assembly of the Command Launch Unit (CLU) and Round

Safety Note

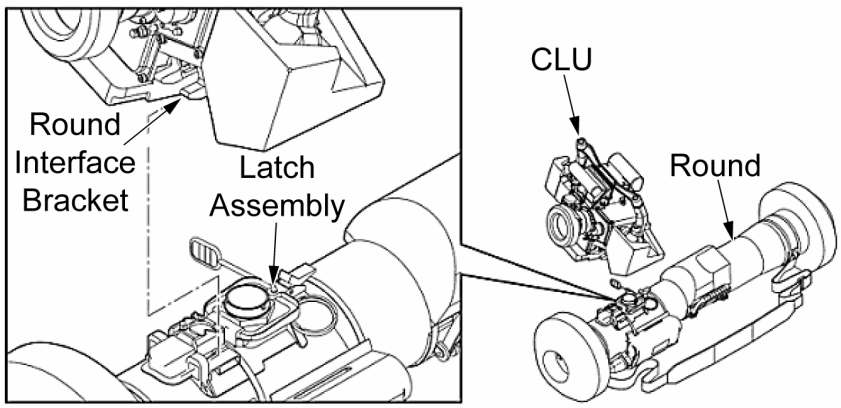
CAUTION: Failure to assemble this weapon properly will cause it to malfunction and possibly render it inoperable.

When To Assemble

You will assemble this weapon system when contact with the enemy is likely.

Steps to Assembly

Follow the steps in the table below to assemble the Javelin properly.

Step	Action
1	Place the round on the ground with the flat sides of the end caps down and latch assembly facing up.
2	Remove protective cover from the CLU interface connector. Pull on tab of lanyard to snug protective cover against side of round. Position protective cover so that no interference will exist when the CLU is connected.
3	Remove protective cover from round interface connector. Pull on tab of lanyard to snug protective cover against side of the CLU. Position protective cover so that no interference will exist when round is connected.
4	Place round interface bracket in round hooks.
5	Slide the CLU forward and press down to engage the CLU and round interface connectors. Round and the CLU are connected properly when latch release snaps into place. 

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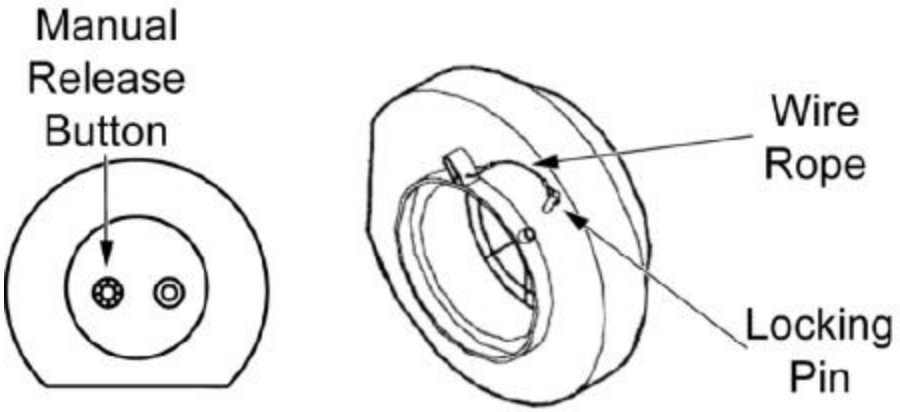
Remove Forward End Cap

Steps for Removal

Follow the steps below to remove the forward end cap.

Step	Action
1	Remove locking pin by pulling straight up on wire rope.
2	Turn forward end cap latch counterclockwise. Lift Javelin by the CLU hand grips and remove forward end cap. If forward end cap does not come off round, press manual release button until hissing stops, then remove forward end cap.
3	Inspect area around seeker head for dirt or debris. Tip end of round down to allow debris to fall out if required.
4	Place forward end cap on ground and position open end of round to rest atop of forward end cap. This will help prevent dirt and debris from accumulating on the seeker dome.



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Lesson 1 Exercise

Directions

Complete exercise items 1 through 3 by carefully reading the scenario below and then select the best answer from the list provided.

Scenario

You are a 0351 in a combat environment with an armored threat. The Javelin gunner attached to your company has become a casualty along with his assistant. You observe an enemy tank to the company's front at about 1,000 meters. The Javelin round and the CLU are on the ground un-assembled.

Item 1

You have placed the round interface bracket in round hooks. How do you engage the CLU and round interface connectors?

a. Slide the CLU down and lift up.
b. Slide the CLU forward and press down.
c. Slide the CLU down and press down.
d. Push the CLU left and up.

Item 2

After you have placed the round on the ground with the flat sides of the end caps down and latch assembly facing up, what is the next step in assembling the Javelin properly?

a. Turn on the CLU.
b. Remove the forward end cap.
c. Remove the lens covers.
d. Remove protective cover from the CLU interface connector.

Item 3

In removing the forward end cap, you remove the locking pin, then turn the forward end cap latch

a. clockwise.
b. counterclockwise.
c. half way to the right.
d. half way to the left.

Continued on next page

Solutions

The table below lists to the reference page.

Item Number	Answer	Reference
1	b	2-4
2	d	2-4
3	b	2-5

Lesson Summary

In this lesson, you learned how to assemble the Javelin weapon system and how to remove the forward end cap. You have taken two pieces of high-tech metal and turned them into a sophisticated weapon.

In the next lesson, you will learn how to prepare this weapon system for firing.

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LESSON 2

SIGHT OPERATION

Introduction

Scope

Due to the technology incorporated into the Javelin, there are specific tasks that must be accomplished to prepare the weapon for firing. In this lesson, you will learn how to prepare and operate the Javelin night vision sight (NVS) during the day and night.

Learning Objective

Upon completion of this lesson, you should be able to identify and sequence the steps for night vision sight operation.

In This Lesson

This lesson contains the following topics:

Prepare the Night Vision Sight For Operation

Safety Note

WARNING: If the battery compartment becomes hot to the touch, turn the CLU off immediately. Allow battery to cool at least 60 minutes before removing it.

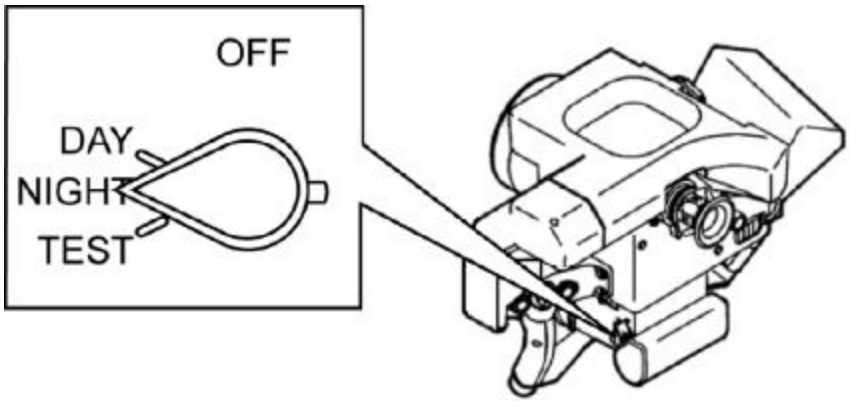
If you hear a hissing sound from the battery compartment, turn off the CLU and leave area until any smell or signs of leaking gas have been cleared from the area.

When to Prepare

You should prepare the night vision sight (NVS) for operation prior to firing the weapon system.

Preparation Steps

Follow the steps below to prepare the night vision sight (NVS) for operation:

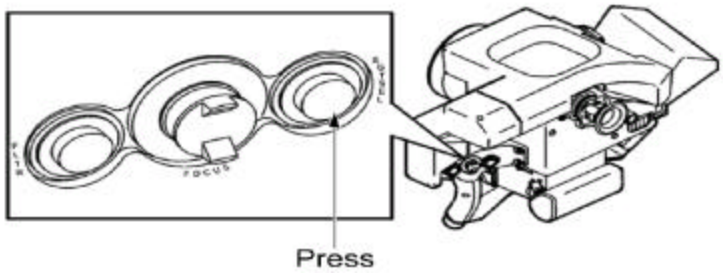
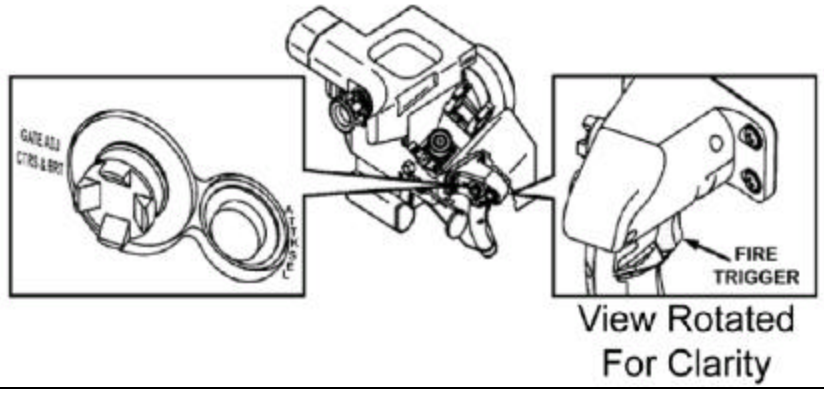
Step	Action
1	Select a firing position that best meets your situation (see study unit 5).
2	Set power switch to NIGHT position. 
3	Adjust diopler ring for best clarity of the CLU display. If no suitable objects are seen in the CLU display, adjust for better clarity.
4	Verify the NVS not ready and DAY FOV indicators are lit. If any other indicators are lit, notify chain of command.

Continued on next page

Night Vision Sight Operation

Operation Steps

Follow the steps listed below for night vision sight operation:

Step	Action
1	Turn power switch to the NIGHT position.
2	After the NVS cool down is complete (about 2 minutes and 30 seconds), verify that the NVS not ready indicator goes out and the DAY indicator remains lit.
3	Press the SGT SEL switch to select Wide Field Of View (WFOV). 
4	Observe the WFOV indicator is lit and the WFOV stadia and infrared video appear on the CLU display.
5	Adjust focus of WFOV video by pressing the FOCUS switch up or down. When focus reaches upper or lower limits, the WFOV indicator will flash.
6	Adjust contrast of the WFOV video by pressing GATE ADJ/CTRS and BRT switch left or right. 

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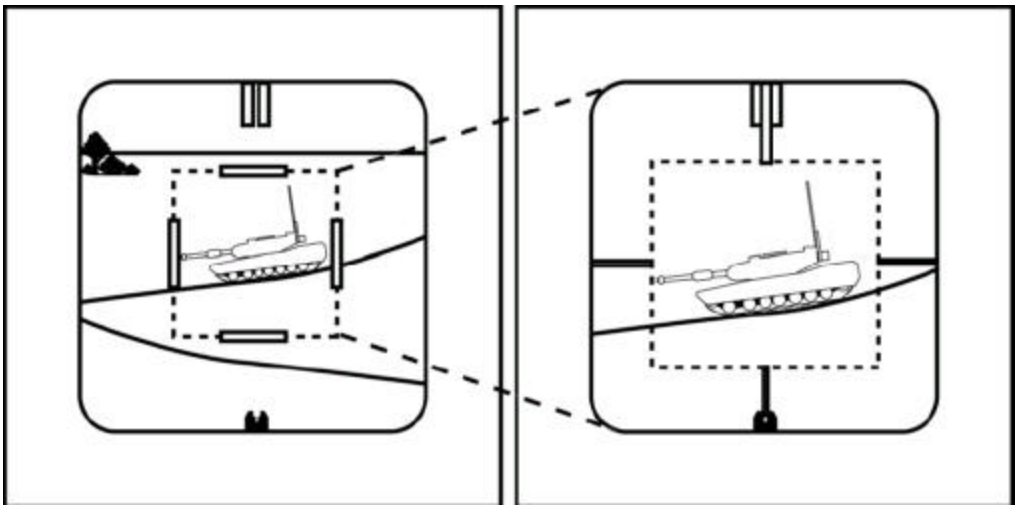
Night Vision Sight Operation, Continued

Operation Steps, continued

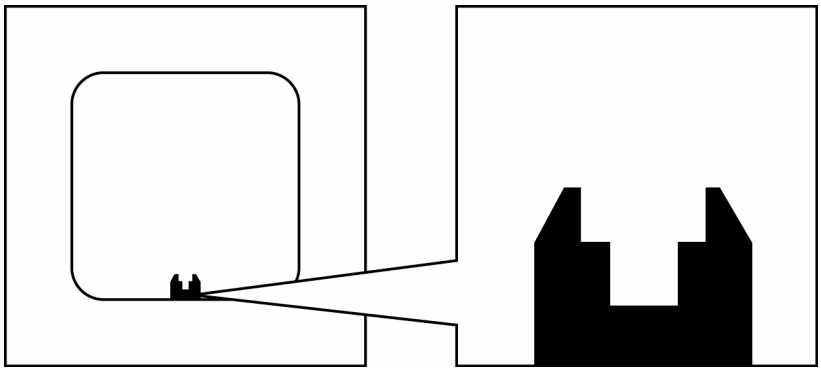
Step	Action
7	Adjust the brightness of the WFOV video by pressing GATE ADJ/CTRS and BRT switch up or down.
8	Use the WFOV to scan for targets.
9	If unsure of target, switch to the NFOV.



Day Sight Operation

Operation Steps

Follow the steps listed below for day sight operation:

Step	Action
1	Verify the DAY indicator is lit.
2	Verify the day FOV stadia are visible on the CLU display. 
3	Scan for targets in the day FOV.

Lesson 2 Exercise

Directions

Complete exercise items 1 through 9 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Through Item 9

Matching: For items 1 through 9, sequentially match the step in column 1 with the appropriate action for night vision sight operation in column 2. Place your responses in the spaces provided.

Column 1	**Column 2**
Step	**Action**
___ 1.	a. Turn power switch to the NIGHT position.
___ 2.	b. If unsure of target, switch to the NFOV.
___ 3.	c. Use the WFOV to scan for targets.
___ 4.	d. Press the SGT SEL switch to select Wide Field of View (WFOV).
___ 5.	e. After the NVS cool down is complete (about 2 minutes and 30 seconds), verify that the NVS not ready indicator goes out and the DAY indicator remains lit.
___ 6.	f. Adjust contrast of the WFOV video by pressing GATE ADJ/CTRS and BRT switch left or right.
___ 7.	g. Observe the WFOV indicator is lit and the WFOV stadia and infrared video appear on the CLU display.
___ 8.	h. Adjust the brightness of the WFOV video by pressing GATE ADJ/CTRS and BRT switch up or down.
___ 9.	i. Adjust focus of WFOV video by pressing FOCUS switch up or down. When focus reaches upper or lower limits, the WFOV indicator will flash.

Continued on next page

Solutions

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
1	a	2-11
2	e	2-11
3	d	2-11
4	g	2-11
5	i	2-11
6	f	2-11
7	h	2-12
8	c	2-12
9	b	2-12

Lesson Summary

In this lesson, you learned how to prepare the Javelin and operate the night and day sights. In the next study unit, you will learn how to fire the Javelin.

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STUDY UNIT 3

TARGET ENGAGEMENT AND FIRING

Overview

Scenario

You have properly prepared the Javelin for firing. The enemy armor is too close for comfort. You need to get this weapon into the fight quickly. However, a wasted round does no good and could cost you your life. You need to properly determine if the enemy is within range, determine the attack mode, lock on to the target, and finally launch the missile.

Scope

This study unit will provide instruction regarding target engagement, modes of attack, achieving seeker lock-on, and launching the missile.

In This Study Unit

This study unit contains the following lessons:

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LESSON 1

DETERMINE TARGET ENGAGEMENT

Introduction

Scope

Due to the Javelin's range limitations, the CLU uses stadia lines for determining if a target is within range of the weapon system.

Content

In this lesson, you will learn how to determine if a target is within range of the Javelin weapon system by using stadia lines.

Learning Objective

Upon completion of this lesson, you should be able to

- Identify the method of use to determine range using stadia lines.
- Provided with illustrations, identify whether targets are within range.

In This Lesson

This lesson contains the following topics:

Stadia Lines

Description

Stadia lines are used to determine whether a target is in range and are seen in all CLU fields of view (FOV). They change in their appearance, size, and location, according to the field of view selected. The CLU has three different stadia for each of the three fields of view:

- Day FOV
- Wide field of view (WFOV)
- Narrow field of view (NFOV)

The day FOV stadia are seen in all fields of view but are only used in the day FOV. Each stadia is different for each FOV. This allows the gunner to identify each FOV just by seeing the stadia.

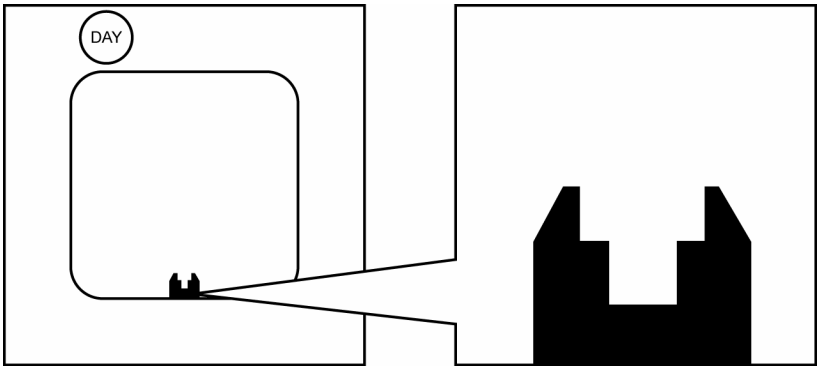
Method Of Use

To use the stadia to determine range, you fit the target into the stadia. If the target touches both sides, it is within range. If the target does not touch each side, then it is out of range thus; do not fire the weapon.

Full stadia are used when the target presents a side view to the gunner; the half stadia are used when the target presents a frontal view to the gunner. Stadia for the different FOV are listed below.

Day FOV

The day FOV stadia are attached permanently to and appear at the bottom center of the CLU display.



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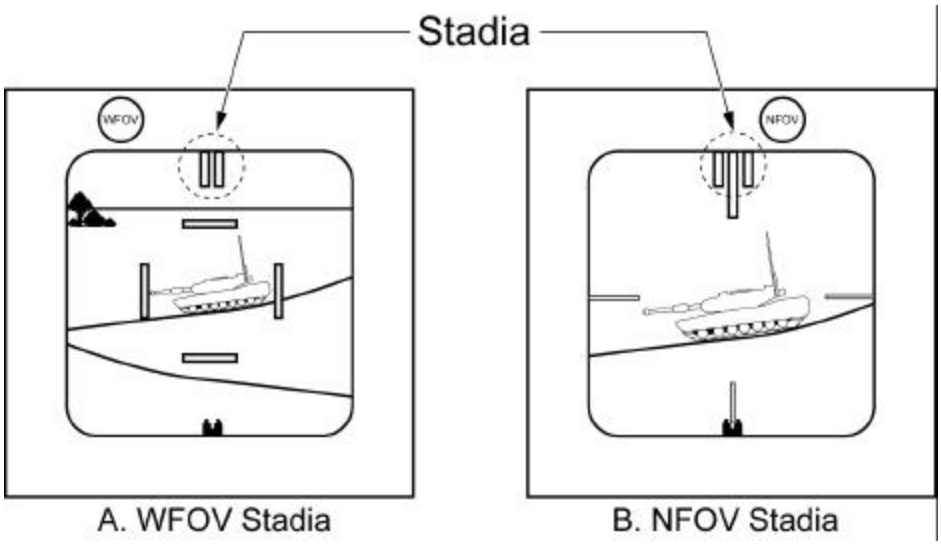
Stadia Lines, Continued

WFOV Stadia

The WFOV stadia (A) consist of two vertical lines centered at the top of the CLU display. The WFOV stadia are visible only in the WFOV.



NFOV Stadia

The NFOV stadia (B) consist of two vertical stadia lines and the upper reticle line centered at the top of the CLU display. The NFOV stadia are visible only in the NFOV.

Continued on next page

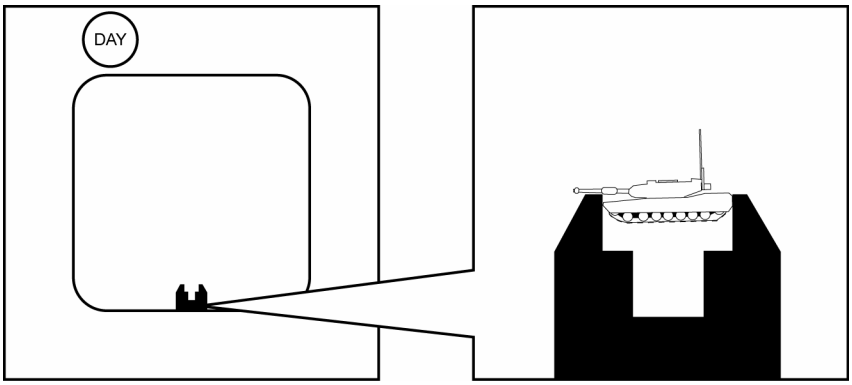
Full-Stadia Method

Definition

The full-stadia method uses the full distance between the stadia to determine if a target presenting a side view is in-range. The full-stadia method is applied equally for the day FOV, WFOV, and NFOV stadia.

