

**TECHNICAL MANUAL
OPERATOR AND FIELD MAINTENANCE MANUAL**

**FOR
AR-2A Aiming Laser for M4, M16 and AR-15
Rifles and Carbines with A-Frame Front Sight**



- P/N 24417 AR-2A for M4 & AR-15 Carbine with Visible Pointer**
- P/N 24418 AR-2A for M4 & AR-15 Carbine with IR Pointer**

- P/N 24415 AR-2A for M16 & AR-15 Rifle with Visible Pointer**
- P/N 24416 AR-2A for M16 & AR-15 Rifle with IR Pointer**

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SAFETY SUMMARY

DANGER

**VISIBLE OR INVISIBLE LASER RADIATION
AVOID DIRECT EXPOSURE TO THE BEAM**



**VISIBLE LASER POINTER (Class IIIa)
WAVELENGTH: 635nm**

**INFRARED LASER POINTER (Class IIIb)
WAVELENGTH: 835nm**

- DO NOT stare into the laser beam.
- DO NOT look into the laser beam through binoculars or telescopes.
- DO NOT point the laser beam at mirror-like surfaces.
- DO NOT shine the laser beam into other individual's eyes.

Table A-1 Safety Data

WARNING

LASER	SAFETY CLASS/MODE	NOHD w/o¹
Visible Pointer	Class IIIa	75m
Infrared Pointer	Class IIIb	30m

¹ Nominal Ocular Hazard Distance without magnifying optics.

DEFINITION OF THE FOLLOWING ALERTS THROUGHOUT THIS MANUAL:

WARNING – Identifies a clear danger to the person doing that procedure.

CAUTION – Identifies risk of damage to the equipment.

NOTE – Used to highlight essential procedures, conditions, statements, or convey important instructional data to the user.

SAFETY SUMMARY, continued

WARNING

Be sure the weapon is CLEAR and on SAFE before proceeding.

WARNING

RISK OF DETECTION BY ENEMY—To reduce the risk of detection by an enemy using a Night Vision Device (NVD), avoid prolonged activation of the AR-2A infrared laser model.

WARNING

The infrared laser beam is more detectable to an enemy using a NVD when used in smoke, fog and rain. Avoid prolonged activation of the AR-2A infrared laser model in these conditions.

WARNING

DO NOT store the AR-2A with the battery installed.

WARNING

If the Laser Borelight System (LBS) is used to boresight the AR-2A, be sure to remove the LBS from the weapon prior to firing.

WARNING

The AR-2A is activated by depressing the remote cable switch. Remove batteries prior to storage in a rifle, or in any situation where the remote cable switch may be depressed accidentally.

WARNING

DO NOT lay a rifle equipped with the AR-2A on the ground or other hard surface in a way that will rest the weight of the rifle on the pressure pad switch.

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

CAUTION

Use ONLY authorized weapon cleaning supplies on the AR-2A or permanent damage may occur.

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HOW TO USE THIS MANUAL

Usage

You must familiarize yourself with the entire manual before operating the equipment. Read the complete maintenance task before performing maintenance and follow all **WARNINGS, CAUTIONS** and **NOTES**.

Manual Overview

The manual contains sections for Operating and Maintaining the AR-2A.

Appendix A Repair Parts.

**CHAPTER I
GENERAL INFORMATION**

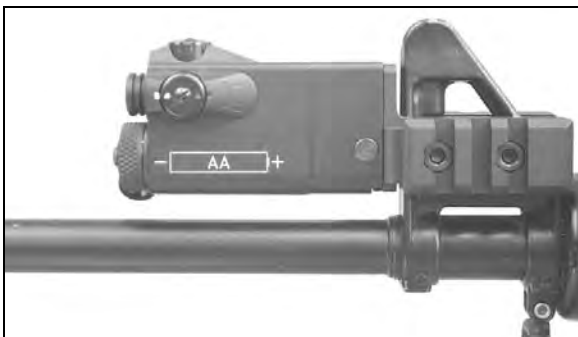


Figure 1-1 AR-2A in Use

GENERAL INFORMATION, continued

1.1 GENERAL INFORMATION

1.1.a Type of Manual:

Operator and Field Maintenance Manual.