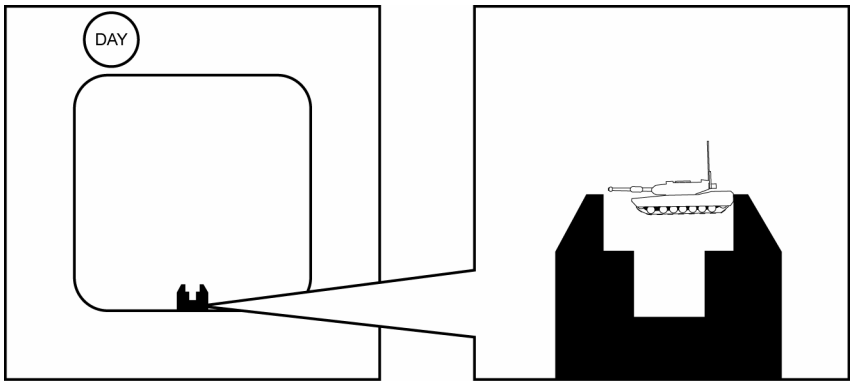
Day FOV: Target in Range

Target is in range.



Day FOV: Target Out of Range

Target is out of range.



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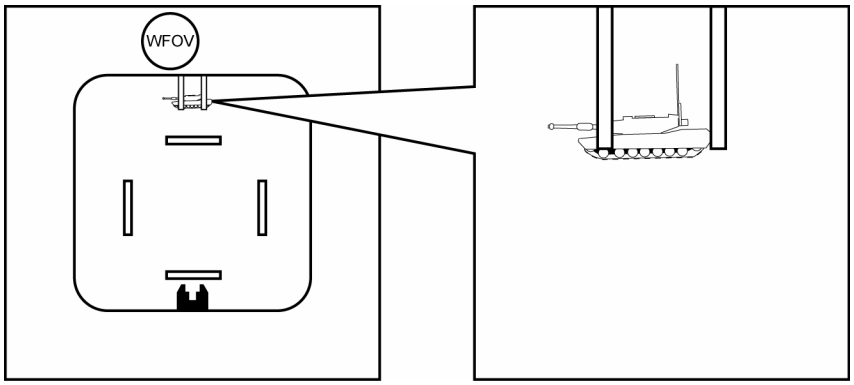
Full-Stadia Method, Continued

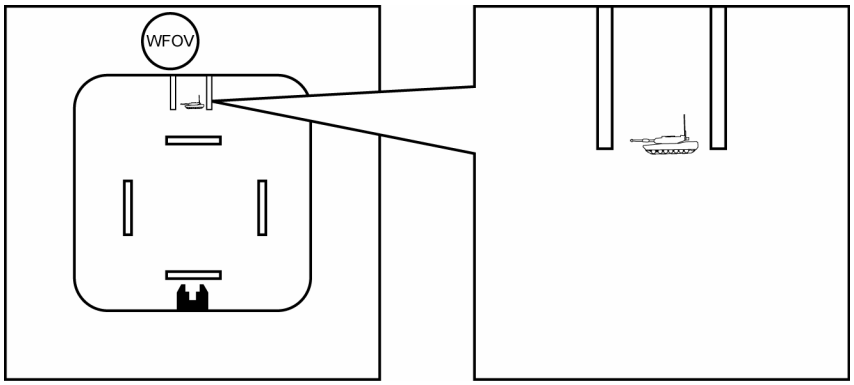
WFOV: Target in Range

Target is in range.



WFOV: Target Out of Range

Target is out of range.



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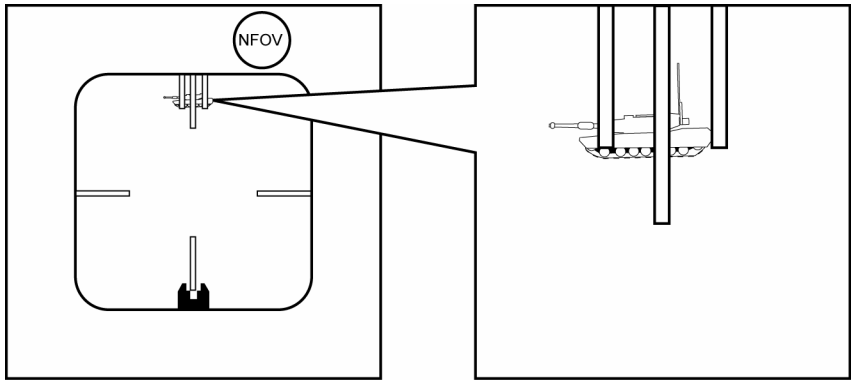
Full-Stadia Method, Continued

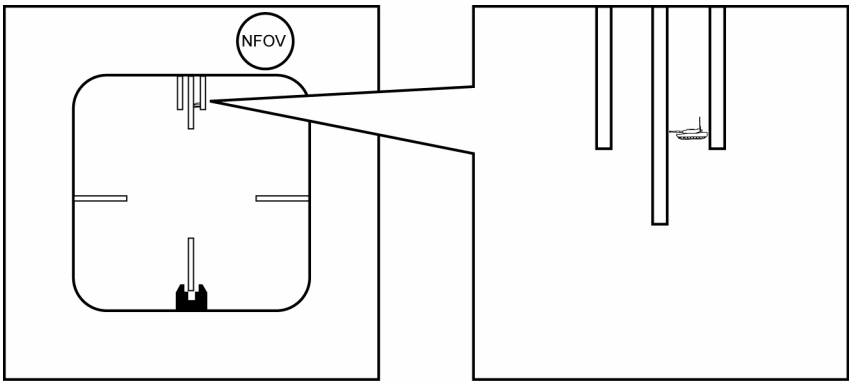
NFOV: Target In Range

Target is in range.



NFOV: Target Out of Range

Target is out of range.



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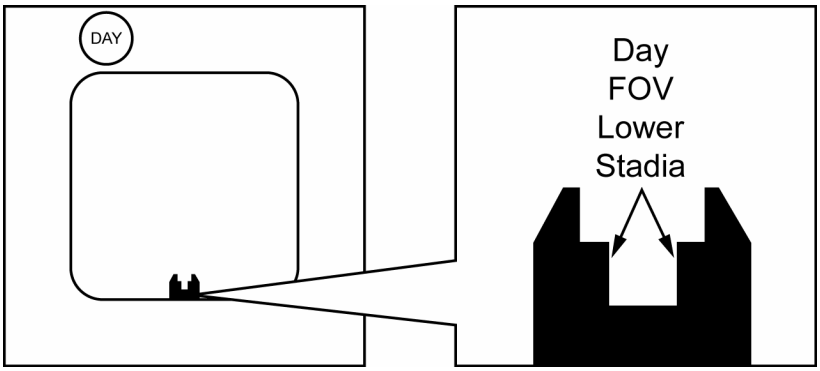
Half-Stadia Method

Definition

The half-stadia method uses half the distance between the stadia to determine if the target presenting a frontal view is in range. The half-stadia method is applied differently for the day FOV, WFOV, and NFOV stadia.

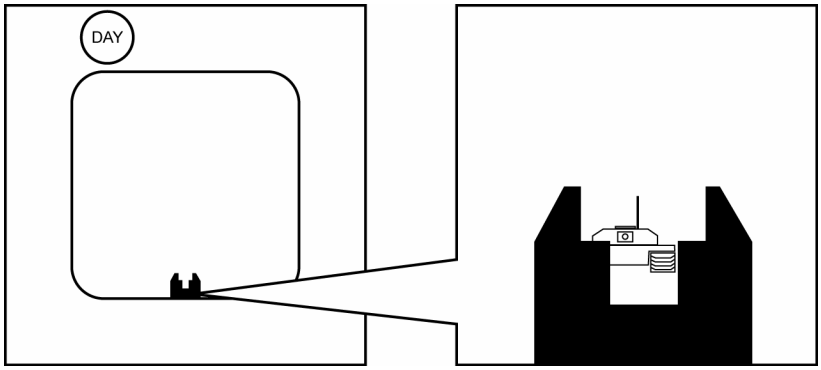
Day FOV

In the day FOV, the gunner determines whether a target is in range by using the lower stadia lines.



Day FOV: Target In Range

Target is in range.



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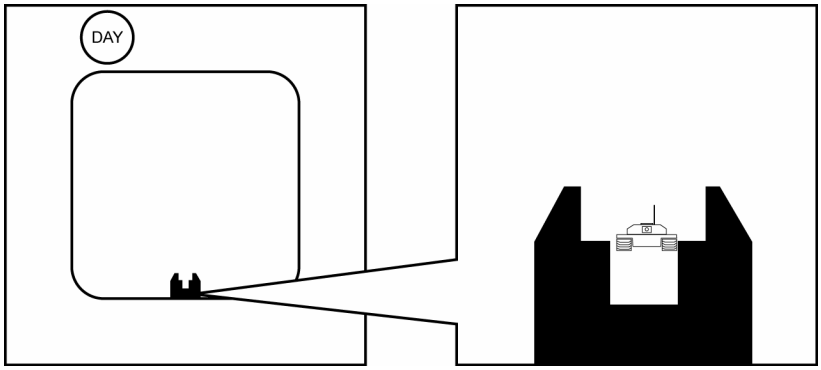
Half-Stadia Method, Continued

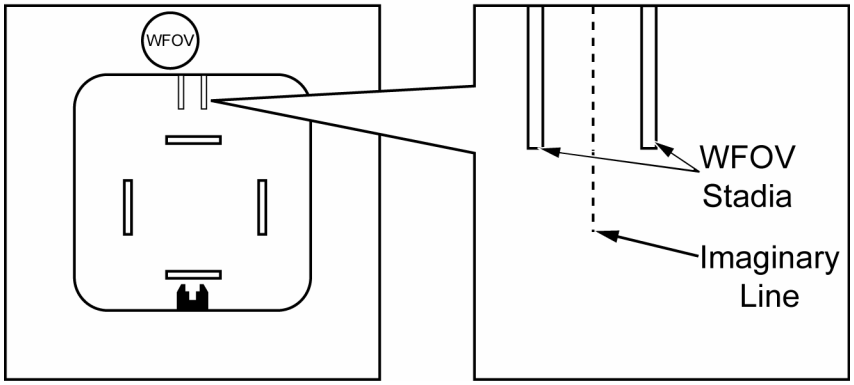
Day FOV: Target Out of Range

Target is out of range.



WFOV

In the WFOV, the gunner must determine if the target is in range by imagining a dividing line between the left and right full stadia. This imaginary line is now the boundary for half stadia.



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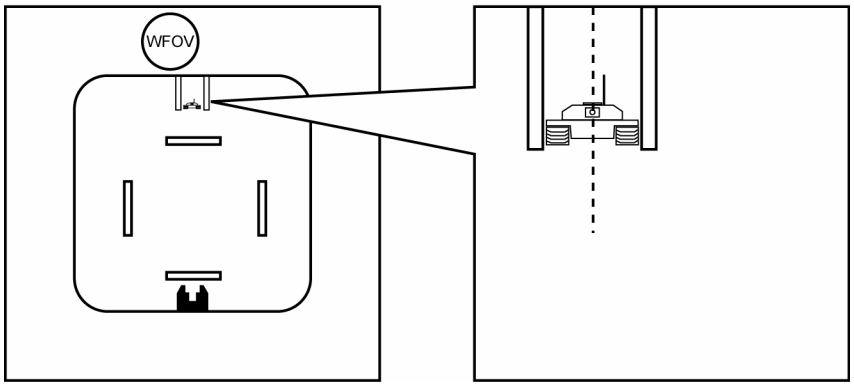
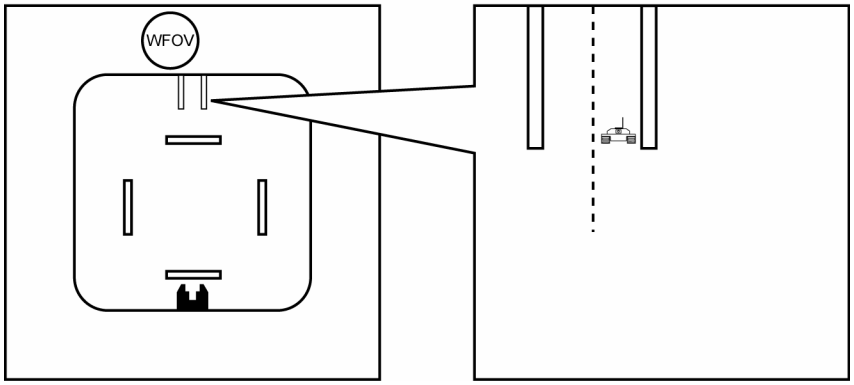
Half-Stadia Method, Continued

WFOV: Target In Range Target is in range.



WFOV: Target Out of Range Target is out of range.



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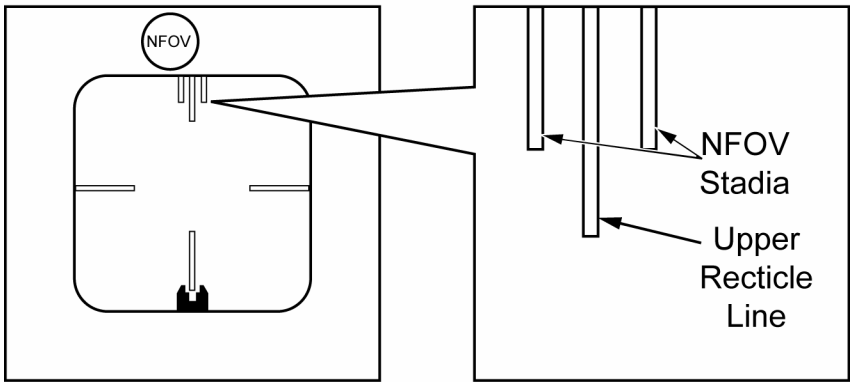
Half-Stadia Method, Continued

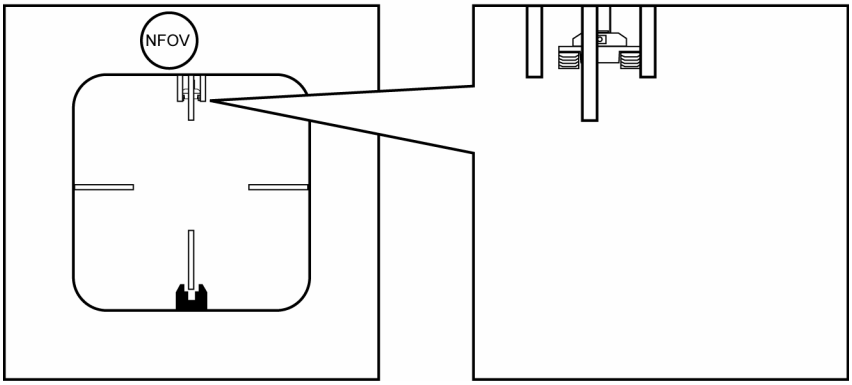
NFOV

The NFOV has a line between the full stadia lines. This line is used to determine if a target is in range in the half stadia method. This middle line now becomes a boundary.



NFOV: Target In Range

Target is in range.



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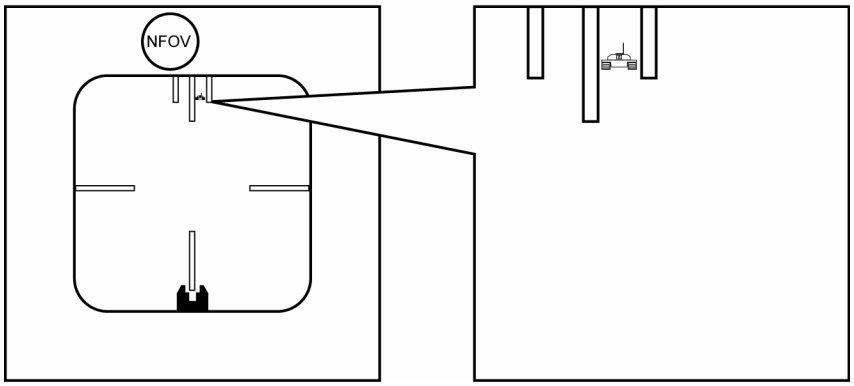
Half-Stadia Method, Continued

NFOV: Target Out of Range

Target is out of range.



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Lesson 1 Exercise

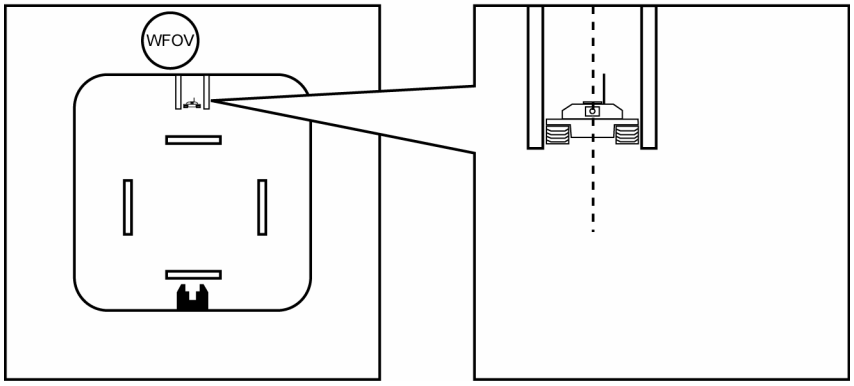
Directions Complete exercise items 1 through 3 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 The gunner would use the full stadia method to determine range when the target

a. presents a side view to the gunner.
b. presents a frontal view to the gunner.
c. presents a rear view to the gunner.
d. is moving.

Item 2 What stadia is used; is the target in range?

a. Full stadia; No.
b. Full stadia; Yes.
c. Half stadia; Yes
d. Half stadia; No



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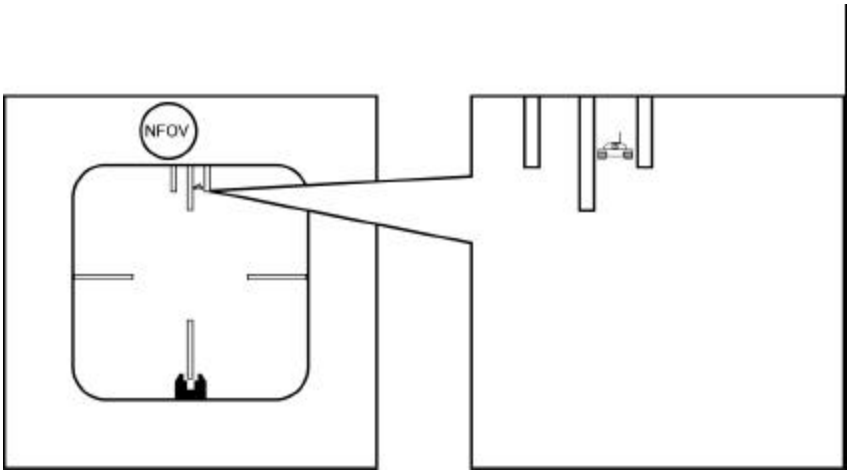
Item 3

What field of view is illustrated; is the target in range?

a. Night field of view; No
b. Narrow field of view; No
c. Night field of view; Yes
d. Narrow field of view; Yes



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Answers

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

Item Number	Answer	Reference
1	a	3-4
2	c	3-11
3	b	3-13

Lesson Summary

In this lesson, you have learned how to determine if a target is within range by using the full- or half-stadia line method. In the next lesson, you will learn how to determine and select the attack mode for the Javelin.

LESSON 2

DETERMINE ATTACK MODE

Introduction

Scope

The Javelin has the unique ability to attack targets in two modes: top and direct. Each attack mode has its own flight profile. Depending on the target, the gunner can choose which attack mode to use. In this lesson, you will learn how to determine the attack mode you should use based on the targets position.

Learning Objective

Upon completion of this lesson, you should be able to identify the two attack modes.

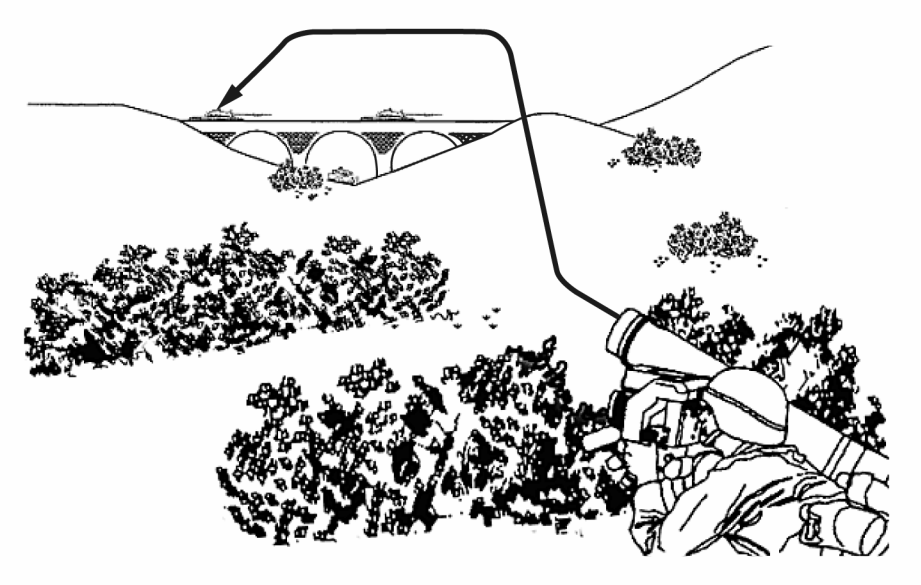
In This Lesson

This lesson contains the following topics:

Top Attack Mode

Description

The top attack is the default mode when the missile seeker is first activated. In the top attack mode, the missile approaches from above to impact and detonate on the top of the target. This capability allows the gunner to attack a target from all points and greatly increases the probability of a kill. Armored vehicles have their thinnest armor on top. The minimum range in this mode is 150 meters.



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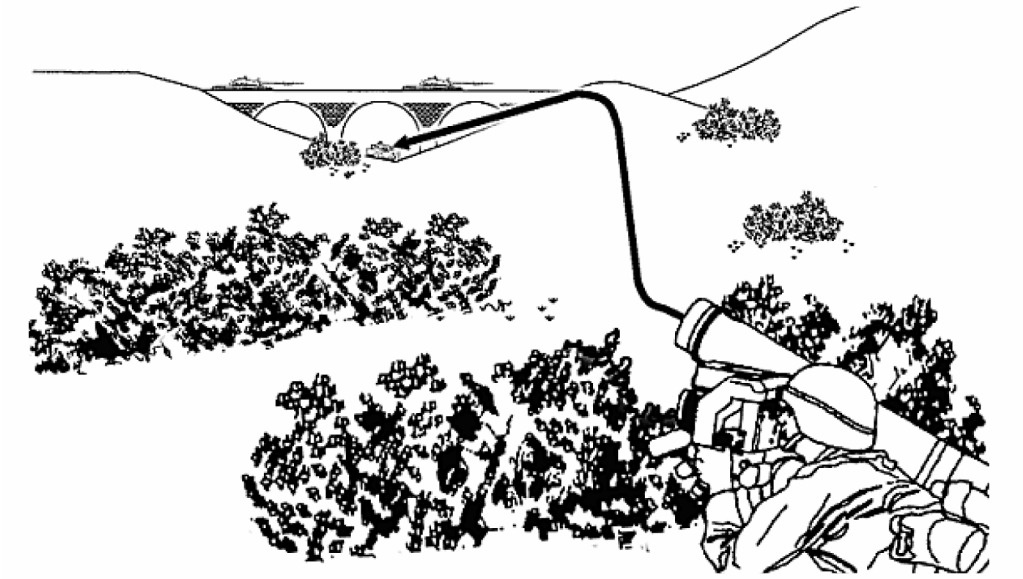
Direct Attack Mode

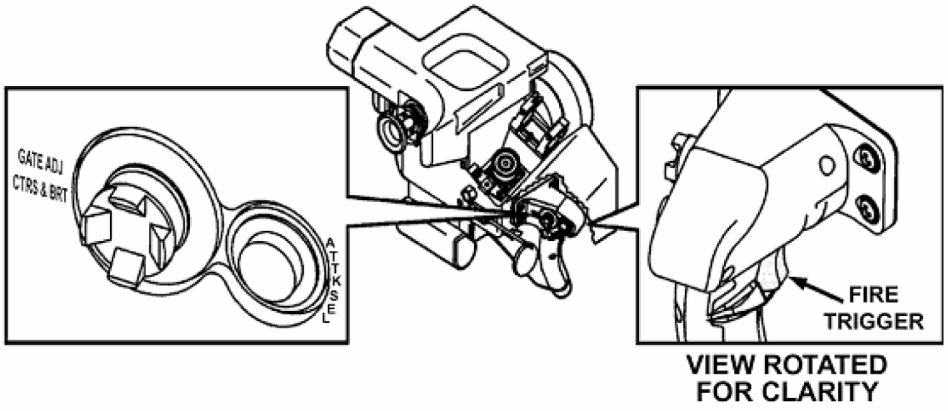
Description

In the direct attack mode, the missile flies on a more direct path to the target. The missile impacts and detonates on the side, front, or rear of the target. The minimum engagement range in this mode is 65 meters. If the target is under cover, the direct attack mode should be used.



How to Select

The direct attack mode can be selected only after seeker cool down and before lock-on. The gunner pushes the attack select (ATTK SEL) switch on the right handgrip to change attack modes.



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Direct Attack Mode, Continued

When To Select The target location will determine which attack mode the gunner should select. If the target is under a protective structure such as a bridge, the top attack mode will cause the missile to detonate on the bridge instead of the target. The direct attack mode would be better suited in this situation.

Lesson 2 Exercise

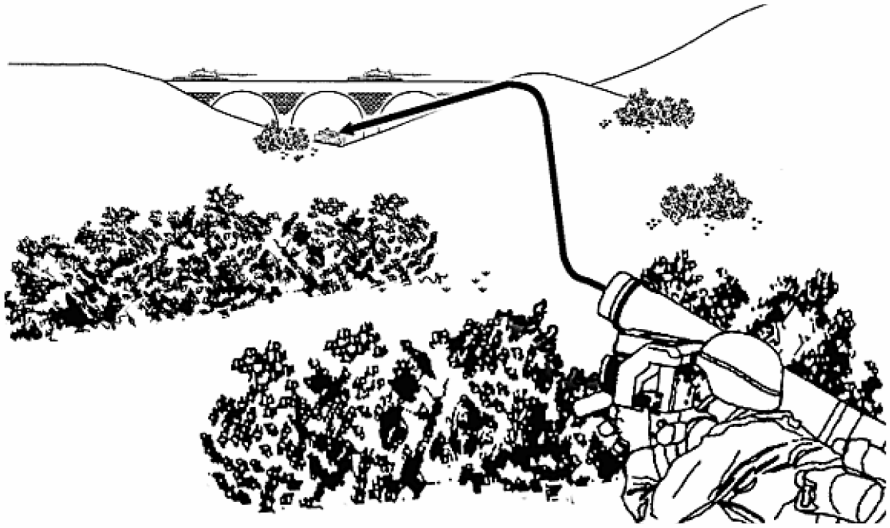
Directions Complete exercise items 1 through 2 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Which attack mode is the default mode on the Javelin?

a. Direct attack mode
b. Front attack mode
c. Top attack mode
d. Rear attack mode

Item 2 Given the scenario below, determine which attack mode to use.

You are the Javelin gunner attached to A Co. 1/1. Your company is isolating an enemy force within the village. Towards evening, the enemy attempts to break out of town. Leading the breakout is a T-72. The T-72 is under a bridge to protect it from being bombed by aircraft.



Which attack mode would you select?

a. Top attack
b. Front attack
c. Flank attack
d. Direct attack

Continued on next page

Answers

The table below lists the answers to the study unit exercise items. If you have questions about these items please refer to the reference page.

Item Number	Answer	Reference
1	c	3-18
2	d	3-19

Lesson Summary

In this lesson, you learned of the two types of attack modes associated with this weapon system. The direct attack and the top attack modes offer unique capabilities to the Javelin gunner. The top attack mode gives the Javelin the ability to defeat any known armored vehicle in the world. The direct attack mode gives the gunner the ability to fire if the vehicle is parked under cover. No vehicle is safe from this weapon.

In the next lesson, you will learn how to achieve seeker lock.

LESSON 3

ACHIEVE SEEKER LOCK

Introduction

Scope

The purpose of achieving seeker lock on the target is to ensure the missile destroys the intended target. This lesson will explain how to adjust the tracking gates and use the crosshairs to designate center mass on a target in order to achieve a seeker lock.

Learning Objective

Upon completing this lesson, you should be able to

- Identify how much time the gunner has to launch the missile once the BCU is activated.
- Identify the procedure to achieve seeker lock.
- Identify the proper placement of the solid crosshairs in relation to the target after seeker lock.

In This Lesson

This lesson contains the following topics:

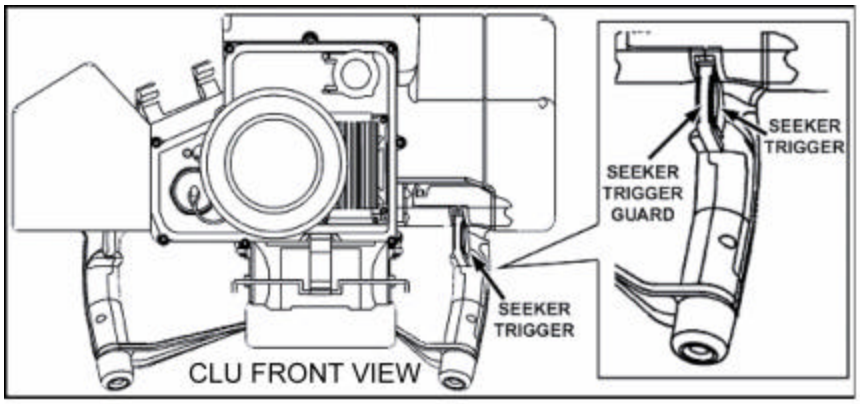
Tracking Gate Adjustment

Safety Note

CAUTION: Once seeker mode is entered, the BCU is activated; the gunner will have approximately 4 minutes to launch the missile. If the BCU indicator begins to flash, the BCU has approximately 30 seconds of operating time remaining.

Procedure

Follow these steps to achieve seeker lock-on:

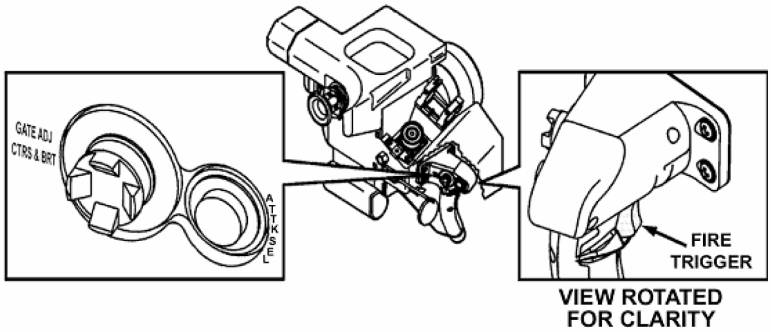
Step	Action
1	Center target in selected FOV.
2	Lift seeker trigger guard and squeeze seeker trigger located on the left handgrip to activate the seeker. 
	Release trigger after "SEEK" and "Missile Not Ready" indicators illuminate (no longer than 4 seconds).
	No more than 20 seconds after seeker activation, observe the FOV and missile not ready indicators go out.
	Observe TOP indicator, flashing track gates, and SEEK FOV appear on CLU display.
3	Change attack mode if necessary. If gunner needs to change attack mode he will press the attack select switch.

Continued on next page

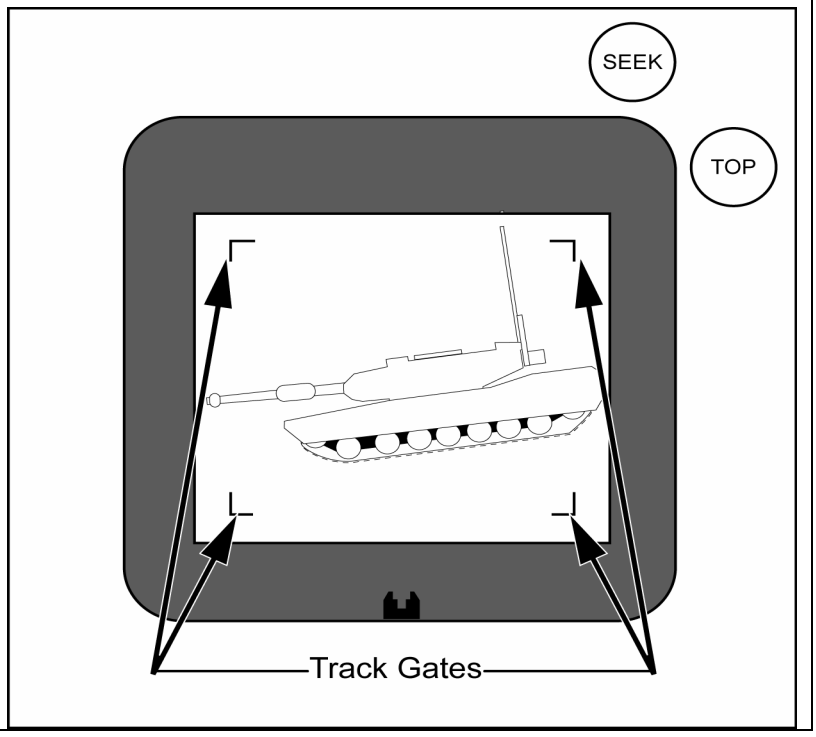
Tracking Gate Adjustment, Continued

Procedure , continued

Step	Action
4	Position track gates around outer edge of target by pressing the GATE ADJ/CTRS&BRT switch up, down, right or left. Pressing GATE ADJ/CTRS&BRT switch up or down opens or closes the track gates vertically.



Pressing the GATE ADJ/CTRS&BRT switch left or right opens or closes track gates horizontally.



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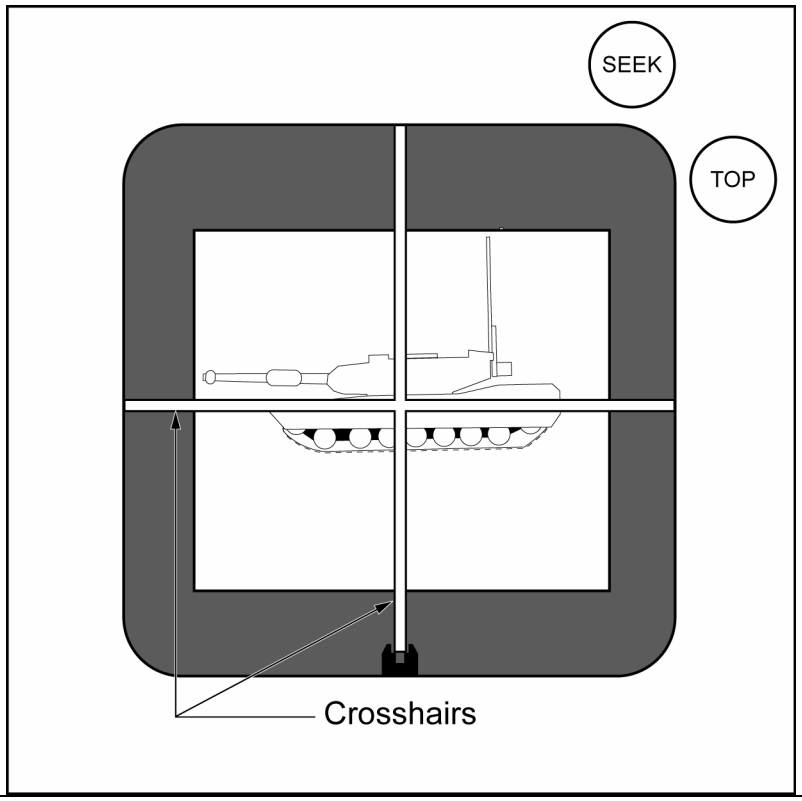
Center Crosshairs on Target

Procedure Follow these steps to center crosshairs on target:

Step	Action
1	Squeeze and hold seeker trigger. Tracking gates stop flashing and solid crosshairs appear on CLU display. Note: After lock-on is achieved, seeker trigger must be held until missile is launched. Otherwise, seeker lock will be broken and gunner will have to re-engage target and achieve lock again.
2	Once crosshairs are solid, position them center mass on the target. This ensures the missile will lock onto the correct target (point of aim = point of impact). 

Lesson 3 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 Once the seeker mode is entered, approximately how much time does the gunner have to launch the missile?

a. 1 minute
b. 2 minutes
c. 3 minutes
d. 4 minutes

Item 2 Your company is on a movement when suddenly enemy armor is spotted. You occupy a firing position and prepare the weapon for firing. How do you get the missile to lock on to the target?

a. Lift seeker trigger guard and squeeze seeker trigger.
b. Lift fire trigger guard and squeeze fire trigger.
c. Push the attack mode select button.
d. Push the SGT SEL button.

Item 3 On what part of the CLU is the seeker trigger located?

a. Right handgrip
b. Eyepiece
c. Display screen
d. Left handgrip

Item 4 You have just squeezed the seeker trigger and released it. The tracking gates appear. Which switch do you use to adjust the tracking gates?

a. Attack mode select button
b. GATE ADJ/CTRS&BRT switch
c. SGT SEL switch
d. FLTR Switch

Continued on next page

Item 5

You have adjusted the tracking gates around the target. You squeeze the seeker trigger again and hold it. The tracking gates stop flashing and the crosshairs appear. Where do you place the crosshairs?

a. Center mass on the target.
b. Lead the target by 25 meters.
c. At the bottom of the tracks because the missile is top attack.
d. At the top of the vehicle because the missile is top attack.

Continued on next page

Answers

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

Item Number	Answer	Reference
1	a	3-24
2	d	3-24
3	b	3-25
4	a	3-26

Lesson Summary

In this lesson, you have learned how to activate the seeker and achieve seeker lock. This is necessary to destroy the enemy and not waste missiles. In the next lesson, you will learn how to fire the weapon and destroy the enemy.

LESSON 4

FIRE THE JAVELIN

Introduction

Scope

The purpose of firing the Javelin is to eliminate enemy armored threats. In this lesson you will learn how to launch the missile, disconnect the CLU from the missile, and displace.

Learning Objectives

Upon completing this lesson, you should be able to

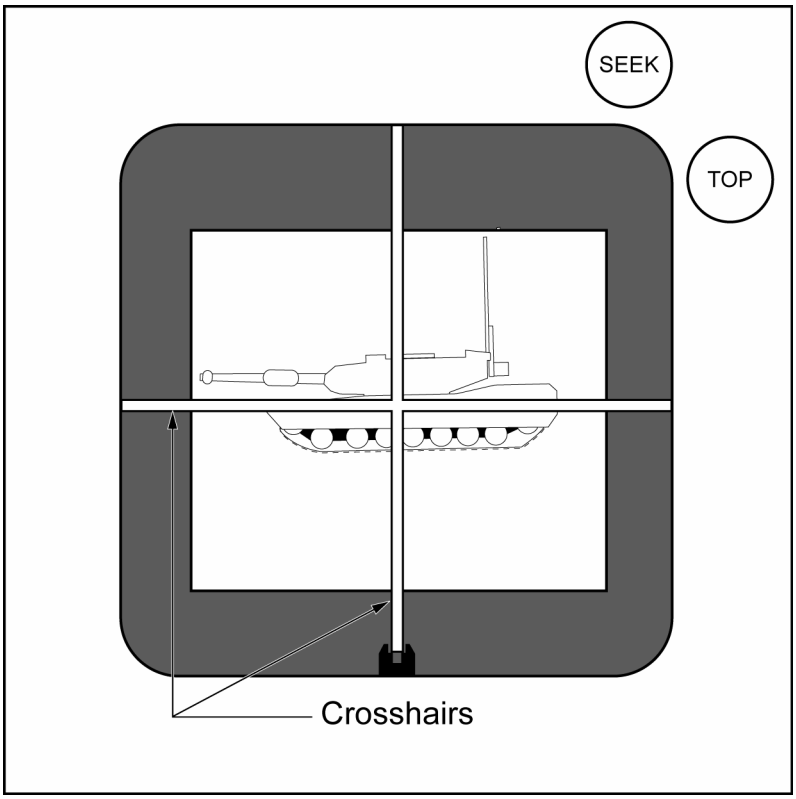
- Identify the steps for firing the Javelin.
- Identify the steps for disconnecting the Javelin.