1.1.b Model Number and Equipment Name:

AR-2A, AR-2A (IR POINT) AR-2A(VIS POINT)

1.1.c Purpose of Equipment:

For aiming and pointing using the visible aiming laser (VIS POINT) model, or for aiming and directing fire using an infrared laser pointer (IR POINT) model with an NVD.

1.2 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

If AR-2A product or technical manual needs improvement, let us know. Mail your comments to Laser Devices, Inc., 70 Garden Court, Monterey, CA 93940, USA, send a fax to 831-373-0903 or send an Email to Sales@laserdevices.com.

1.3 WARRANTY INFORMATION

This item shall conform to design, manufacturing, and performance requirements and be free from defects in material and workmanship for one (1) year from the date of manufacture. This warranty does not cover battery, exit port covers or pressure pad switch assemblies. Nor does it protect against damage due to loss, misuse or mishandling.

1.4 CROSS REFERENCES

<u>Common Name</u>	<u>Official Name</u>
Allen Wrench.....	Socket Head Screw Key
Battery Compartment.....	Battery Box Cover
Shipping Case.....	Textile Bag
Cotton Swab	Disposable Applicator
Neoprene Jack Plug.....	Plug Assembly
O-Ring.....	Gasket
Pattern Generator	Optical Instrument Reticule
Paddle Switch	Remote Cable Switch
Battery.....	AA
Technical Manual	Operator and Field Maintenance Manual
Tape Fastener Loop.....	Fastener, Loop Tape
Tape Fastener Hook	Fastener, Hook Tape

GENERAL INFORMATION, continued

1.5 LIST OF ABBREVIATIONS

C.....	Celsius (Centigrade)
CCW.....	Counter-clockwise
cm.....	Centimeters
cont'd.....	Continued
CTA.....	Common Table of Allowance
CW.....	Clockwise
F.....	Fahrenheit
in.....	Inches
IR.....	Infrared
LBS.....	Laser Borelight System
m.....	Meters
Max.....	Maximum
Mfr.....	Manufacturer
Min.....	Minimum
MOM.....	Momentary
mrad.....	Milliradians
mW.....	Milliwatts
nm.....	Nanometers
No.....	Number
NOHD.....	Nominal Ocular Hazard Distance
NSN.....	National Stock Number
NVD.....	Night Vision Device
Para.....	Paragraph
POINT.....	Pointer
QTY.....	Quantity
RMA.....	Return Material Authorization
SR.....	Service Representative
TM.....	Technical Manual
VIS.....	Visible

CHAPTER II EQUIPMENT DESCRIPTION

2.1 SYSTEM DESCRIPTION

The AR-2A may be equipped with either a Class IIIa VIS POINT or a Class IIIb IR POINT laser.

The VIS POINT model is for daylight and low light operations. The IR POINT model emits a highly collimated beam of infrared light for precise aiming of the weapon for users equipped with a NVD.

The AR-2A mounts to the A-frame sight of an M4, M16 or AR-15 rifle or carbine. The mounting system offers the advantage of locating the aiming laser away from the heat generated by the barrel of the weapon. In addition, the integrated MIL-SPEC-1913 rail on each side of the mounting bracket provides a MIL-SPEC-1913 rail for purposes of mounting a tactical light.