In This Lesson

This lesson contains the following topics:

Launch The Missile

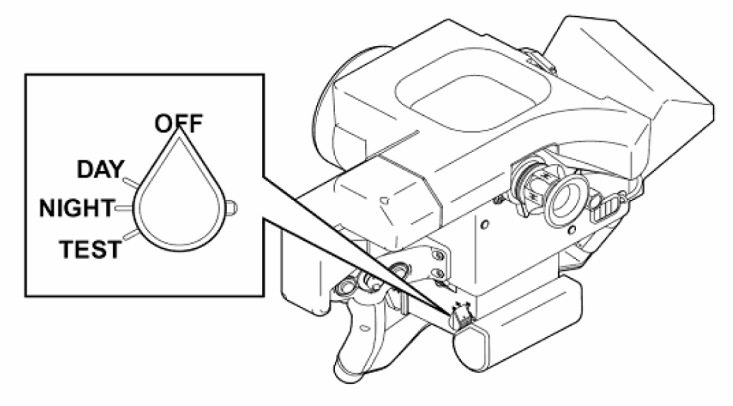
Fire the Javelin Follow these few steps to fire the Javelin:

Step	Action
1	Center crosshairs on target (crosshairs are moved by adjusting position of CLU). They need to be centered on target once seeker lock is achieved. Note: Ensure A-gunner checks back blast area and once secure, announces: "Back blast area all secure!" The a-gunner continuously watches the backblast area until rocket is fired. 
2	Squeeze and hold fire trigger until missile launches (announce "Launch!").
3	When missile launches, release fire and seeker triggers. Observe CLU display returns to previous FOV.

Continued on next page

Disconnect CLU From Round

Procedures To disconnect the CLU from the round, follow these steps:

Step	Action
1	Turn power switch to OFF (Before turning it off from "Night", switch to "Day" and wait for 1-2 seconds for flipper mirror to lower. Then turn CLU off.) 
2	Place Javelin on the ground with the handgrips facing up. 

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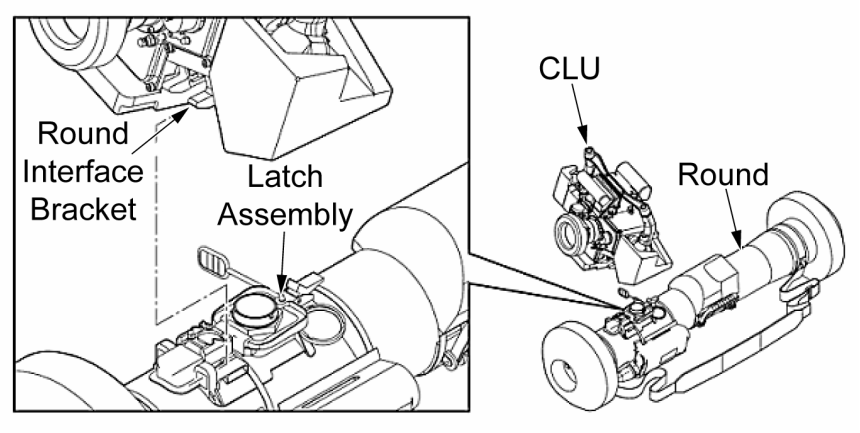
Disconnect CLU From Round, Continued

Procedures, continued

Step	Action
3	Press latch release and disconnect the CLU from the round. 
4	Install protective cover on round interface connector on the CLU.
5	Close day sight and NVS lens covers.
6	Displace immediately!

Lesson 4 Exercise

Directions

Complete exercise items 1 through 7 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1

You are the gunner for the Javelin; the enemy is closing on your position. You have achieved target lock. What trigger do you squeeze to launch the missile?

a. Sight select trigger
b. Seeker trigger
c. Focus trigger
d. Fire trigger

Item 2 Through Item 7

Matching: For items 2 through 7, match the step for disconnecting the CLU from the round in column 1 with the appropriate action in column 2. Place your response in the spaces provided.

Column 1	**Column 2**
Step	**Action**
___ 2. (Step 1)	a. Press latch release and disconnect CLU from round.
___ 3. (Step 2)	b. Install protective cover on round interface connector on the CLU.
___ 4. (Step 3)	c. Turn power OFF.
___ 5. (Step 4)	d. Displace immediately!
___ 6. (Step 5)	e. Place Javelin on the ground with the handgrips facing up.
___ 7. (Step 6)	f. Close day sight and NVS lens covers.

Continued on next page

Answers

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

Item Number	Answer	Reference
1	d	3-31
2	c	3-32
3	e	3-32
4	a	3-33
5	b	3-33
6	f	3-33
7	d	3-33

Lesson Summary

In this lesson, you learned how to fire the Javelin, disassemble the CLU from the round, and displace. In the next study unit, you will learn how to identify and correct malfunctions and perform immediate action procedures.

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STUDY UNIT 4

MALFUNCTIONS

Overview

Scenario

As with any weapon, there are occasional malfunctions. Many of the malfunctions a gunner will encounter can be corrected. Procedures for correcting a malfunction must be carried out immediately and accurately.

Scope

This study unit will provide instruction on how to identify malfunctions you may face. You will also learn how to correct the malfunction and return the weapon system to action.

In This Study Unit

This study unit contains the following lessons:

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LESSON 1

STATUS INDICATORS

Introduction

Scope

The CLU display contains fourteen indicators. Seven of these indicators are green, two are amber, and the remaining five are red. In this lesson, you will learn how to identify the different types of warning indicators and what they mean to you, the gunner.

Learning Objective

At the end of this lesson, you will be able to

- Identify the meaning of the various status and warning indicators.
- Identify the location and functions of various status and warning indicators.

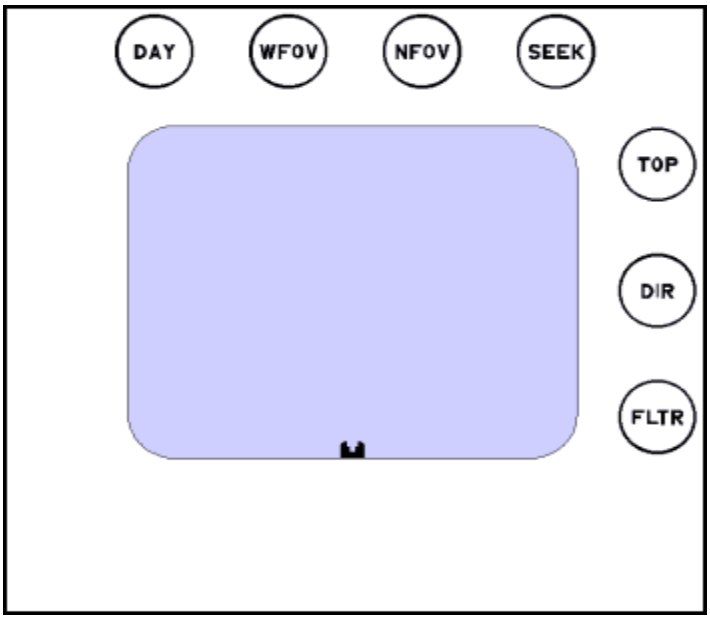
In This Lesson

This lesson contains the following topics:

Green Status Indicators

Description

There are seven green status indicators on the CLU display. These status indicators indicate the monitored function is in a satisfactory condition and that it is okay to proceed with normal operations.



Indicators and Functions

The table below lists the green status indicators and their location and function:

Indicator	Location and Function
	The day (DAY) indicator is located at the top of the CLU display to the far left. The DAY indicator illuminates when the CLU is in the DAY field of view.
	The wide field of view (WFOV) indicator is located at the top of the CLU display to the left. The WFOV illuminates when the WFOV is selected.
	The narrow field of view (NFOV) indicator is located at the top of the CLU display to the right. The NFOV illuminates when the NFOV is selected.
	The seek (SEEK) indicator is located at the top of the CLU display to the far right. It illuminates within 3 seconds after squeezing the seeker trigger.

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Green Status Indicators, Continued

Indicators and Functions, continued

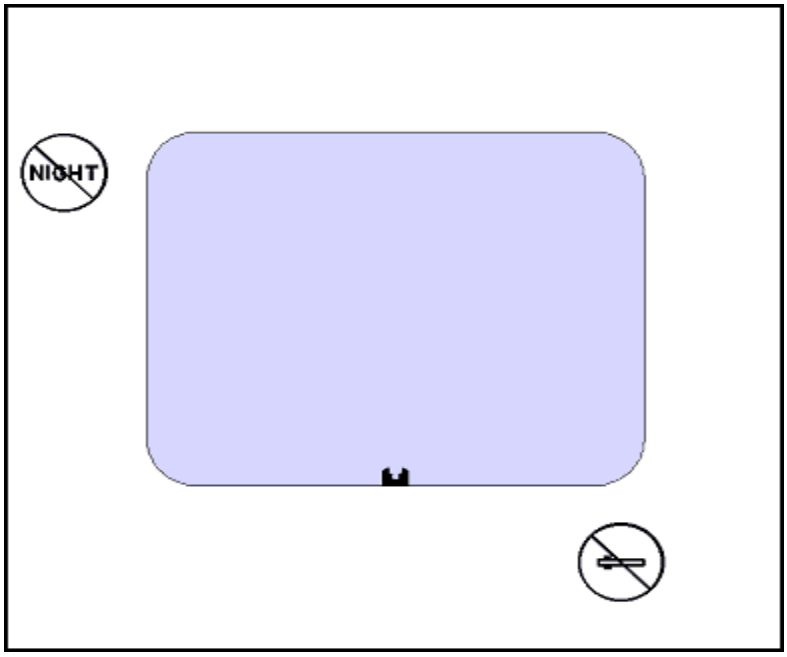
The table below lists the green status indicators and their location and function:

Indicator	Location and Function
	The top (TOP) indicator is located on the right side of the CLU display at the top. It illuminates when the missile is in the TOP attack mode.
	The direct (DIR) indicator is located on the right side of the CLU display in the center. It illuminates when the missile is in the direct attack mode.
	The filter (FLTR) indicator is located on the right side of the CLU display at the bottom. It illuminates when the NVS filter is selected.

Amber Status Indicators

Description

There are two status indicators that are amber. Amber means a marginal condition exists. It is also used to alert the gunner to a situation where caution, recheck, or an unexpected delay is necessary.



Indicators and Functions

The table below lists the amber indicators and their location and function.

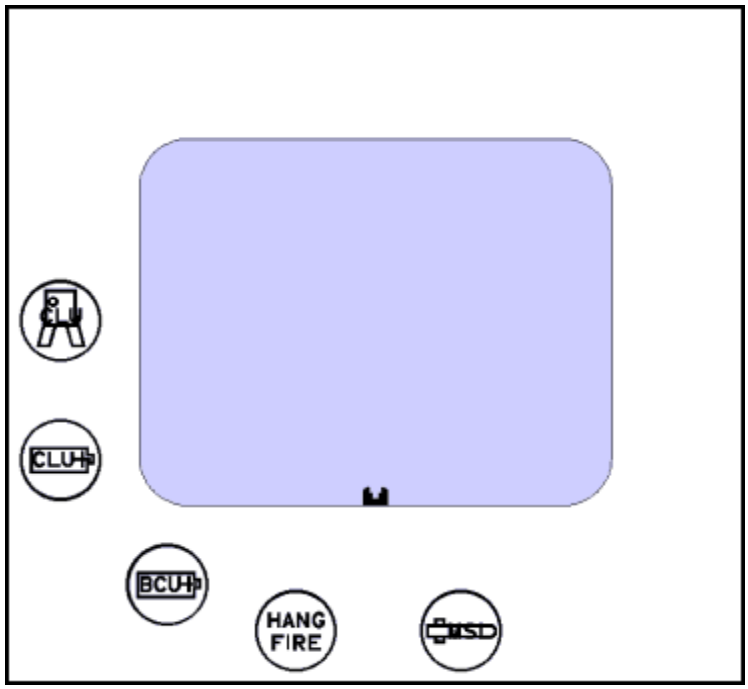
Indicator	Location and Function
	The night vision sight (NIGHT) Not Ready indicator is located to the left side of the CLU display at the top. It illuminates when the CLU is in the night mode but the sight has not cooled to its operating temperature.
	The Missile Not Ready indicator is located to the bottom of the CLU display on the far right. It illuminates (on steady) when the missile flight information is not downloaded from the CLU, Missile Built-In-Test (BIT) is not complete, or the seeker is not cooled. The indicator flashes when the missile's electronics are close to overheat condition. The missile shuts down within 30 seconds after the flashing starts.

Continued on next page

Red Status Indicators

Description

Five of the status indicators are red. There are two types of red indicators. A flashing red indicator warns the gunner of an emergency condition where action must be taken. A solid red indicator alerts the gunner that the Javelin is inoperative and a successful missile launch is not possible until corrective action is taken.



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Red Status Indicators, Continued

Indicators

The table below lists the red indicators and their location and function:

Indicator	Location and Function
	The Missile BIT Failure indicator is located at the bottom of the CLU display to the right. The indicator illuminates when the Missile (BIT) has detected a failure in the missile. The indicator FLASHES to indicate a misfire when the gunner squeezes the fire trigger and the missile does not launch.
	The hangfire (HANGFIRE) indicator is located on the bottom of the CLU display to the left. The HANGFIRE indicator flashes to indicate a missile hangfire when the gunner squeezes the trigger and the missile does not launch.
	The battery coolant unit (BCU) indicator is located at the bottom of the CLU display to the far left. The BCU indicator flashes to indicate the BCU has about 30 seconds of operating time remaining. The indicator illuminates on steady when the BCU is spent.
	The CLU Battery indicator is located on the left side of the CLU display on the bottom. The indicator illuminates when the CLU battery has 5 minutes of operating time remaining.
	The CLU BIT failure indicator is located on the left side of the CLU display at the center. The CLU bit failure indicator illuminates to indicate the CLU has failed an automatic built-in-test.

Lesson 1 Exercise

Directions

Complete exercise items 1 through 14 by performing the action required. Check your answers against those listed at the end of the lesson.

Item 1 Through Item 7

Matching: For items 1 through 9, match the green and amber status indicator in column 1 with its location and function in column 2. Place your responses in the spaces provided.

Column 1 **Indicator**	**Column 2** **Purpose**
___ 1. 	a. This indicator illuminates when the CLU is in the Day field of view.
___ 2. 	b. This indicator illuminates when the WFOV is selected.
___ 3. 	c. This indicator illuminates when the NFOV is selected.
___ 4. 	d. This indicator illuminates within 3 seconds after squeezing the seeker trigger.
___ 5. 	e. This indicator illuminates when the missile is in the Top attack mode.
___ 6. 	f. This indicator illuminates when the missile is in the direct attack mode.
___ 7. 	g. This indicator illuminates when the NVS filter is selected.
___ 8. 	h. It illuminates when the CLU is in the night mode, but the sight has not cooled to its operating temperature.
___ 9. 	i. It illuminates steady on when the missile flight information is not downloaded from the CLU, is not complete, or the seeker is not cool. The indicator Flashes when the missiles electronics are close to overheat condition. The missile shuts down within 30 seconds.

Continued on next page

Item 10 Through Item 14

Matching: For items 10 through 14, match the red warning indicator in column 1 with its purpose in column 2. Place your responses in the spaces provided.

Column 1 **Indicator**	**Column 2** **Purpose**
___ 10. 	a. This indicator flashes when a missile hangfire when the gunner squeezes the trigger and the missile does not launch.
___ 11. 	b. The indicator flashes when the BCU has about 30 seconds of operating time remaining. The indicator illuminates on steady when the BCU is spent.
___ 12. 	c. The indicator illuminates when the CLU battery has 5 minutes of operating time remaining.
___ 13. 	d. The indicator illuminates when the CLU has failed an automatic built-in-test.
___ 14. 	e. The indicator illuminates when the BIT has detected a failure in the missile. The indicator Flashes to indicate a misfire when the gunner squeezes the fire trigger and the missile does not launch.

Continued on next page

Solutions

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

Item Number	Answer	Reference
1	b	4-4
2	d	4-4
3	g	4-5
4	f	4-5
5	c	4-4
6	e	4-5
7	a	4-4
8	i	4-6
9	h	4-6
10	d	4-8
11	c	4-8
12	e	4-8
13	a	4-8
14	b	4-8

Lesson Summary

In this lesson, you learned about the green, amber, and red status indicators that keep you informed of the weapons condition. In the next lesson, you will learn how to perform immediate actions to correct any malfunctions you may encounter.

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LESSON 2

IMMEDIATE ACTION

Introduction

Scope

The warning indicators and malfunction indicators will require the gunner to take corrective action to prevent or fix a problem. These actions are referred to as immediate actions. In this lesson, you will learn how to correct impending problems or failures in the weapon system. This will be accomplished by recognizing the indicator and taking appropriate immediate action.

Learning Objective

Upon completion of this lesson, you should be able to

- Identify the steps in performing immediate action for a misfire.
- Identify the steps in performing immediate action for a hangfire.

In This Lesson

This lesson contains the following topic:

Warning Indicators

Purpose

Indicators warn of pending malfunctions. Immediate action is required to prevent damage to the weapon system.

NVS Not Ready

The following describes what the indicator means and the corrective action the gunner needs to perform:

Indicator	Action
	Wait 2.5 Minutes for the NVS to cool down.
Remains Illuminated	Replace CLU or use Day FOV for target engagement.

WFOV or NFOV Flashes

The WFOV or NFOV begins flashing when the gunner moves the focus switch to the limit. Gunner reverses direction of focus switch.

CLU Battery Low

The CLU battery low indicator comes on when the battery is low.

Indicator	Action
	Turn CLU off and replace battery if not engaged. (If flashing, gunner has 5 minutes of operating time remaining.) Missile can still be launched.

BCU Low

The Red BCU low indicator begins flashing when the BCU has about 30 seconds of operating time remaining.

Indicator	Action
 Flashing	Missile launch still possible before indicator stops flashing.
 Solid	Missile has no power and cannot be launched. CLU display reverts to previous FOV. Replace the BCU.

Continued on next page

Warning Indicators, Continued

Missile Not Ready

The amber missile not ready indicator illuminates after gunner pulls the seeker trigger. This begins the software download to the missile.

Indicator	Action
 Solid	Before adjusting track gates or attempting to launch the missile, wait until indicator goes off or 15 seconds.
 Flashing	After the seeker is activated, the missile begins to overheat. (Missile launch is still possible)
 Off	Missile not ready indicator goes off, the missile cannot be launched. The missile powers down and reverts to the previous FOV. Missile bit failure indicator illuminates solid.

Missile BIT Failure

The red missile bit failure indicator illuminates when the Missile has failed the built-in test.

Indicator	Action
	Missile has overheated. Turn off CLU and replace round.

CLU BIT Failure

The red CLU BIT failure illuminates if the CLU fails the continuous test, the CLU does not initiate software download to the missile, and the CLU battery is spent and the CLU reverts to the day FOV.

Indicator	Action
	Replace the CLU.

Continued on next page

Malfunction Indicators

Misfire

A misfire occurs when the gunner locks onto a target and squeezes the trigger but the missile does not launch. One of two things will happen with the status indicator: (1) No malfunction indicators will illuminate or, (2) the red missile BIT failure indicator will flash. In either case, the seeker FOV remains on the CLU display and the green SEEK and TOP indicators remain illuminated.

Indicator	Step	Action
 Flashing/ No indicator	1	Release fire and seeker triggers; keep weapon pointed toward the enemy.
	2	Re-attempt to launch missile.
	3	Turn CLU power to the off position.
	4	Set Javelin on ground pointed toward the enemy, with the handgrips facing up. Keep backblast area clear.
	5	Disconnect CLU from round.
	6	Reconnect CLU to round.
	7	Attempt to re-engage target.
	8	If missile still fails to launch, repeat steps 3 through 5.
	9	Move round 25 meters from position.
	10	Obtain replacement round and continue mission.

Hangfire

A hangfire occurs when the gunner squeezes the fire trigger but the missile does not launch and the HANGFIRE indicator flashes.

Indicator	Step	Action
 Flashing	1	Release fire and seeker triggers. Keep Javelin pointed toward the enemy for 60 seconds.
	2	Set CLU power switch to OFF.
	3	Set Javelin on the ground, pointed in the direction of the enemy with the handgrips pointed up. Keep the backblast area clear.
	4	Disconnect CLU from round.
	5	Move round at least 25 meters from firing position.
	6	Obtain replacement round and continue mission.

Continued on next page

Lesson 2 Exercise

Directions

Complete exercise items 1 through 16 by performing the action required. Check your answers against those listed at the end of this lesson.

Item 1 Through Item 10

Matching: For items 1 through 10, match the step in column 1 with the immediate action for a misfire in column 2 in sequential performing order. Place your responses in the spaces provided.

Column 1	**Column 2**
Step	**Immediate Action**
___ 1.	a. Set Javelin on ground pointed toward the enemy, with the handgrips facing up. Keep backblast area clear.
___ 2.	b. Obtain replacement round and continue mission.
___ 3.	c. Turn CLU power to the off position.
___ 4.	d. Release fire and seeker triggers; keep weapon pointed toward the enemy.
___ 5.	e. Disconnect CLU from round.
___ 6.	f. If missile still fails to launch, repeat steps 3 through 5
___ 7.	g. Attempt to re-engage target.
___ 8.	h. Reconnect CLU to round.
___ 9.	i. Move round 25 meters from position.
___ 10.	j. Re-attempt to launch missile.

Continued on next page

Item 11 Through Item 16

Matching: For items 11 through 16, match the steps in column 1 with the immediate action for a hangfire in column 2 in sequential performing order. Place your responses in the spaces provided.

Column 1	**Column 2**
Step	**Immediate Action**
___ 11.	a. Disconnect CLU from round.
___ 12.	b. Move round at least 25 meters from firing position.
___ 13.	c. Set Javelin on the ground, pointed in the direction of the enemy with the handgrips pointed up. Keep the back blast area clear.
___ 14.	
___ 15.	
___ 16.	d. Release fire and seeker triggers. Keep Javelin pointed toward the enemy for 60 seconds.
	e. Obtain replacement round and continue mission.
	f. Set CLU power switch to OFF.

Continued on next page

Solutions

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
1	d	4-16
2	j	4-16
3	c	4-16
4	a	4-16
5	e	4-16
6	h	4-16
7	g	4-16
8	f	4-16
9	i	4-16
10	b	4-16
11	d	4-16
12	f	4-16
13	c	4-16
14	a	4-16
15	b	4-16
16	e	4-16

Lesson Summary

In this lesson, you have learned how to perform immediate action for malfunctions you may face. By performing these immediate actions, you can return your weapon to action and accomplish your mission.

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STUDY UNIT 5

FUNDAMENTALS OF JAVELIN EMPLOYMENT

Overview

Introduction

Fundamentals are the building blocks that will help you employ your weapon system effectively. In the performance of these fundamentals, you will find they will increase your chances of survival while also accomplishing the mission.

Scope

This study unit will provide instruction on the four firing positions and on how to prepare range cards and employ your weapon system.

In This Study Unit

This study unit contains the following lessons:

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LESSON 1

JAVELIN FIRING POSITIONS

Introduction

Scope

Just as with firing a rifle, firing a Javelin requires the operator to assume a safe and stable body position. Proper body position will aid in rapid acquisition and engagement of targets. In this lesson, you will learn about the four basic firing positions. You will also learn factors that will determine which position you use.

Learning Objectives

Upon completion of this lesson, you should be able to

- Identify the benefits of various firing positions.
- Identify the drawbacks of various firing positions.

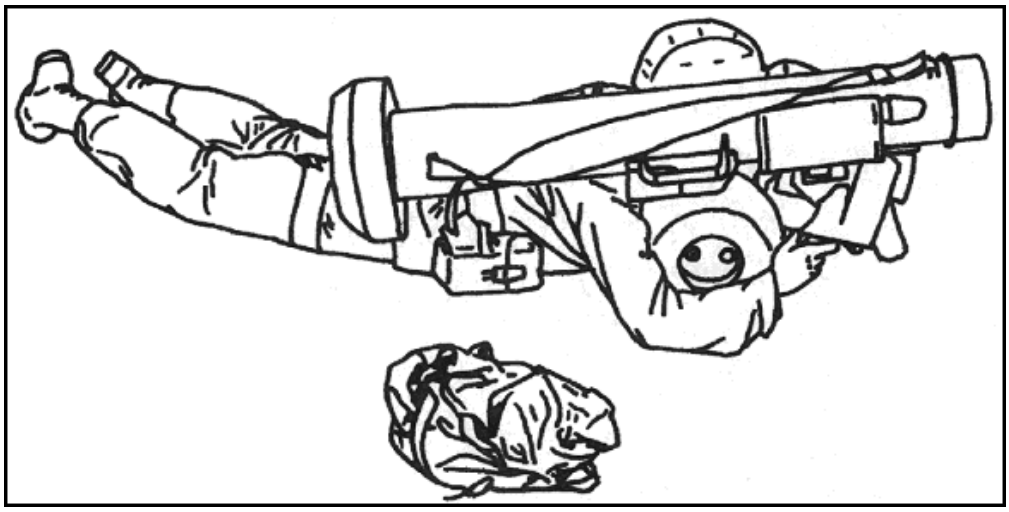
In This Lesson

This lesson contains the following topics:

Prone-Supported Position

Description

The graphic below shows the body in full contact with the ground, with the gunner's feet facing away from the backblast at a 30-degree angle.



When to Use

The prone-supported position is used when there are no other covered or concealed positions available.

Assuming the Prone Position

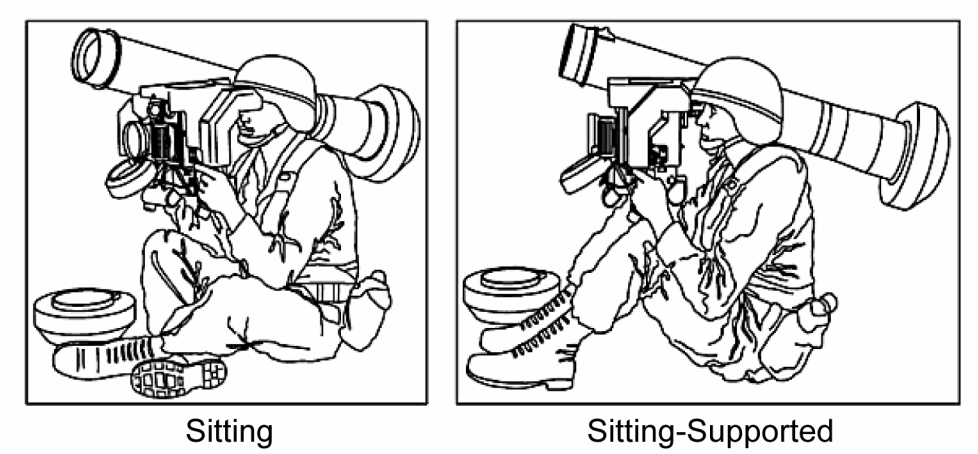
Utilize the following steps in assuming the prone position:

Step	Action
1	Set the Javelin on the ground with the CLU handgrips down.
2	Place forward end cap between the right side of the CLU and the shoulder pad.
3	Tip the round forward and fit the flat side of the forward end cap against the shoulder pad.
4	Slide the forward end cap forward until it contacts the absorber on the CLU battery compartment. This wedges the forward end cap into position.
5	Assume the prone position by placing the body at a 30-degree angle to the round and pulling the round tightly to the right shoulder.
6	Press eye firmly against the eyecup.

Sitting/Sitting-Supported Position

Description

In the sitting position/sitting-supported position, the gunner has three points of contact with the ground and rests the weight of Javelin on thighs. In the sitting-supported position, the CLU is resting on the gunner's knees. Both are considered very stable positions.



Sitting Sitting-Supported

When to Use

When the ground occupied is in a slight depression or there is cover and/or concealment, the gunner may use this position to his advantage.

Assuming the Sitting Position

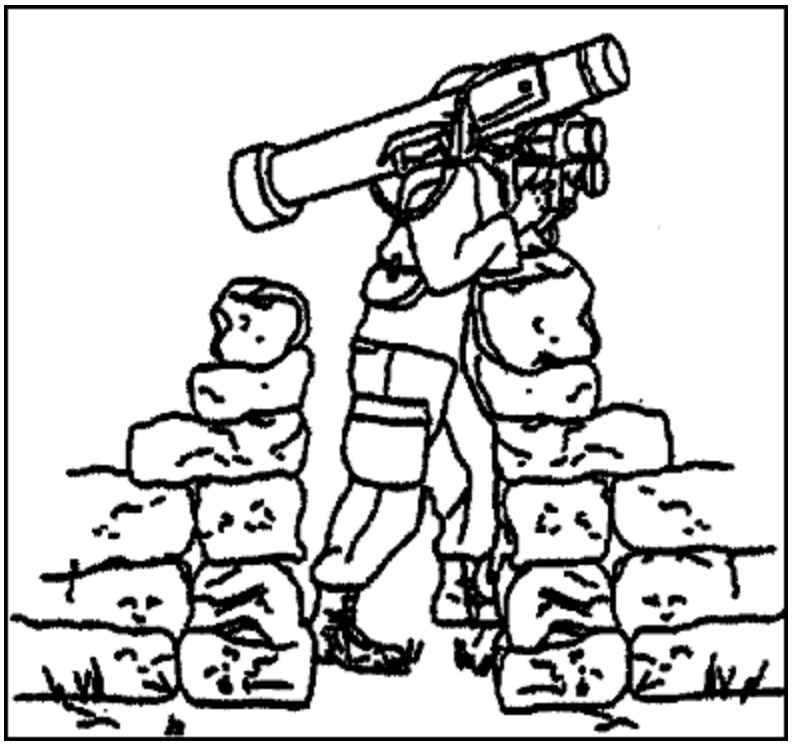
Utilize the following steps in assuming the sitting/sitting-supported position:

Step	Action
1	Sit on the left side of the Javelin facing the direction of fire.
2	Grasp the left handgrip of the CLU with the left hand. Place the right hand under the round near the shoulder pad.
3	Lift the Javelin in a single, smooth motion and position the shoulder pad on the right shoulder.
4	Assume a comfortable sitting position with legs crossed or bent as illustrated above.
5	Press eye firmly against eyecup.

Standing-Supported Position

Description Gunner stands and has the ability to support the weight of the weapon system on a wall or similar structure or feature.

When to Use This position can be used when observation of the battlefield needs to be expanded. It can also be used to take advantage of a terrain feature, building, or constructed firing position.



Continued on next page

Standing-Supported Position, Continued

Assuming the Position

Follow the steps below to assume the standing-supported position:

Step	Action
1	Stand on the left side of the Javelin facing the direction of fire. Taking up a kneeling position with the right knee on the ground.
2	Grasp the left handgrip of the CLU with the left hand. Place the right hand under the round nearest the shoulder pad.
3	Lift the Javelin in a single, smooth motion and position the shoulder pad on the right shoulder.
4	Keep back straight and weight balanced from this one knee position stand. Keep legs spread a comfortable distance apart.
5	Move the right hand to the right handgrip of the CLU. Place elbows on the edge or rim of the fighting position or other sturdy feature to provide support.
6	Keep elbows tucked in close to body.
7	Press eye firmly against eyecup.

Kneeling Position

Description

In the kneeling position, the gunner maintains at least three points of contact with the ground. The shoulder supports the weight of the weapon.

When to Use

Use when quickness is necessary; however, it is uncomfortable and unstable.

Assuming the Kneeling Position

Use the following steps in assuming the kneeling position:

Step	Action
1	Kneel on the left side of the Javelin facing the direction of fire.
2	Grasp the left handgrip of the CLU with the left hand. Place the right hand under the round near the shoulder pad.
3	Lift the Javelin in a single, smooth motion and position the shoulder pad on the right shoulder.
4	Kneel in a comfortable position with one knee on the ground.
5	Hold CLU by the right handgrip and adjust body until comfortable.
6	Press eye firmly against eyecup.

Considerations in Firing Position Selection

Guidelines

Firing positions should offer the gunner excellent observation of the battlefield with a minimum of obstructions to the flight path of the round. Backblast area should be clear of obstructions. Ideally, the gunner would use the terrain to his advantage and select a position that offers protection from enemy observation and fire.

Mask and Overhead Clearance

The gunner must always perform a mask and overhead clearance check to ensure the missile's flight path is not obstructed every time he selects a firing position. If there is an obstruction, there are three options available to the gunner: move to another position, remove the obstruction, or assume a firing position that avoids the obstruction. To identify potential obstructions, the gunner should sight along the top of the round.

Benefits

In the table below, the major benefits to each position are listed to help the gunner identify which would suit his situation in combat.

Position	Benefit
Prone-Supported	Increased survivability on an open field. Stable position.
Sitting/ Sitting-Supported	Used in conjunction with cover provided by terrain affords good survivability. Stable position.
Standing-Supported	Outstanding observation of the battlefield and increases situational awareness.
Kneeling	Can be assumed quickly and displaced quickly.

Continued on next page

Considerations in Firing Position Selection, Continued

Drawbacks

In the table below, the major drawbacks to each position are listed to help the gunner identify which one would suit his situation in combat.

Position	Drawback
Prone-Supported	Least situational aware position. Takes longer to assume this position.
Sitting/ Sitting-Supported	Reduced situational awareness. Takes time to assume this position and to displace.
Standing-Supported	Least survivable position.
Kneeling	Least stable position; can only be maintained for short periods

Lesson 1 Exercise

Directions

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

Item 1 Through Item 4

Matching: For items 1 through 4, match the position in column 1 with the benefit that it would provide in column 2. Place your responses in the spaces provided.

Column 1	**Column 2**
Position	**Benefit**
____ 1. Prone-Supported	a. Can be assumed quickly and displaced quickly.
____ 2. Kneeling	b. Outstanding observation of the battlefield and increases situational awareness.
____ 3. Sitting/Sitting-Supported	c. Increased survivability on an open field. Stable position.
____ 4. Standing-Supported	d. Used in conjunction with cover provided by terrain affords good survivability. Stable position.

Item 5 Through Item 8

Matching: For items 5 through 8, match the position in column 1 with its drawback in column 2. Place your responses in the spaces provided

Column 1	**Column 2**
Position	**Drawback**
___ 5. Prone-Supported	a. Least survivable position.
___ 6. Kneeling	b. Least stable position; can only be maintained for short periods.
___ 7. Sitting/Sitting-Supported	c. Least situational aware position. Takes longer to assume this position.
___ 8. Standing-Supported	d. Reduced situational awareness. Takes time to assume this position and to displace.

Continued on next page

Solutions

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

Item Number	Answer	Reference
1	c	5-9
2	a	5-9
3	d	5-9
4	b	5-9
5	c	5-10
6	b	5-10
7	d	5-10
8	a	5-10

Lesson Summary

In this lesson, you have learned the various firing positions used when employing the Javelin and factors to consider when selecting a firing position. In the next lesson, you will learn about anti-armor range cards.

Continued on next page

LESSON 2

ANTIARMOR RANGE CARD

Introduction

Scope

Preparing an antiarmor range card is important for a various reasons. Some reasons are to aid in rapidly identifying targets during periods of reduced visibility, to pass your knowledge of area to relieving forces, and to aid in a larger fire plan by higher headquarters. In this lesson, you will learn the elements of an antiarmor range card.

Learning Objective

At the end of this lesson, you should be able to

- Identify the purpose of the antiarmor range card.
- Identify the information to be included on an antiarmor range card.
- Identify the sections of an antiarmor range card.

In This Lesson

This lesson contains the following topics:

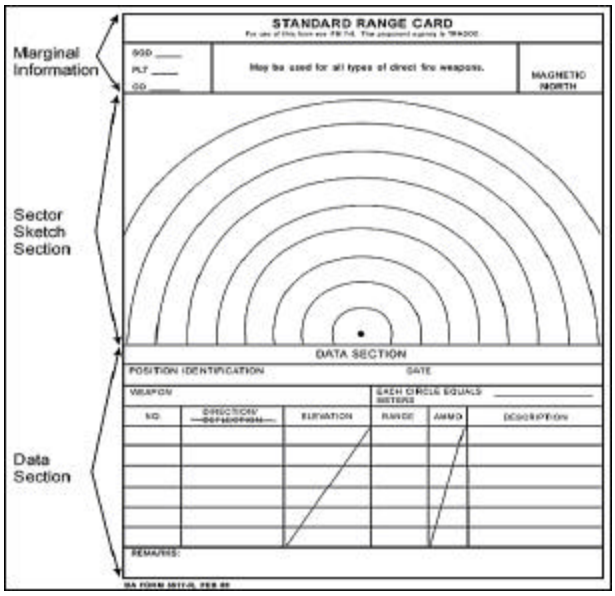
Elements of an Antiarmor Range Card

Purpose

The range card is a sketch of a gunner's assigned sector of fire. It contains information that helps in planning and controlling fires, detecting and engaging targets, and orienting replacement personnel. Using range cards allows a gunner or a replacement gunner to find and engage targets quickly.

Standard Range Card

The following is an example of a standard range card (DA Form 5517-R).



Information Needed

The gunner needs to have certain information provided to him by his leader. This information should include:

- Firing position
- Left and right limits of fire
- Maximum engagement line
- Avenues of approach
- Target reference points

Sections of a Range Card

The three sections on a range card used to record information are:

- Marginal Information
- Sector sketch section
- Data Section

Continued on next page

Marginal Information

Description

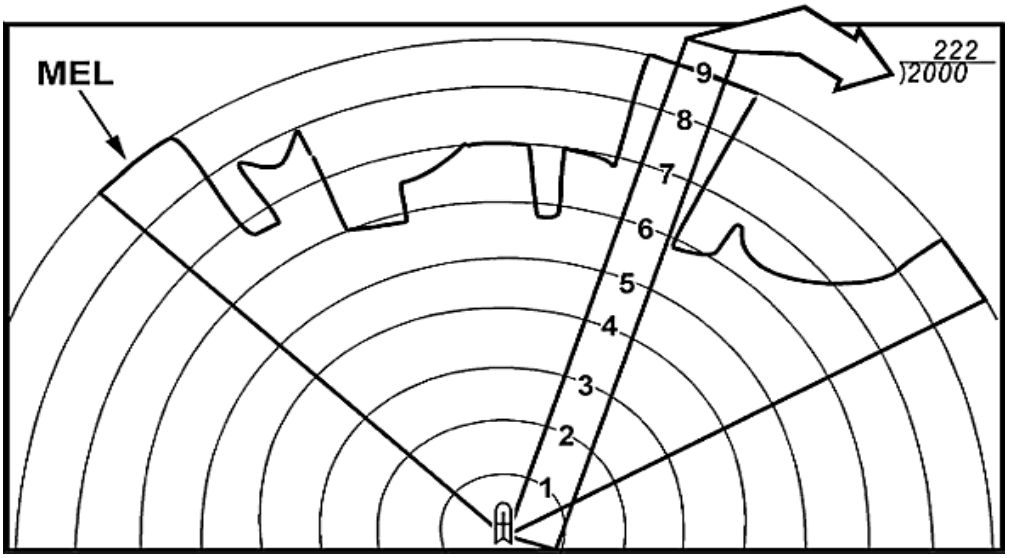
Marginal information contains the basic information that enables replacements of gunners from a different unit to orient the card. Marginal information includes the following information:

- Magnetic north
- Unit description (do not designate units higher than company)

STANDARD RANGE CARD For use of this form see FM 7-8. The proponent agency is TRADOC.		
SQD 1 PLT 3 CO A	May be used for all types of direct fire weapons.	1 MAGNETIC NORTH

Range

To calculate the distance between each ring, you use the maximum engagement line (MEL) and divide by the number of range rings. This would give you the distance between each ring.



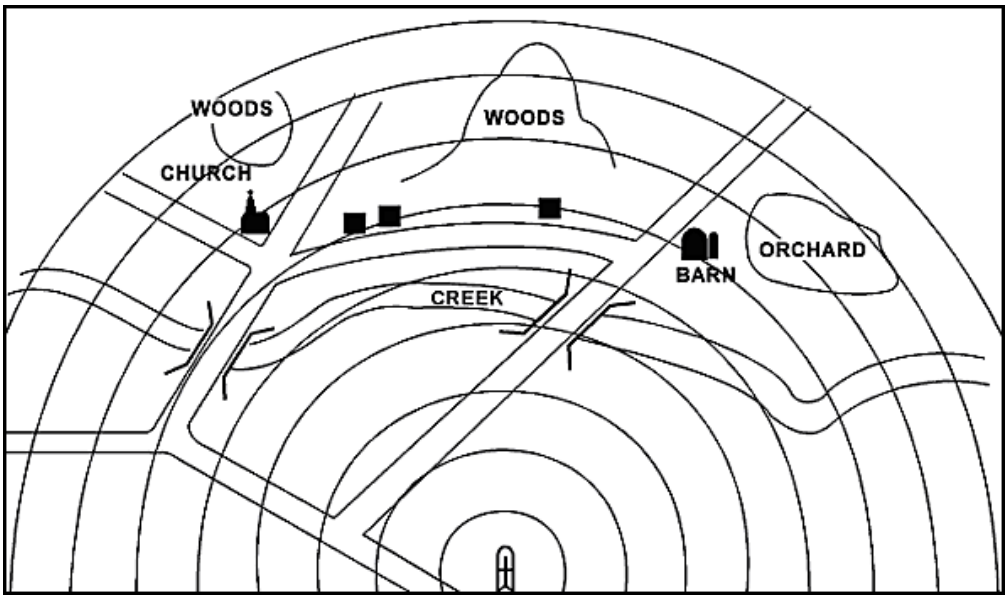
Example

The MEL is 2000 meters. If you divide the distance of the MEL by the number of rings (9), you would get 222.2 meters between each ring; rounded down to 220. Each ring, therefore, would equal 220 meters.