EQUIPMENT DESCRIPTION, continued

2.1 SYSTEM DESCRIPTION (cont.)

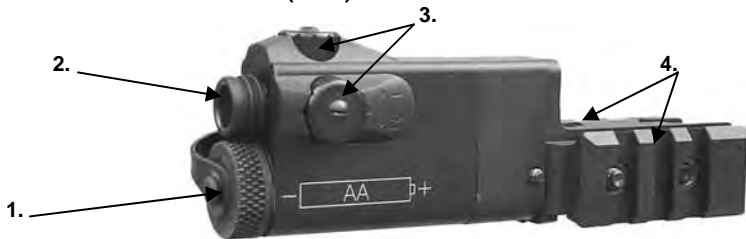


Figure 2-1a AR-2A System Description

Table 2-1a AR-2A System Description

ITEM	DESCRIPTION
1	Battery Cap
2	Laser Exit Port
3	Laser Boresight Adjusters
4	Mounting Bracket with MIL-SPEC-1913 Side Mounting Rails

2.2 GENERAL CHARACTERISTICS

Table 2-2 Weight, Dimensions and Performance

WEIGHT	
AR-2A (w/battery & Mount)	5.6 oz / 159 grams
DIMENSIONS	
Length	4.9 in. / 12.4 cm
Width	.74 in. / 1.9 cm
Height	1.7 in. / 4.3 cm
LASER SPECIFICATION	
Laser Wavelength	
VIS POINT	635 nm (± 5 nm)
IR POINT	840 nm (- 30nm)
Output Power	
VIS POINT	<5 mW
IR POINT	<1 mW
Beam Divergence	
VIS POINT	0.3
IR POINT	0.3
Battery Life	5 hours continuous
IR POINT and IR POINT RANGE (STARLIGHT CONDITIONS)	
VIS POINT	500m
IR POINT with NVD	600m

EQUIPMENT DESCRIPTION, continued

2.3 DESCRIPTION OF MAJOR COMPONENTS

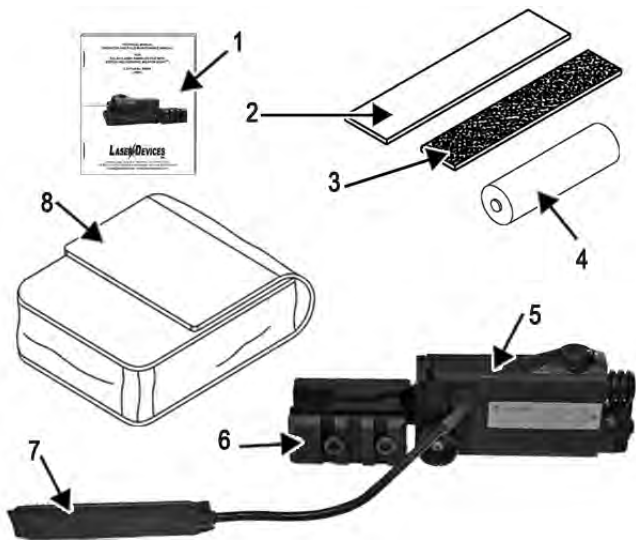


Figure 2-2 AR-2A Major Components

Table 2-3 AR-2A Major Components

ITEM	DESCRIPTION
1	Operator and Field Maintenance Manual
2	Tape Fastener Loop 5/8" (Black)
3	Tape Fastener Hook 1/2" (Black) (attached to remote cable switch)
4	Battery, 1.5-volt AA
5	AR-2A Assembly
6	Mounting Bracket with MIL-SPEC-1913 Side Rails
7	Integrated Remote Cable Pressure Pad Switch
8	Shipping Case

EQUIPMENT DESCRIPTION, continued

2.3 DESCRIPTION OF MAJOR COMPONENTS

2.3.a Operator and Field Maintenance Manual

NOTE

Before operating the AR-2A, you must read the entire Operator and Field Maintenance Manual and follow all WARNINGS, CAUTIONS and NOTES.

The Operator and Field Maintenance Manual provides safety information, equipment information, operating instructions, mounting procedures, zeroing procedures and operator and unit maintenance procedures.

2.3.b Tape Fastener Loop

The Tape Fastener Loop is provided to secure the Remote Cable Switch to the weapon in a position convenient to the soldier.