Sector Sketch Section

Description

The sketch should cover the entire assigned sector. Make the sketch as large as possible but do not exceed the limits of the largest circle. When depicting large natural objects (forests, hills, etc.) or manmade objects (buildings, bridges, etc.), draw the outline of the object and label it appropriately. When sketching objects in the sector, locate them on or near the corresponding circle to denote range to the object.



Gunner's Firing Position

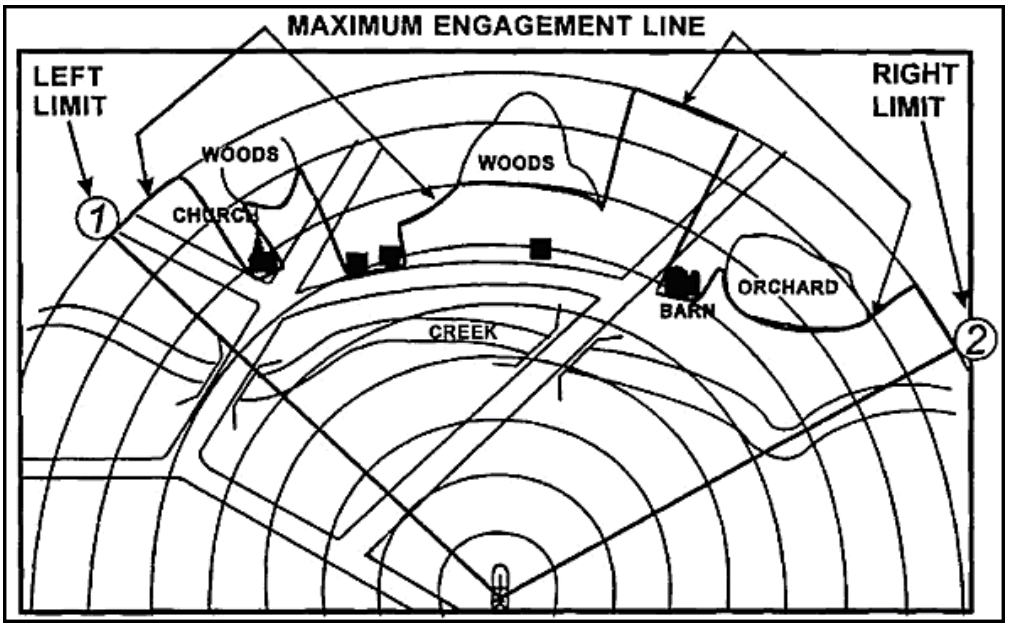
The gunner's firing position is designated by the black dot in the center of the smallest circle of the range card. Draw a symbol of the Javelin over the black dot to designate that this range card is for the Javelin.

Continued on next page

Sector Sketch Section, Continued

Left and Right Limits

Left and right limits are imaginary lines from the firing position to a designated point on the ground. The use of terrain features or other recognizable features to designate these points are recommended when possible. The area between the left and right limits depicts the gunner's sector of fire or area of responsibility. Lines are drawn from the designated firing positions to the maximum engagement line (MEL) in the area of designated limits. Number the left limit as No. 1 and the right limit as No. 2 and place a circle around each number. Record the azimuth and distance of each limit in the data section.



Maximum Engagement Line

The MEL designates the maximum effective range of a weapon (Javelin) and the gunner's line of sight limitations due to terrain in his sector or fire.

- If there are no limitations, draw the MEL along the last circle in the sector sketch section. The line should connect with the left and right limit labels.

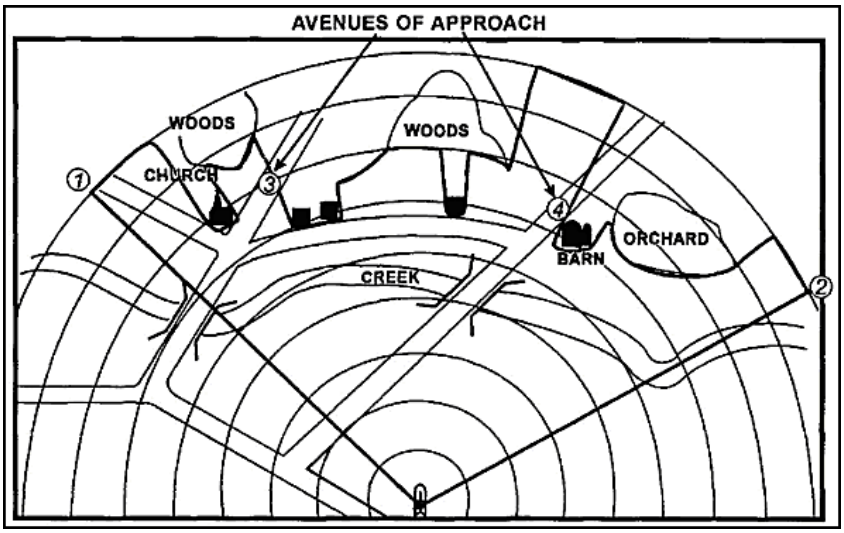
- If there are limitations, starting at the left limit, draw the MEL in front of the limiting terrain features.

Continued on next page

Sector Sketch Section, Continued

Avenues of Approach

Avenues of approach (AA) are areas where a target is most likely to appear or most likely to travel. This area can be a natural line of drift or a road. Tracked and wheeled vehicles may or may not use the same AA. Starting from the left and working to the right, number the areas where targets are likely to appear. Start with "No. 3," since No. 1 and No. 2 were used in designating the left and right limits. Place a circle around each number. Record the azimuth and distance to each AA in the data section.



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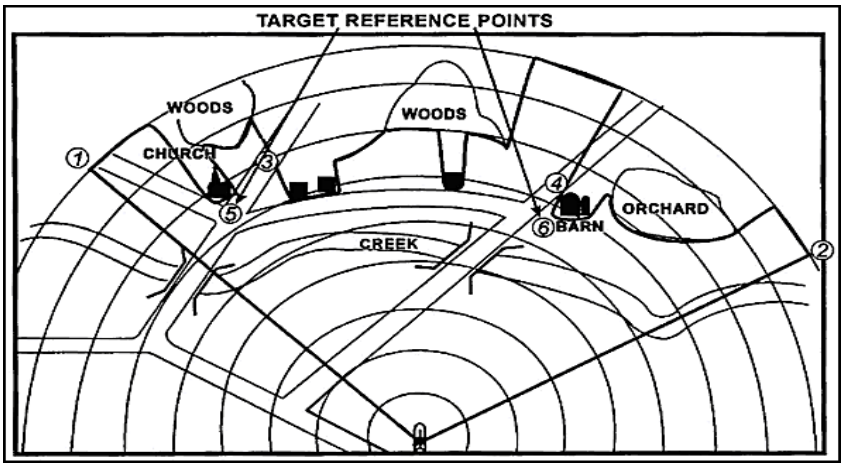
Sector Sketch Section, Continued

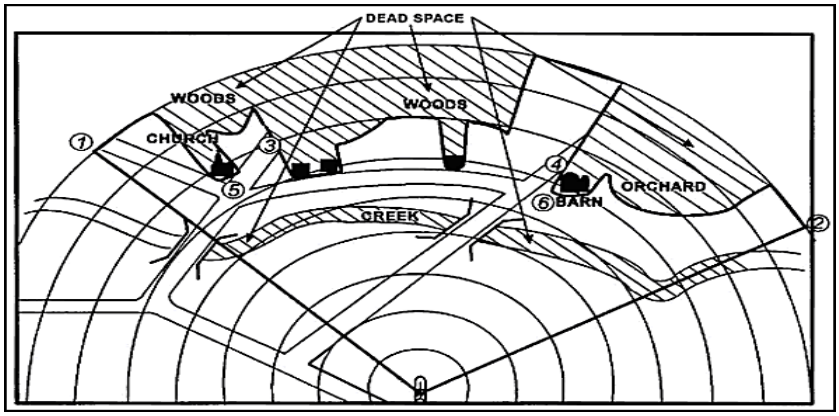
Target Reference Points

Prominent terrain features and easily recognizable man-made objects are used as target reference points (TRP). TRPs are used to locate targets and adjust direct or indirect fires. Normally, the sector has at least one TRP but no more than three. Number each TRP and place a circle around each number starting with the next available number after the last AA number. Record the azimuth and distance of each TRP in the data section.



Dead Space

Dead space is an area inside the gunner's sector of fire and inside the range of his weapon system where he can neither observe nor place any direct fire. Any area in which a gunner does not have line of sight is considered dead space. Shade these areas using diagonal lines to indicate significant dead space in the sector. These areas can then be identified as areas for indirect fire weapons.



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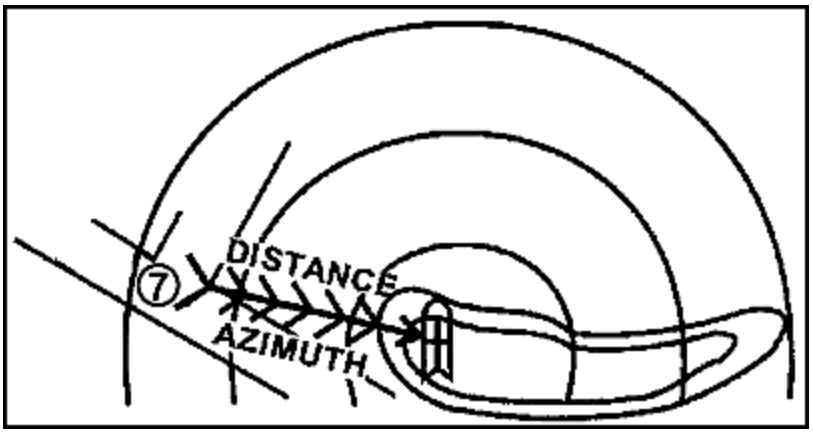
Sector Sketch Section, Continued

Gunners Reference Point

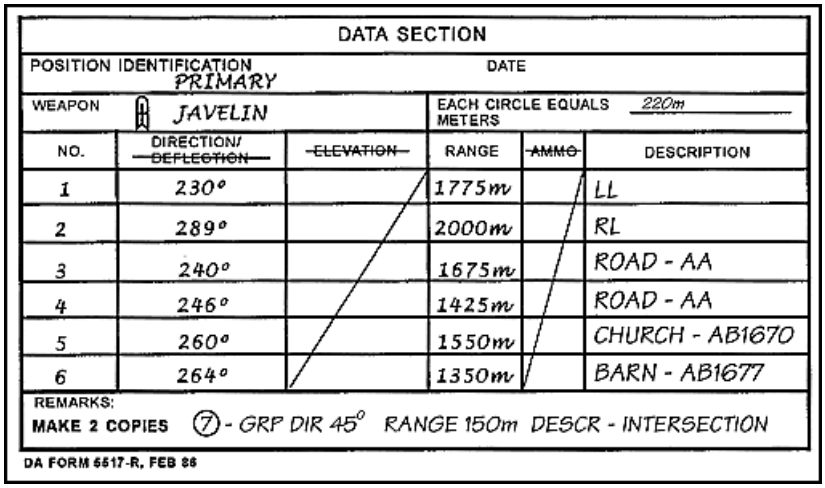
For a gunner's reference point (GRP), the gunner locates a nearby recognizable terrain feature to the right or left of his firing position. Label the GRP and draw an arrow between it, then label the firing position of the terrain feature. The direction of the arrow determines which azimuth to use. Record the azimuth and distance of the GRP in the data section.



Data Section

Parts

The fields of the data section are illustrated below.



DATA SECTION

POSITION IDENTIFICATION: PRIMARY — DATE

WEAPON: JAVELIN — EACH CIRCLE EQUALS METERS: 220m

NO.	DIRECTION/ ~~DEFLECTION~~	~~ELEVATION~~	RANGE	~~AMMO~~	DESCRIPTION
1	230°		1775m		LL
2	289°		2000m		RL
3	240°		1675m		ROAD - AA
4	246°		1425m		ROAD - AA
5	260°		1550m		CHURCH - AB1670
6	264°		1350m		BARN - AB1677

REMARKS:
MAKE 2 COPIES ⑦ - GRP DIR 45° RANGE 150m DESCR - INTERSECTION

DA FORM 6517-R, FEB 86

Field	Description
Position Identification	Designate as either primary, alternate, or supplementary
Date	Indicate only the day and month (23 May)
Weapon	Enter weapon system used (Javelin).
Number	Use the Nos. 1 and 2 to represent the left and right limits. Starting with the subsequent numbers, designate AA and TRP as shown (Sector Sketch Section).
Direction/ Deflection	List only direction (in degrees) for the appropriate item in the number column. Line through the word "DEFLECTION" since it is not applicable.
Elevation	Line through the word 'ELEVATION" since it is not applicable. Draw a diagonal line through the "ELEVATION" column.
Range	Distance is measured in meters from the designated firing position to the target or target engagement area.
Ammo	Line through the word "AMMO" since it is not applicable. Draw a diagonal line through the "AMMO" column.
Description	List the name of the item listed in the corresponding No. column. If the object is a TRP, list the TRP number, if left limit or right limit enter LL or RL
Remarks	Enter any information useful in understanding the range card. Also, this section may be used for the GRP data if there isn't sufficient room in the data section.

Continued on next page

Completed Range Card

The example below illustrates a completed range card.

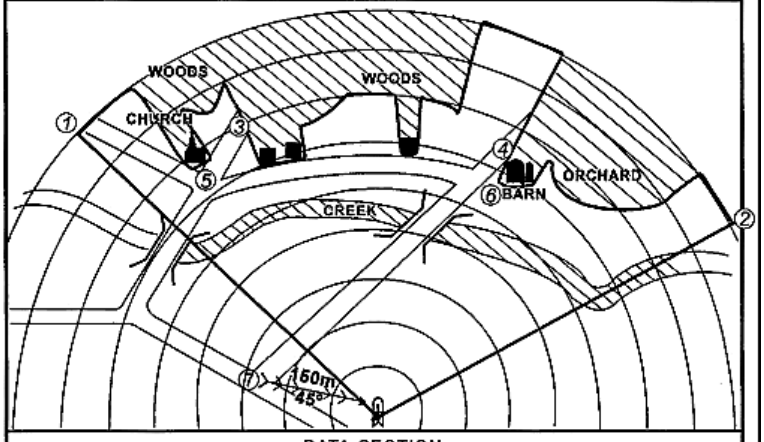
STANDARD RANGE CARD

For use of this form see FM 7-8. The proponent agency is TRADOC.

SQD 1
PLT 3
CO A

May be used for all types of direct fire weapons.

MAGNETIC NORTH



DATA SECTION

POSITION IDENTIFICATION: PRIMARY
DATE:

WEAPON: JAVELIN
EACH CIRCLE EQUALS METERS: 220m

NO.	DIRECTION/ ~~DEFLECTION~~	~~ELEVATION~~	RANGE	~~AMMO~~	DESCRIPTION
1	230°		1775m		LL
2	289°		2000m		RL
3	240°		1675m		ROAD - AA
4	246°		1425m		ROAD - AA
5	260°		1550m		CHURCH - AB1670
6	264°		1350m		BARN - AB1677

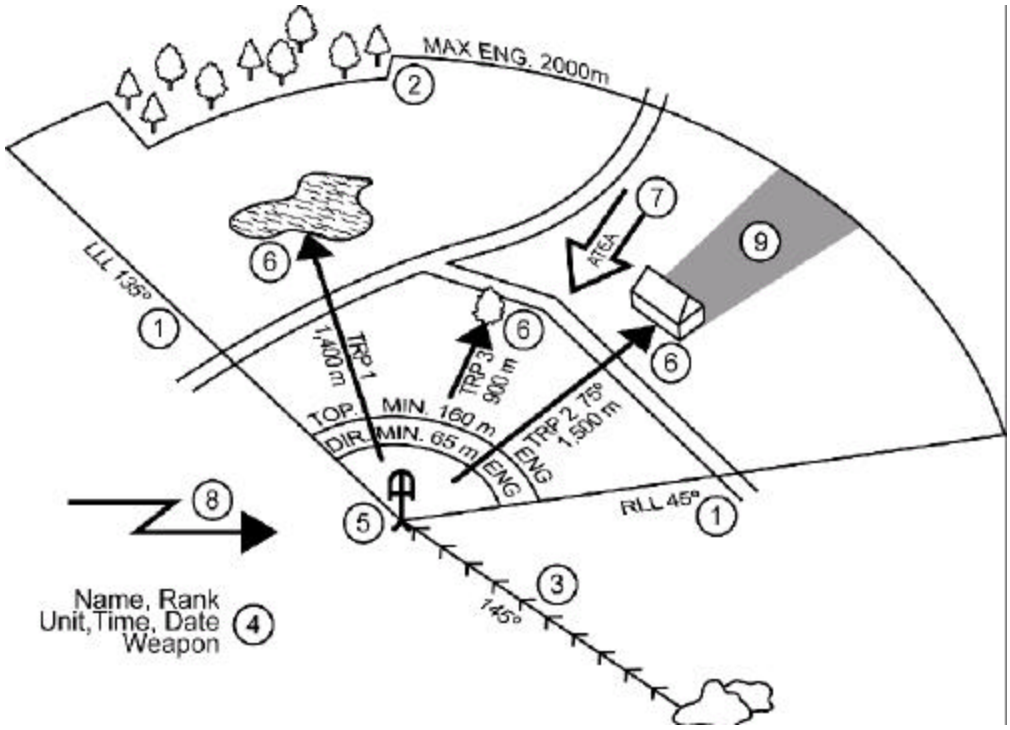
REMARKS:
MAKE 2 COPIES ⑦ - GRP DIR 45° RANGE 150m DESCR - INTERSECTION

DA FORM 5517-R, FEB 86

Field Expedient Range Card

Purpose

A field expedient range card is used when the DA Form 5517-R is not available. Preparation of a field expedient range card follows the same guidelines as a standard range card. The gunner can use just about anything to draw on as long as the data is recorded; the cardboard container of an MRE is an example.



Description

The objects annotated are essential to the range card sketch. The descriptions of those objects are listed in the table below.

Item	Object	Item	Object
1	L/R Lateral Limit	6	Target Reference Point
2	Max/Min Engagement Line	7	Anticipated Target Engagement Area (ATEA)
3	Back Azimuth to CP	8	North Seeking Arrow
4	Marginal Data	9	Dead Space
5	Hot Position (map symbol)		Legend (not shown) lower R/H corner of sketch

Lesson 2 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 The antiarmor range card

a. helps in planning and controlling fires and in detecting and engaging targets.
b. shows a gunner's position to see how he can find his way to the rear.
c. determines the distance from one position to another.
d. denotes the plan of attack on a defended position.

Item 2 The information on the antiarmor range card should include

a. firing position , left and right limits, maximum engagement line, avenues of approach, and target reference points.
b. platoon headquarters location, patrol checkpoints, minimum engagement line, and unit information.
c. location of forward and rear command post, location of crew-served weapons, and call signs.
d. obstacles in company area, limits of advance, objective rally point, and enemy situation.

Item 3 What are the three sections of an antiarmor range card?

a. Left and right limits, target reference points, and the weapon's position
b. Name, ammunition, and unit
c. Top, bottom, and back
d. Marginal information, sector sketch section, and data section

Continued on next page

Solutions

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

Item Number	Answer	Reference
1	a	5-14
2	a	5-14
3	d	5-14

Lesson Summary

In this lesson, you learned the purpose, required information, and sections of the range card. This range card can be used for all weapons organic to an infantry battalion. However, for the purpose of this lesson, the Javelin weapon system was used. In the next lesson, you will be introduced to methods of engagement.

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LESSON 3

METHODS OF ENGAGEMENT

Introduction

Scope

The conditions under which you will fire your weapon will be governed primarily by situation and opportunity. Methods of engagement, however, provide you with various options that can be used to facilitate target engagement.

Learning Objective

At the end of this lesson, you should be able to

- Identify a description of standoff.
- Identify the various fundamentals of employment.

In This Lesson

This lesson contains the following topics:

Standoff

Purpose

The term standoff refers to the ability of using a particular weapon's maximum effective range to minimize or negate the effect of enemy fire. Javelin's increased range and lethality gives the commander a greater advantage on the battlefield. By applying the fundamentals of antiarmor employment, the gunner and his leaders increase the probability of destroying enemy targets and enhancing the survivability of the Javelin gunner.