2.3.c Tape Fastener Hook

The Tape Fastener Hook is pre-attached by the manufacturer to the pressure pad switch.

2.3.d Battery

One 1.5-volt AA battery. The use of high-quality battery is recommended.

2.3.e AR-2A Assembly

The AR-2A device offers a VIS POINT model or an IR POINT model. The device is used for aiming, signaling, command and control.

2.3.f Mounting Bracket with MIL-SPEC-1913 Side Rails

Attaches the laser to A-frame sight on M4, M16 and AR-15 style rifles and carbines. Integrated MIL-SPEC-1913 side rails provide additional mounting location for tactical light or other accessories.

2.3.g Integrated Remote Cable Switch

The Remote Cable Switch allows the user to activate the AR-2A in a momentary (MOM) fashion by depressing the pressure pad. When the Remote Cable Switch is released, the unit turns off. The pressure pad provides a tactile (silent) click that indicates when the switch has been activated. The Remote Cable Switch has a hook strip fastener attached to the switch.

2.3.h Shipping Case

The AR-2A is provided with a Shipping Case that is used to protect the unit during transport or storage.

CHAPTER III
SECTION I OPERATING INSTRUCTIONS

3.1 GENERAL



VISIBLE OR INVISIBLE LASER RADIATION
AVOID DIRECT EXPOSURE TO THE BEAM



VISIBLE LASER POINTER (Class IIIa)
WAVELENGTH: 635nm

INFRARED LASER POINTER (Class IIIb)
WAVELENGTH: 835nm

- DO NOT stare into the laser beam.
- DO NOT look into the laser beam through binoculars or telescopes.
- DO NOT point the laser beam at mirror-like surfaces.
- DO NOT shine the laser beam into other individual's eyes.

This section contains a description of the controls and adjustments for the AR-2A.

OPERATING INSTRUCTIONS, continued

3.2 CONTROLS AND INDICATORS

3.2.a Battery Installation

WARNING

DO NOT store the AR-2A with the battery installed.

Unscrew the battery cap in a CCW direction. Remove and properly discard the spent battery. Inspect the battery compartment for dirt, moisture and corrosion. Clean the battery compartment as needed (refer to Paragraph 4.3.c). Inspect the O-ring seal on the battery cap to make sure it is free of sand and dirt particles and that it has not been damaged (see Paragraph 4.3.d). Install the battery as indicated by the marking on the AR-2A housing. Reinstall the battery cap and hand tighten in a CW direction.

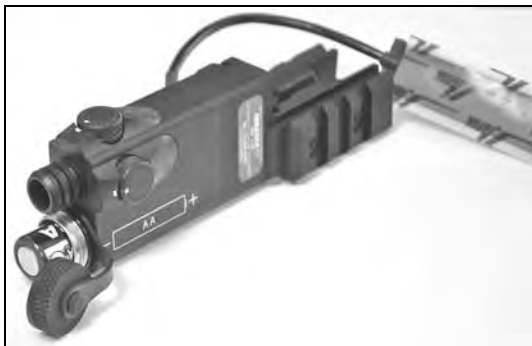


Figure 3-1 AR-2A Battery Installation

3.2.b Laser Remote Cable Switch

WARNING

The AR-2A is activated by depressing the remote cable switch. Remove batteries prior to storage in a rifle, or in any situation where the remote cable switch may be depressed accidentally.

DO NOT lay a rifle equipped with the AR-2A on the ground or other hard surface in a way that will rest the weight of the rifle on the pressure pad switch.

The Remote Cable Switch is integrated into the right side of the laser housing as shown in Figure 3-2. Pressing the Remote Cable Switch activates the AR-2A laser. When the remote cable switch is released, the laser turns off.

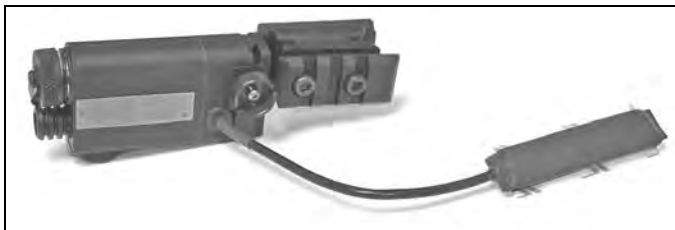


Figure 3-2 Remote Cable Switch Location

OPERATING INSTRUCTIONS, continued

3.2 CONTROLS AND INDICATORS

3.2.c Laser Boresight Adjusters

CAUTION

DO NOT over adjust the adjusters by forcing them beyond their end of travel.

NOTE

The adjuster may offer increased resistance as you turn it in a CW direction from the factory neutral position. When the adjuster is harder to turn it has reached the maximum CW travel.

The AR-2A laser is equipped with boresight adjusters to adjust the laser for elevation and azimuth. Each adjuster click will move the laser point by approximately 5 millimeters at 25 meters.

The laser housing is engraved with arrows and the letters U (UP), D, (Down), L (Left) and R (Right). The arrows and letters show the direction that the shot group will move when the adjuster is turned.



Figure 3-3 Laser Boresight Adjusters

Table 3-2 Adjuster Rotation and Shot Group Movement for the Laser POINT

ZEROING THE POINT	Adjuster Movement	Shot Group Movement
Top Adjuster Elevation (marked U/D)	CW CCW	Up Down
Side Adjuster Azimuth (marked L/R)	CW CCW	Left Right

CHAPTER III
SECTION II MOUNTING PROCEDURES

3.3 MOUNTING PROCEDURES



Be sure the weapon is CLEAR and on SAFE before proceeding.

NOTE

Do not remove the laser from the mounting bracket.

When properly installed, the AR-2A laser assembly should be parallel with the barrel.

Failure to tighten the screws in the order established herein may result in the laser being misaligned.

Place the left side mount into the A-frame front site. Install the right of the mount and align the screw holes.

Insert the hex screws. First firmly tighten the #1 hex screw, then tighten the #2 hex screw (see below).

Finger tighten the thumb screw (located on the right side of the laser housing) so that the laser will not move.

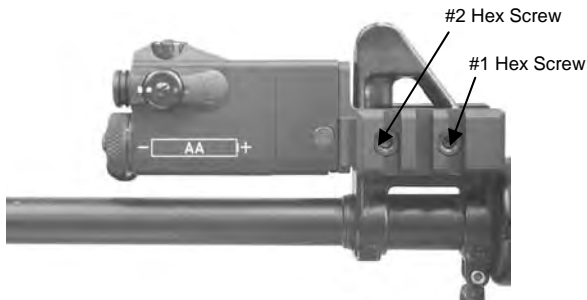


Figure 3-4 AR-2A Mount Assembly

If the laser has been removed from the dovetail mount, reinstall the laser by sliding it down onto the dovetail mount. Make sure that the laser is aligned with the bottom of the dovetail mount (see A below)

Finger tighten the thumb screw (located on the right side of the laser housing) so that the laser will not move.

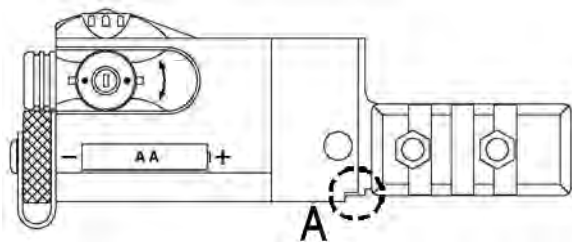


Figure 3-5 Reinstalling the AR-2A Laser to the Dovetail Mount

CHAPTER III

SECTION III BORESIGHTING/ZEROING PROCEDURES

This section provides boresighting/zeroing instructions for the AR-2A using the MBS-1WE Laser Borelight System (LBS), LDI Part No. 3160635 or on a 25 meter range.