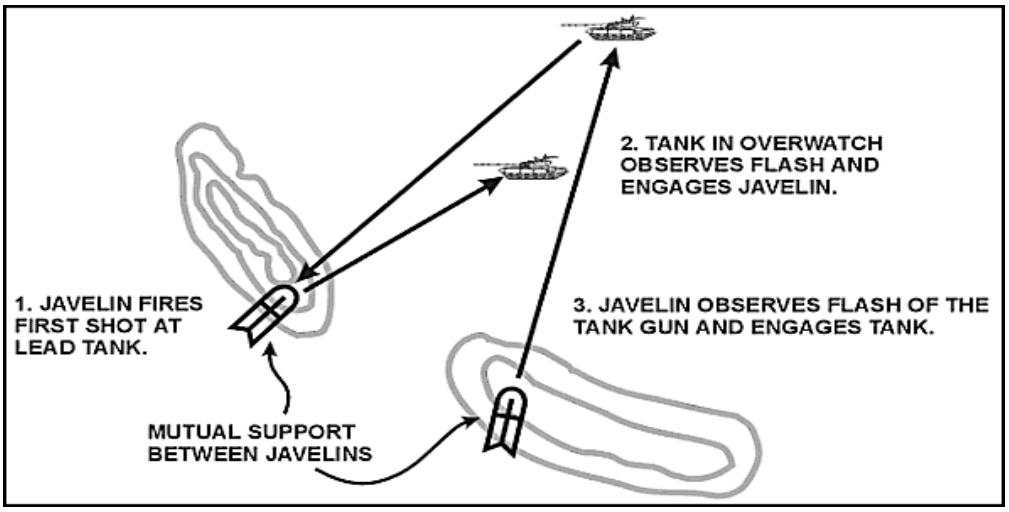
Description

During target engagement, the gunner strives to engage armored and mechanized infantry vehicles in the 1,000- to 2,000-meter range. The Javelin size and small-launch signature are not easily detected at these distances. Engagement at ranges of less than 1,000 meters exposes the gunner to enemy direct fire weapons and lessens his survivability on the battlefield. By engaging the enemy whenever possible out to 2,000 meters, the enemy armor threat is forced to break formation. Mechanized infantry vehicles are forced to take cover and dismount the infantry. The result is a change in momentum of the battle for both defensive and offensive operations.

Mutual Support

Description

The Javelin provides mutual support for the other antiarmor assets and for each other. Mutual support is established by employing the Javelin in sections and by overlapping sectors of fire between Javelins.

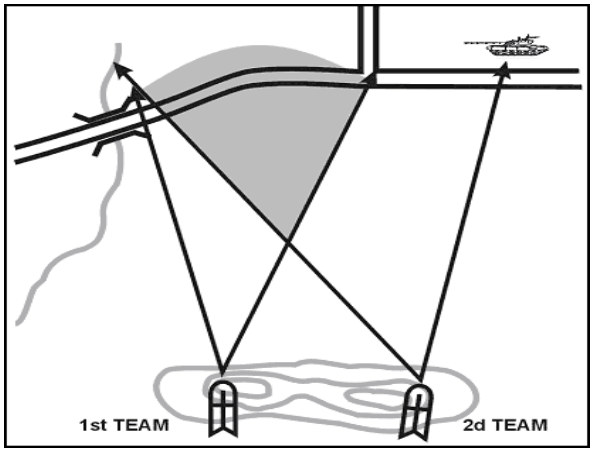


Employment by Section

Employment of Javelins by section establishes mutual support between gunners. If one gunner has engaged and is displacing, the other gunner can continue to cover the assigned sector. To achieve this, Javelins are positioned so that fires directed at one Javelin do not suppress the other Javelins.

Overlapping Sectors of Fire

The gunners may overlap sectors of fire to maximize coverage. Overlapping sectors of fire are essential to mutual support.



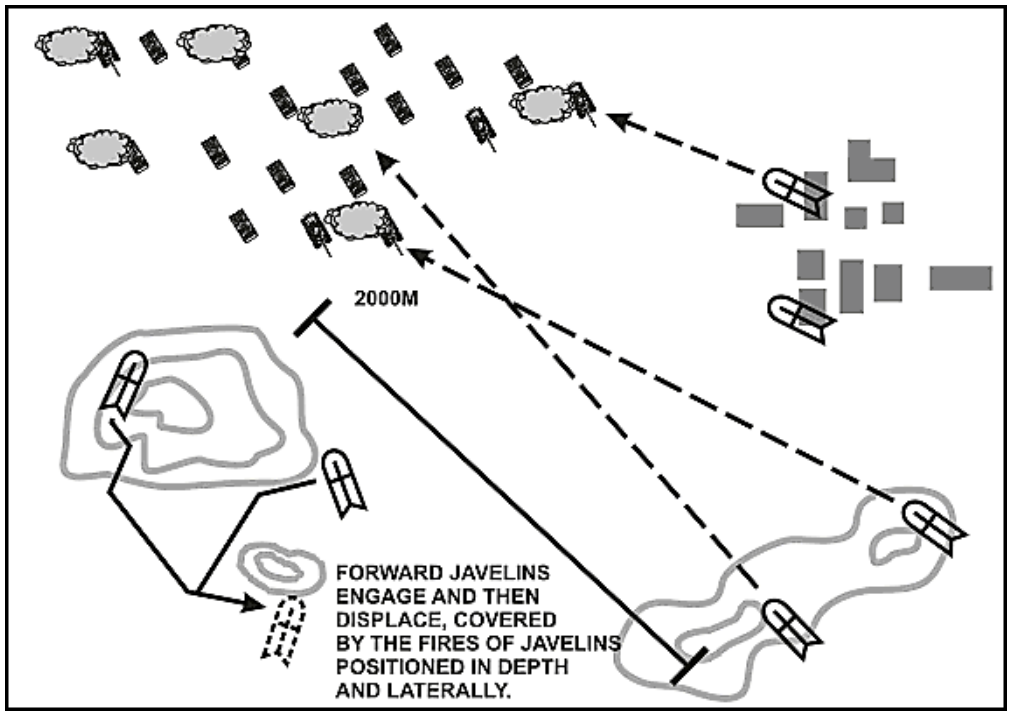
The Fundamentals

Security	Antiarmor sections are vulnerable to attack by infantry. To protect Javelin sections, position them near friendly infantry units.
Flank Engagements	The Javelin should be employed to engage enemy vehicles from the flank. Although the Javelin has the unique ability to use a top attack, the gunner should still seek to engage with flank shots.
Cover and Concealment	The Javelin gunners should use cover and concealment to increase their survivability. Cover is protection from the fire of enemy weapons and from observation. Concealment is protection from enemy observation.
Combined Arms	Skillful integration of infantry, armor, engineer, and indirect fire assets greatly improve the survivability and lethality of antiarmor units. The Javelin can be an integral asset of the combined arms team.

Employment In-Depth

Description

Javelin fire should be employed in-depth. By employing the Javelins in-depth in conjunction with integrated fires and obstacles, the commander prevents the enemy from easily engaging friendly antiarmor systems. This slows and canalizes the enemy advance. This increases engagement times for all antiarmor systems and the probability of achieving a hit. Positions should be selected to capitalize on the Javelins 2,000 meter range.



Lesson 3 Exercise

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

Item 1 Use of the Javelin to engage targets at distances of 1,000 to 2,000 meters is a description of

a. mutual support.
b. defense in depth.
c. standoff.
d. security.

Item 2 Your section has been tasked with conducting an antiarmor ambush on a suspected enemy tank column. Your team is positioned on a slight rise in terrain parallel to the enemy direction of movement. To your right is a second team that will cover the assigned sector while you displace to a new position. What type of mutual support is being used?

a. Overlapping sectors of fire
b. Employment by section
c. Employment in-depth
d. Alternate sectors of fire

Item 3 Your team and the second team to your left have sectors of fire that cross. What type of mutual support is being used?

a. Overlapping sectors of fire
b. Employment by section
c. Employment in-depth
d. Alternate sectors of fire

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Item 4 Through Item 8

Matching: For items 4 through 8, match the fundamental in column 1 with its description in column 2. Place your responses in the spaces provided.

Column 1	**Column 2**
Fundamental	**Definition**
___ 4. Security	a. This is the protection from the fire of enemy weapons and from observation. Also this provides protection from enemy observation.
___ 5. Flank Engagements	b. Skillful integration of infantry, armor, engineer, and indirect fire assets greatly improve the survivability and lethality of anti-armor units.
___ 6. Cover and Concealment	c. This slows and canalizes the enemy advance. This increases engagement times for all antiarmor systems and the probability of achieving a hit. Positions should be selected to capitalize on the Javelins 2,000 meter range.
___ 7. Combined Arms	d. Antiarmor sections are vulnerable to attack by infantry. To protect Javelin sections, position them near friendly infantry units.
___ 8. Employment in-depth	e. The Javelin should be employed to engage enemy vehicles from the flank.

Continued on next page

Solutions

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

Item Number	Answer	Reference
1	c	5-28
2	b	5-29
3	a	5-29
4	d	5-30
5	e	5-30
6	a	5-30
7	b	5-30
8	c	5-31

Lesson Summary

In this lesson, you have learned a description of standoff and the fundamentals of antiarmor warfare. This information greatly increases your lethality and survivability on the battlefield.

STUDY UNIT 6

SAFETY, MAINTENANCE, DECONTAMINATION, AND DESTRUCTION OF MATERIALS

Overview

Scenario

Due to the nature of it's fire and forget characteristic, the Javelin weapon system produces backblast as a result of firing the missile. Therefore, as is the case with any weapon system, safety is paramount. In addition, the effectiveness level of the Javelin will be greatly diminished if proper maintenance is not performed.

Scope

This study unit will provide instruction regarding the safety considerations, maintenance, decontamination from nuclear, biological, and chemical (NBC) exposure, and destruction of the Javelin weapon system to prevent it from falling into enemy hands.

In This Study Unit

This study unit contains the following lessons:

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LESSON 1

JAVELIN SAFETY PRECAUTIONS

Introduction

Scope

In this lesson, you will learn safety precautions related to the weapon system, firing from enclosures, and safety precautions for the battery coolant unit (BCU).

Learning Objectives

Upon completion of this lesson, you should be able to

- Identify danger areas associated with the Javelin weapon system.
- Identify how to safely fire the Javelin from an enclosed room.
- Identify the definition of venting.

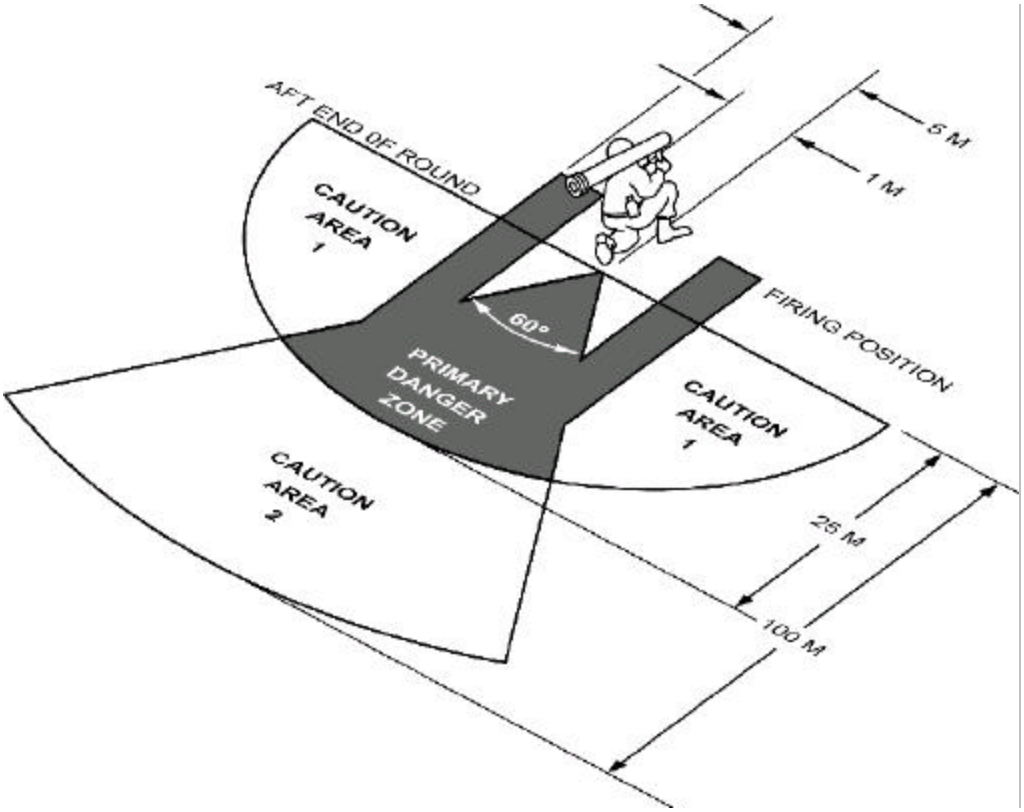
In This Lesson

This lesson contains the following topics:

Javelin Safety

Backblast

The backblast of the Javelin in the graphic below comes from the firing of the launch motor and the flight motor. The Javelin has little recoil because the propellant gases escape to the rear of the weapon. This backblast can damage equipment or seriously injure personnel who are too close to the rear of the round at time of firing. The Javelin backblast area extends 100 meters to the rear, up to 25 meters to the sides of the launcher, and forms a 60-degree danger area. The danger area is divided into a primary danger area and two caution areas.



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Javelin Safety, Continued

Primary Danger Area

The primary danger area extends 25 meters from the aft end of the round and projects outward at a 60-degree angle. The primary danger zone also extends 1 to 5 meters either side of the round to the firing position.

WARNING: Fatalities or serious injury is possible for personnel in the primary danger area during missile launch.

Caution Area 1

Caution Area 1 is an area extending radially 25 meters from each side of the primary danger zone to the firing line. Serious hearing impairment or damage from frequent exposure could occur to personnel in this area during firing. Personnel should avoid this area.

Caution Area 2

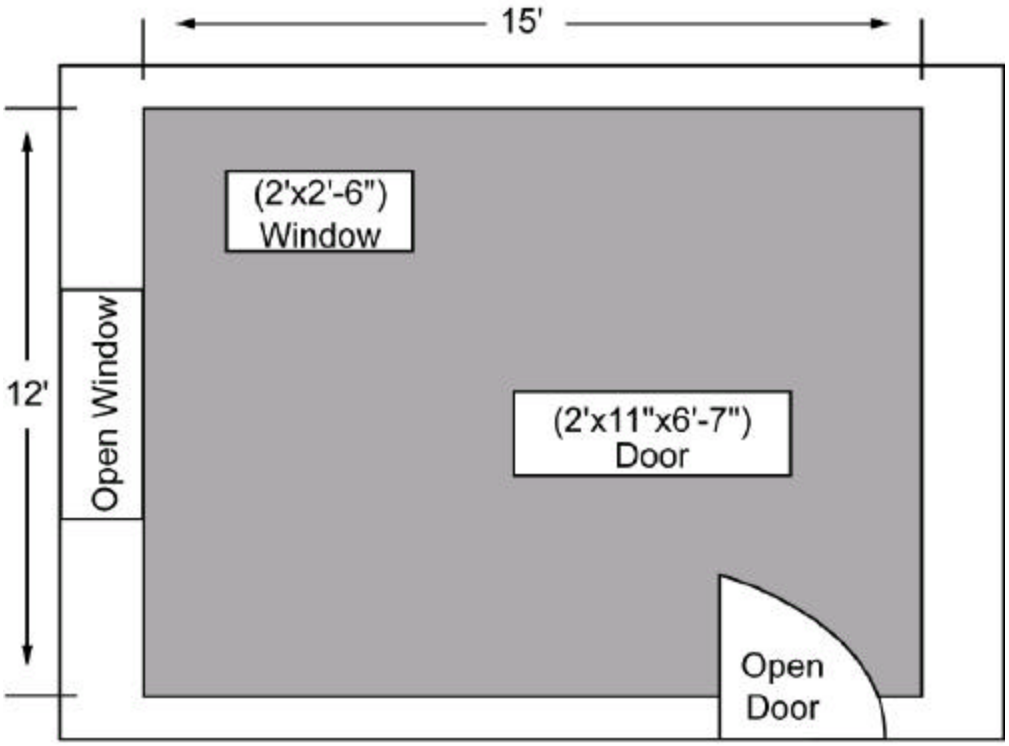
Caution Area 2 is an area extending 100 meter radius, aft the launcher, and within the 60-degree sector. This area is affected by the activation of the flight motor. Again, personnel should avoid this area.

Firing from Enclosures

Requirements

When launching a missile from an enclosure, the enclosure must meet the following minimum requirements:

- Ceiling height of at least 7 feet
- Walls 12 feet wide by 15 feet deep
- Window opening must be at least 2 feet by 2 feet 6 inches
- Door opening must be at least 2 feet 11 inches by 6 feet 7 inches



Example of minimum enclosure requirements

Firing Safety

When launching a missile from an enclosure, allow sufficient room for round to extend beyond outermost edge of the enclosure.

Debris

Debris and loose objects are cleared from the room when firing within a confined area.

Continued on next page

Firing From Enclosures, Continued

Venting	When possible, doors and windows are opened to allow backblast and overpressure to escape.
Structural Damage	Escaping gases from the missile's first stage motor are hot and flammable. The materials that can easily catch fire are removed before firing.
Hearing Protection	All personnel within 25 meters of the Javelin must wear hearing protection.
Face Shield	The face shield protects the gunner's face. It is possible to damage the face shield absorber between the indentation and the CLU main housing. If this part of the face shield is missing, the gunner must switch from firing the Javelin with the right eye to firing with the left eye.
BCU Safety Precautions	Avoid skin contact with the BCU. The heat produced by the BCU can cause serious burns.

Lesson 1 Exercise

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

Item 1 What is the backblast area for the Javelin?

a. 30 meters back and 25 meters to either side at a 60 degree angle
b. 50 meters back and 20 meters to either side at a 30 degree angle
c. 100 meters back and 25 meters to either side at a 60 degree angle
d. 25 meters back and 1 meter to either side at a 45 degree angle

Item 2 When firing from a confined area

a. the team leader must be present.
b. debris and loose objects are cleared from the room.
c. the forward edge of the room cannot be less than 10 meters from the firing position.
d. the window opening cannot exceed 3 square feet.

Item 3 When firing the Javelin from inside enclosures, the opening of doors and windows to allow backblast and overpressure to escape is defined as

a. shielding.
b. securing.
c. clearing.
d. venting.

Continued on next page

Solutions

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
1	c	6-4
2	b	6-6
3	d	6-6

Lesson Summary

In this lesson, you have learned the safety precautions related to the weapon system, firing from enclosures, and safety precautions for the battery coolant unit (BCU). In the next lesson, you will learn how to perform maintenance on the Javelin.

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LESSON 2

MAINTENANCE OF THE JAVELIN

Introduction

Scope

To ensure safe operation of the Javelin for both the gunner and the weapon system, proper maintenance must be performed before, during, and after operation. In this lesson, you will learn how and when to conduct proper maintenance of the Javelin weapon system.

Learning Objective

Upon completion of this lesson, you should be able to

- Identify when Preventive Maintenance Checks and Services (PMCS) are conducted.
- Identify the serviceability of various parts of the Javelin weapon system during PMCS.
- Identify when the CLU operational checks are conducted.

In This Lesson

This lesson contains the following topics:

Preventive Maintenance Checks and Services

Introduction

Preventive Maintenance Checks and Services (PMCS) are scheduled maintenance actions used to make sure that the Javelin is in a serviceable condition and ready for operation at all times. Inspect the Javelin regularly and carefully so that you can find any defects and correct them. PMCS should be performed before and after operation.

CLU Before Operation

Perform the following steps before operation PMCS when removing weapon systems from the company area or performing an operation.

Step	Action	It is unserviceable if…
1	Inspect the main housing for scratches, dents, or cracks.	Cracks are visible.
2	Inspect absorbers for damage or missing parts.	Any part of the face shield absorber between indentation and main housing is missing.
3	Inspect daysight and NVS lens covers.	
4	Open daysight and NVS lens covers and depress the eyecup. Inspect lenses for damage.	Lenses are cracked or broken or if scratches on eyepiece lens prevents gunner from focusing CLU display.
5	Inspect humidity indicator.	The humidity indicator is pink.
6	Inspect seeker trigger and trigger guard for damage.	Seeker trigger is broken.
7	Inspect fire trigger for damage.	Fire trigger is broken.
8	Remove protective cover and inspect the round interface connector for corrosion.	Round interface connector is corroded.
9	Inspect round interface bracket, round interface catch, and alignment pin for damage.	CLU and round will not connect.
10	Inspect eyecup for cracks or tears.	Eyecup is missing.
11	Rotate diopler for full range-of-motion.	

Continued on next page

CLU Before Operation, continued

Step	Action	It is unserviceable if…
12	Inspect left and right handgrip controls for damage.	
13	Inspect power switch for damage.	Power switch is broken.
14	Release bail and raise battery cover. Inspect for dirt.	
15	Inspect battery interface connector for bent pins or corrosion.	Battery interface connector pins are bent or broken.
16	Inspect battery. Remove white tape from electrical connector. Inspect for loose terminals, cracks in case, or leakage.	Damage is found; replace battery.
17	Perform CLU BIT.	Test failed.