3.4 PLACING A POSITIVE LOAD ON THE ADJUSTERS

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

NOTE

ALWAYS Boresight/Zero the AR-2A starting with the Adjuster marked U/D.

When moving the adjusters, make sure that the adjustment mechanism has engaged a detent and has not stopped between detents. Failure to properly engage a detent may impact accuracy as the laser may move when the weapon is fired.

Positive Load is required anytime an adjustment to LASER AIM POINT is made in a CCW direction. A Positive Load is not required when making a CW adjustment.

Positive Load is the controlled compression of the spring within the adjuster mechanism to insure the highest level of accuracy is maintained after the weapon is Boresighted or Zeroed.

When adjusting in a CCW direction, apply a positive load to the adjuster by turning an additional $\frac{1}{4}$ turn (8 clicks) CCW, then make the final boresight/zero adjustment by turning the adjuster CW. For example, to move the adjuster one (1) click CCW, turn the adjuster CCW 8 clicks and then turn it CW 7 clicks to the new position.

3.5 FACTORY NEUTRAL PRESET

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

NOTE

ALWAYS Boresight/Zero the AR-2A starting with the Adjuster marked U/D.

When moving the adjusters, make sure that the adjustment mechanism had engaged a detent and has not stopped between detents. Failure to properly engage a detent may adversely impact accuracy as the laser may move to the next detent when the weapon is fired.

The adjuster may offer some resistance as you turn it in a CW direction from the factory neutral position. When the adjuster is harder to turn it has reached the maximum CW travel.

The AR-2A is preset at the factory to a neutral position. In the neutral position the laser beam is parallel to the bore of the weapon. The laser aim point can be returned to the factory alignment (neutral position) using the following procedure:

1. Turn the adjuster marked U/D CW to the natural stop.
2. Turn it CCW one and one-quarter (1¼) turn.
3. Turn it CW until the white dot on the adjuster aligns with the white dot on the adjuster guard.
4. Turn the adjuster marked L/R CW to the natural stop.
5. Turn it CCW one and one-quarter (1¼) turn.
6. Turn it CW until the white dot on the adjuster aligns with the white dot on the adjuster guard.

BORESIGHTING/ZEROING PROCEDURES, Continued

3.5 FACTORY NEUTRAL PRESET

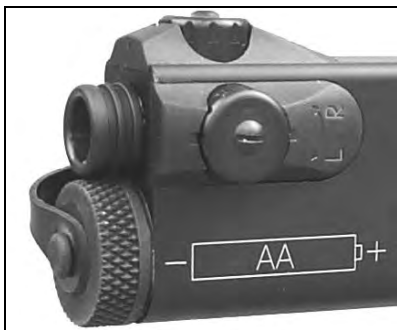


Figure 3-11 Neutral Preset

Table 3-3 Factory Neutral Preset

Adjuster	Instruction
Adjuster Guard marked U/D	First, turn CW to end of travel. DO NOT force past mechanical stop. Next, turn CCW 1¼ turn. Finally, turn CW to align the dot on the adjuster with the dot on the adjuster guard.
Adjuster Guard marked L/R	

3.6 MOUNTING CONFIGURATIONS AND WEAPON OFFSETS

The AR-2A laser AIM POINT is horizontally aligned with the weapon bore and offset 2.6" above the weapon bore.

3.6.a Boresight Using the Laser Borelight System (LBS)

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

NOTE

Always move the adjusters slowly, on click at a time, to prevent the adjuster from jumping detents.

In extreme cold temperatures the adjusters may offer more resistance.

The adjuster may offer some resistance as you turn it in a CW direction from the factory neutral position. When the adjuster is harder to turn it has reach the maximum CW travel.

A positive load is required on the adjustment mechanism when boresighting/zeroing the AR-2A for purposes of retaining the set alignment See paragraph 3.4.

BORESIGHTING/ZEROING PROCEDURES, Continue

3.6 MOUNTING CONFIGURATIONS AND WEAPON OFFSETS (Cont.)

3.6.a Boresight Using the Laser Borelight System (LBS) (Cont.)

NOTE

The adjuster knobs on the AR-2A may vary slightly in the force required to turn the adjusters. This is normal and does not indicate a failure condition.

At the maximum CW or CCW travel the AR-2A lasers may not move a full 1cm per click, or may jump squares on the target. If this happens the AR-2A should be returned to its factory neutral preset as described in Section 3.5. Confirm that the mount was properly tightened so that the laser is parallel with the barrel.

This procedure is used to boresight the AR-2A on its weapon using the MBS-1WE Laser Borelight System (LBS), LDI Part No. 3160635.

Refer to the LBS Operator's Manual for instructions on creating boresight targets. Each adjuster click moves the strike point 4mm on the 10 meter boresight offset target.

- 1.** Create the 10 Meter Boresight Target for the AR-2A weapon combination for which boresighting is required.
- 2.** Position the target at 10 Meters oriented in a level, vertical position. Proper positioning of the target is critical for accurate boresighting results.
- 3.** Stabilize the weapon so it does not move and insert the LBS Mandrel Interface assembly into the muzzle of the weapon.
- 4.** Rotate the LBS Mode Selector Switch to the LO position and verify that the LBS is properly aligned. Refer to LBS Operator's Manual for zeroing procedures.

- 5.** Adjust the target as required to place the laser dot on the target location marked “Laser Borelight.”
- 6.** Activate the aiming laser to be boresighted by press the remote momentary switch. Adjust the Aiming Laser azimuth and elevation adjusters until the point is centered on the corresponding offset location on the boresighting target.
- 7.** A positive load is required on the adjustment mechanism when boresighting/zeroing the AR-2A for purposes of retaining the set alignment. See Paragraph 3.4.
- 8.** The AR-2A weapon combination is now boresighted. Release the remote momentary switch of the AR-2A and remove the Borelight Mandrel Interface assembly from the weapon.
- 9.** Test fire the rifle equipped with the AR-2A to confirm proper boresight alignment.

BORESIGHTING/ZEROING PROCEDURES, Continue

3.6 MOUNTING CONFIGURATIONS AND WEAPON OFFSETS (Cont.)

3.6.b Zeroing the AR-2A Laser on a 25 Meter Range

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

NOTE

Always move the adjusters slowly, one click at a time, to prevent the adjuster from jumping detents.

In extreme cold temperatures the adjusters may offer more resistance.

The adjuster may offer some resistance as you turn it in a CW direction from the factory neutral position. When the adjuster is harder to turn it has reached the maximum CW travel.

When the adjuster is at its maximum CW or CCW point of travel and is turned in the opposite direction the laser point may trace a small loop on the target. This is normal and does not indicate a failure condition.

A positive load is required on the adjustment mechanism when boresighting/zeroing the AR-2A for purposes of retaining the set alignment See paragraph 3.4.

The adjuster knobs on the AR-2A may vary slightly in the force required to turn the adjusters. This is normal and does not indicate a failure condition.

NOTE

At the **maximum** CW or CCW travel the AR-2A laser may not move a full 1cm per click, or may jump squares on the target. If this happens the AR-2A should be returned to its factory neutral preset as described in Section 3.5. Confirm that the mount was property tightened so that the laser is parallel with the barrel.

This procedure is used to zero the AR-2A to its weapon. Refer to Tables 3-3 and 3-4 for adjuster rotation and direction of shot group movement. Each adjuster click moves the strike point by 1 cm on the M16A2/M16A4 25 meter zeroing target.