Round Before Operation

Perform PMCS before removing weapon system from the company area or on operating.

Step	Action	It is unserviceable if…
1	Ensure forward endcap is present.	Forward endcap is missing.
2	Inspect BCU.	BCU is damaged; replace if damaged. Check status indicator. If dark spot appears, replace BCU.
3	Inspect pylon and guide pins for damage.	BCU will not connect.
4	Reinstall BCU.	
5	Inspect aft endcap for punctures.	Aft endcap membrane is punctured.
6	Inspect launch tube assembly.	Dents or cracks are visible on outer surface.
7	Inspect latch release for damage.	Latch release is broken.
8	Inspect round interface connector.	Round interface connector is broken.

Continued on next page

Preventive Maintenance Checks and Services, Continued

CLU After Operation

Perform the same checks as in the before operation steps

Round After Operation

Perform the same checks as in the before operation steps. Add the following step.

Step	Action	It is unserviceable if…
1	If forward endcap was removed during mission, remove endcap and inspect seeker head for damage or dirt.	Seeker head is broken or dirt remains in LTA.

CLU Operational Check

Operational Check for the CLU

Perform the following steps in conducting an operational check to ensure the CLU functions correctly. CLU operational checks are always performed before and after operaton.

Step	Action
1	Ensure NVS and daysight lens covers are open.
2	Set power switch to night position.
3	Set diopler ring for best clarity of CLU display.
4	Verify day and NVS not ready indicators are illuminated.
5	After approximately 2 1/2 minutes, verify the NVS not ready indicator goes out.
6	Press the SGT SEL switch. Observe the DAY indicator goes out and the WFOV video appears. The WFOV indicator will be illuminated.
7	Press the SGT SEL switch again and observe the NFOV video appears along with the NFOV indicator illuminated.
8	Press up on the focus switch until the NFOV indicator begins to flash. Hold down on the focus switch until the NFOV begins flashing again.
9	Select a target in the CLU display and adjust focus for clear video using the focus switch.
10	Adjust the contrast of the CLU display for clear video by pressing the GATE ADJ/ CTRS& BRT switch left and right.
11	Adjust brightness of the CLU display for clear video by pressing the GATE ADJ/ CTRS & BRT switch up and down.
12	Press FLTR switch. Observe that the CLU display becomes darker and the FLTR indicator is illuminated.
13	Press FLTR switch. Observe that the CLU display brightens and the FLTR indicator goes out.
14	Press the SGT SEL switch. Observe that the Day FOV appears and that the day indicator illuminates.
15	Turn power switch to the OFF position.
16	Close the day and NVS lens covers.

Lesson 2 Exercise

Directions

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

Item 1

When do you perform preventive maintenance checks and services?

a. Before operation
b. After operation
c. Both before and after operation
d. Only when fired

Scenario for Item 2 Through Item 5

Scenario: You are conducting an inspection on four Javelin weapon systems. While performing a visual inspection of the systems, you make note of the following findings:

Javelin #1: The eyecup is missing from the CLU.
Javelin #2: The round interface connector is corroded.
Javelin #3: The round has cracks on the outer surface.
Javelin #4: The aft endcap membrane is punctured.

Item 2

You determine that Javelin #1 is

a. serviceable.
b. unserviceable.

Item 3

You determine that Javelin #2 is

a. serviceable
b. unserviceable

Continued on next page

Item 4 You determine that Javelin #3 is

a. serviceable.
b. unserviceable.

Item 5 You determine that Javelin # 4 is

a. serviceable.
b. unserviceable.

Item 6 When do you perform an operational check of the CLU?

a. Before operation
b. After operation
c. Both before and after operation
d. Only when fired

Continued on next page

Solutions

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
1	c	6-12
2	b	6-12
3	b	6-12
4	b	6-13
5	b	6-13
6	c	6-12 – 6-15

Lesson Summary

In this lesson, you've learned how to perform preventive maintenance checks and services and operational check of the CLU to ensure it works properly. In the next lesson, you will learn decontamination techniques in order to remove hazardous contaminates from the weapon and destruction procedures to prevent enemy capture.

LESSON 3

DECONTAMINATION AND DESTRUCTION

Introduction

Scope

On the modern battlefield, it is important for a Marine to understand how to decontaminate himself and his equipment. Additionally, in combat situations, it is conceivable that the Javelin team could be ordered to destroy the Javelin system to prevent its capture or use by the enemy.

In this lesson, you will learn how to decontaminate the Javelin weapon system from NBC contamination. You will also learn how to destroy the Javelin if necessary to prevent its use by the enemy.

Learning Objectives

Upon completion of this lesson, you should be able to

- Identify procedures to decontaminate the Javelin weapon system.
- Identify the best way the gunner can destroy the Javelin round.

In This Lesson

This lesson contains the following topics:

Decontamination of the Javelin from NBC Agents

Principles

Decontamination means the removal or reduction in the hazardous level of NBC contamination from personnel, weapons, and material. To perform this, the Marine can use his M291 individual equipment decontamination kit (IEDK) or the M295 IEDK kit to remove H-series, G-series, and V-series agents. FM 3-5 and TM 3-4230-216-10 provide more information about decontamination procedures for equipment and weapons. Once a Marine is aware of chemical or biological contamination, he initiates immediate decontamination techniques. To remove radiological contamination from equipment and personnel, brush the contaminants off and/or use soap and water.

Decontaminate The Javelin Round

To reduce the spread/transfer of liquid contamination, follow the steps below for immediate decontamination of the Javelin round.

Step	Action
1	Decontaminate gloves using the IEDK.
2	Decontaminate the round by patting it with the IEDK, working from the front to the rear until the entire round is covered. Note: When the shoulder strap is grossly contaminated, discard it.
3	Repeat step 1.
4	Discard the IEDK.

Decontaminate The CLU

To reduce the spread/transfer of liquid contamination, follow the steps for immediate decontamination of the Javelin CLU.

Step	Action
1	Decontaminate gloves using the IEDK
2	Decontaminate the CLU by patting it with the IEDK, paying special attention to the handgrips, battery cover, round interface connector protective cover, buttons, and absorbers. Note: Do not apply an IEDK to any optic lens. The abrasive effect of the charcoal in the IEDK will cause damage to the lens.
3	Use a knife to cut the protective cover lanyard from the protective cover and remove it.
4	Repeat step 1.
5	Discard the IEDK.

Destruction of the Javelin

Principles	Unless otherwise instructed, the destruction of the Javelin only occurs when the commander gives the order. If the Javelin cannot be evacuated, the unit launches the round and destroys the CLU. Destroying the same component in all weapon systems prevents the enemy from assembling a complete system.
Procedures For Destroying The Javelin	The Javelin can be destroyed in several ways. Only the Marines trained in the proper use of explosives should attempt to destroy the CLU and round. Each unit that uses, maintains, or stores the Javelin should have an SOP for destroying them. The destruction plan should be flexible enough to cover any situation. It should state priorities and methods of destruction and should provide clear instructions on how to conduct each method of destruction.
Destroy The CLU and Round	The easiest and quickest way to destroy the CLU is to destroy its optics. Smash the CLU optics with an axe, hammer, helmet, butt of a weapon, or have a vehicle run over it. You can also destroy the optics using small arms fire. The best way to destroy the round is to launch it towards the enemy. **WARNING**: Do not use mechanical methods to destroy live missiles.
CLU Battery and BCU	Before the destruction of the CLU, remove the battery. If possible, keep both the BCU and CLU battery until you can return to a rear area to dispose of them.

Lesson 3 Exercise

Directions

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

Item 1 Through Item 5

Matching: For items 1 through 5, match the step in column 1 with the appropriate decontamination procedure for the CLU in column 2. Place your responses in the spaces provided.

Column 1	**Column 2**
Step	**Decontamination Procedure**
___1. (Step 1)	a. Use a knife to cut the protective cover lanyard from the protective cover and remove it.
___2. (Step 2)	b. Discard the IEDK.
___3. (Step 3)	c. Decontaminate gloves using the IEDK.
___4. (Step 4)	d. Decontaminate the round by patting it with the IEDK, working from the front to the rear until the entire round is covered.
___5. (Step 5)	e. Decontaminate gloves using the IEDK.

Item 6 Through Item 9

Matching: For items 6 through 9, match the step in column 1 with the appropriate decontamination procedure for the Javelin round in column 2. Place your responses in the spaces provided.

Column 1	**Column 2**
Step	**Decontamination Procedure**
___ 6. (Step 1)	a. Discard the IEDK.
___ 7. (Step 2)	b. Decontaminate gloves using the IEDK.
___ 8. (Step 3)	c. Decontaminate the round by patting it with the IEDK, working from the front to the rear until the entire round is covered.
___ 9. (Step 4)	d. Decontaminate gloves using the IEDK.

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Item 10 The best way for the gunner to destroy the Javelin round is to

a. destroy the seeker head.
b. cut off the propulsion section.
c. launch it towards the enemy.
d. burn it with thermite grenades.

Continued on next page

Solutions

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
1	c,e	6-20
2	d	6-20
3	a	6-20
4	e,c	6-20
5	b	6-20
6	b,d	6-20
7	c	6-20
8	d,b	6-20
9	a	6-20
10	c	6-21

Lesson Summary

In this lesson, you learned how to decontaminate the Javelin weapon system and how to properly destroy it.

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

The Javelin consists of two main parts; the command launch unit and

a. battery coolant unit.
b. round.
c. missile.
d. main housing.

Item 2

The minimum range of the Javelin in the top attack mode is _____ meters.

a. 65
b. 100
c. 150
d. 200

Item 3

The Javelin has a maximum effective range of _____ meters.

a. 1,000
b. 2,000
c. 3,000
d. 4,000

Continued on next page

Item 4 The Javelin battery is interchangeable with the battery in the

a. PRC 119.
b. PRC 109.
c. PRC 77.
d. PRC 68.

Item 5 The Javelin round consists of the launch tube assembly (LTA), the missile, and the

a. command launch unit.
b. battery coolant unit.
c. forward end cap.
d. aft end cap.

Item 6 The battery coolant unit has an operating time of _____ minutes/(s).

a. 1
b. 2
c. 3
d. 4

Item 7 The _____ section of the missile houses the seeker head.

a. guidance
b. mid-body
c. warhead
d. propulsion

Continued on next page

Item 8 Where does the Javelin missile house the seeker head?

a. Missile Guidance Section.
b. Missile Electronics Section.
c. Missile Navigation Section.
d. Missile Warhead Section.

Item 9 The _____ section of the Javelin missile includes the missile skin, electronic safe arm and fire unit (ESAF), wings, and the main charge of the warhead.

a. guidance
b. mid-body
c. control actuator
d. warhead

Item 10 The Javelin would be assembled when contact with the enemy is

a. unlikely.
b. remote.
c. likely.
d. uncertain.

Continued on next page

Item 11

You are a 0351 SMAW gunner in a combat environment with an armored threat. The gunner and assistant gunner are casualties. The weapon is lying nearby unassembled. You hear that enemy armor has been sighted in the distance.

What is the correct sequence to assemble the weapon?

1. Remove protective cover from round interface connector.
2. Remove protective cover from the CLU interface connector.
3. Place round on the ground with flat sides of the end caps down and latch assembly facing up.
4. Slide CLU forward and press down to engage CLU and round interface connectors.
5. Place round interface bracket in round hooks.

a. 1, 2, 3, 4, 5
b. 5, 1, 3, 2, 4
c. 4, 3, 2, 1, 5
d. 3, 2, 1, 5, 4

Item 12

In removing the forward end cap, you remove the locking pin then turn the forward end cap latch

a. clockwise.
b. counterclockwise.
c. ½ turn to the right.
d. ½ turn to the left.

Item 13

To prepare the night vision sight for operation, the gunner needs to turn the power switch to

a. test.
b. day.
c. night.
d. on.

Continued on next page

Item 14 To prepare the Javelin for firing, what part of the eyepiece does the gunner adjust to improve the clarity of the CLU display?

a. Lens
b. Diopler ring
c. Contrast and brightness button
d. SGT SEL button

Item 15 The first step the gunner should perform in night vision sight operation is to turn the power switch to the

a. test position.
b. day position.
c. night position.
d. on position.

Item 16 During night sight operation, what should the gunner press to select Wide Field of View (WFOV)?

a. FLTR switch
b. FOCUS button
c. GATE ADJ/CTRS&BRT button
d. SGT SEL button

Item 17 What should the gunner press to adjust the contrast of the WFOV during night sight operations?

a. FLTR switch
b. FOCUS button
c. GATE ADJ/CTRS&BRT button
d. SGT SEL button

Continued on next page

Item 18 The gunner would use the full stadia method to determine target engageability when the target

a. presents a side view to the gunner.
b. presents a frontal view to the gunner.
c. presents a rear view to the gunner.
d. is moving.

Item 19 The gunner would use the half stadia method to determine target engageability when the target

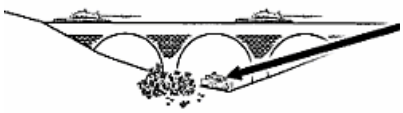
a. presents a side view to the gunner.
b. presents a frontal view to the gunner.
c. presents a side view to the gunner.
d. is stopped.

Item 20 What is the default attack mode on the Javelin?

a. Direct attack
b. Top attack
c. Flank attack
d. Volley fire

Item 21 Which attack mode should be selected based on the target selection (arrow) below.

a. Direct attack
b. Top attack
c. Flank attack
d. Volley fire



Continued on next page

Item 22 Once the battery coolant unit is activated, approximately how much time does the gunner have to launch the missile?

a. 1 minute
b. 2 minutes
c. 3 minutes
d. 4 minutes

Item 23 To activate the seeker, the gunner

a. presses the FLTR switch.
b. squeezes the seeker trigger.
c. presses the SGT SEL button.
d. turns the power switch to seeker.

Item 24 What must the gunner do to adjust the crosshairs on the target before missile launch?

a. Use the GATE ADJ/CTRS&BRT button.
b. Use the FOCUS button.
c. Adjust the position of the CLU.
d. Use the triggers alternately.

Item 25 Once the missile is launched, what is the first step to disconnecting the CLU from the expended round?

a. Put the forward endcap back on.
b. Push the latch release.
c. Turn power switch to "OFF."
d. Close day and night sight covers.

Continued on next page

Item 26 The green status indicators tell you when

a. a malfunction has occurred with the CLU.
b. a misfire has occurred.
c. the BCU module has been expended.
d. the monitored function is in a satisfactory condition.

Item 27 What alerts the gunner to a situation where a caution, recheck, or an unexpected delay exists?

a. Amber status indicators.
b. Green status indicators
c. Red status indicators.
d. Blue status indicators.

Item 28 When flashing, which indicator warns the gunner of an emergency condition where action must be taken?

a. Green status indicators.
b. Red status indicator.
c. Blue status indicator.
d. Amber status indicator.

Item 29 When solid, which indicator alerts the gunner that the Javelin is inoperative and a successful missile launch is not possible until corrective action is taken?

a. Blue status indicators
b. Amber status indicators
c. Red status indicators
d. Green status indicators

Continued on next page

Item 30 The illustration below shows one of the red status indicators.

It's function, when illuminated, is to warn the gunner that the

a. CLU battery is installed incorrectly.
b. CLU battery is missing.
c. CLU battery has 10 minutes of operating time remaining.
d. CLU battery has 5 minutes of operating time remaining.

Item 31 The illustration below shows one of the red status indicators.

It's function, when illuminated, is to warn the gunner that the

a. CLU built-in test has failed.
b. CLU built-in test has passed.
c. CLU has lost power.
d. CLU has 30 minutes of operating time remaining.

Item 32 You have encountered a misfire. If your first attempt to refire the missile fails, your next step should be to

a. attempt to re-engage the target.
b. disconnect CLU from the round.
c. obtain a replacement round.
e. turn CLU power to the OFF position.

Continued on next page

Item 33

The _____ position offers the most protection over open terrain, when there are no other covered or concealed positions available.

a. prone-supported
b. sitting/sitting-supported
c. kneeling
d. standing-supported

Item 34

When the ground occupied is in a slight depression or there is cover and/or concealment, the gunner may use this position to his advantage.

a. Kneeling position
b. Prone-supported position
c. Sitting/sitting-supported position
d. Standing-supported position

Item 35

A benefit of the standing-supported position is that the gunner

a. can assume the position quickly and displace quickly.
b. can use the elements of camouflage and concealment to his advantage.
c. has outstanding observation of the battlefield and increased situational awareness.
d. can use the position in conjunction with cover provided by terrain.

Item 36

A benefit of the kneeling position is that the gunner

a. has increased survivability on an open field.
b. can assume the position quickly and displace quickly.
c. can use the position in conjunction with cover provided by terrain.
d. has an increased probability of effectively engaging the target.

Continued on next page

Item 37 The _____ is considered to be the least survivable position.

a. standing-supported
b. kneeling
c. prone-supported
d. sitting/sitting-supported

Item 38 The antiarmor range card

a. helps in planning and controlling fires and in detecting and engaging targets.
b. shows a gunner's position to see where he can find his way to the rear.
c. determines the distance from one position to another.
d. denotes the plan of attack on a defended position.

Item 39 What are the three sections of an antiarmor range card?

a. Marginal information, sector sketch section, data section
b. Firing position, range rings, header information
c. Limits of fire, maximum engagement line, target reference points
d. Platoons position, higher headquarters position, enemy position

Item 40 The information on the antiarmor range card should include

a. firing position location, left and right limits, maximum engagement line, avenues of approach, and target reference points.
b. platoon headquarters location, patrol checkpoints, minimum engagement line, and unit information.
c. location of forward and rear command post, location of crew-served weapons, and call signs.
d. obstacles in company area, limits of advance, objective rally point, and enemy situation.

Continued on next page

Item 41 Dead space is the area

a. where you can engage any enemy in that area.
b. inside the gunners sector where he can neither observe nor place any direct fire.
c. inside the gunners sector where he can observe and place direct fire.
d. where the enemy dead are stored until burial.

Item 42 The Javelin gunner striving to engage an armor threat at a distance of 1,000 to 2,000 meters is a description of

a. security.
b. mutual support.
c. employment in depth.
d. standoff.

Item 43 What fundamental of employment is used if Javelins are employed in sections and by overlapping sectors of fire?

a. Mutual support
b. Security
c. Employment in depth
d. Standoff

Item 44 Skillful integration of infantry, armor, engineer, and indirect fire assets which greatly improve the survivability and lethality of anti-armor units is a description of

a. security.
b. combined arms.
c. cover and concealment.
d. mutual support.

Continued on next page

Item 45 The backblast, from the aft end of the round and projecting outward at a 60-degree angle, extends _____ meters.

a. 25
b. 50
c. 75
d. 100

Item 46 When firing from a confined area

a. the team leader must be present.
b. debris and loose objects are cleared from the room.
c the forward edge of the room cannot be less than 10 meters from the firing position.
d. the window opening cannot exceed 3 square feet.

Item 47 When firing the Javelin from inside enclosures, the opening of doors and windows to allow backblast and overpressure to escape is defined as

a. shielding.
b. securing.
c. clearing.
d. venting.

Item 48 When do you perform preventive maintenance checks and services?

a. Before operation
b. After operation
c. Both before and after operation
d. Only when fired

Continued on next page

Item 49 When do you perform an operational check of the CLU?

a. Before operation
b. After operation
c. Both before and after operation
d. Only when fired

Item 50 The best way for the gunner to destroy the Javelin round is to

a. destroy the seeker head.
b. cut off the propulsion section.
c. launch it towards the enemy.
d. burn it with thermite grenades.

Continued on next page

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
1	b	1-4
2	c	1-5
3	b	1-5
4	a	1-13
5	b	1-22
6	d	1-25
7	a	1-31
8	a	1-31
9	b	1-32
10	c	2-4
11	d	2-4
12	b	2-5
13	c	2-10
14	b	2-10
15	c	2-11
16	d	2-11
17	c	2-11
18	a	3-4
19	b	3-4
20	b	3-18
21	a	3-19
22	d	3-24
23	b	3-24
24	c	3-30
25	c	3-31
26	d	4-4
27	a	4-6
28	b	4-7
29	c	4-7
30	d	4-8
31	a	4-8
32	d	4-16
33	a	5-4

Continued on next page

Answers, continued

Item Number	Answer	Reference
34	c	5-5
35	c	5-9
36	b	5-9
37	a	5-10
38	a	5-14
39	a	5-14
40	a	5-14
41	b	5-19
42	d	5-28
43	a	5-29
44	b	5-30
45	d	6-4
46	b	6-6
47	d	6-7
48	c	6-12
49	c	6-15
50	c	6-21