1. On a 25 meter zeroing target M16A2/M16A4, mark the designated strike point and designated 4 cm/6 cm strike zone based on the weapon you are using. See Table 3-6 and Figure 3-13.
2. Mount the target on an “E” silhouette or other suitable surface at 25 meters.
3. Set the AR-2A adjusters to their factory neutral position as described in Paragraph 3.5.
4. Activate the LASER AIM POINT pressing the remote momentary switch. Aim center of the target.
5. Fire a 3-round shot group and note the center of the shot group relative to the designated strike zone.
6. Adjust the aiming beam adjusters to move the center of the shot group to the designated strike zone.
7. Repeat steps 5 and 6 until the shot group falls within the strike zone.
8. When firing the M16 or M4 series, when 5 out of 6 consecutive rounds are in the designated 6cm strike zone you are zeroed.

BORESIGHTING/ZEROING PROCEDURES, Continue

3.6 MOUNTING CONFIGURATIONS AND WEAPON OFFSETS (Cont.)

3.6.b Zeroing the AR-2A Laser on a 25 Meter Range (Cont.)

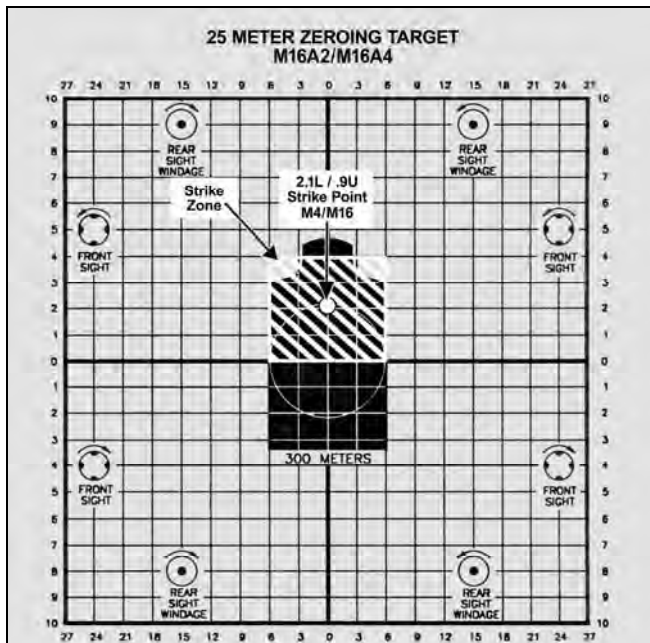


Figure 3-13 25m Zeroing Target

CHAPTER IV
SECTION I OPERATOR PREVENTIVE MAINTENANCE CHECKS

4.1 General



VISIBLE OR INVISIBLE LASER RADIATION
AVOID DIRECT EXPOSURE TO THE BEAM



VISIBLE LASER POINTER (Class IIIa)
WAVELENGTH: 635nm

INFRARED LASER POINTER (Class IIIb)
WAVELENGTH: 835nm

- DO NOT stare into the laser beam.
- DO NOT look into the laser beam through binoculars or telescopes.
- DO NOT point the laser beam at mirror-like surfaces.
- DO NOT shine the laser beam into other individual's eyes.

Table 4-1 Preventive Maintenance Checks, has been provided so that you can keep your equipment in good operating condition.

OPERATOR PREVENTIVE MAINTENANCE CHECKS, continued

NOTE

Perform functional tests in the order listed in Table 4-1.
Operating Procedures are detailed in Chapter III, Section I.

4.1.a Warnings and Cautions

Always observe the WARNINGS and CAUTIONS appearing in the tables.

4.1.b Explanation of Table Entries

NOTE

Perform functional tests in the order listed in Table 4-1.
Operating Procedures are detailed in Chapter III, Section I.

1. Item Number column. Numbers in this column are for reference. Item numbers also appear in the order that you must perform the checks and services listed.

2. Interval column. This column tells you when you must do the procedure in the procedure column. BEFORE (B) PROCEDURES must be done before you operate or use the equipment. DURING (D) PROCEDURES must be done during the time you are operating or using the equipment. AFTER (A) PROCEDURES must be done immediately after you have operated or used the equipment.

3. Location Item to Check/Service column. This column provides the location and the item to be checked or serviced. The item location is underlined.

4. Procedure Column. This column gives the procedure you must do to check the item.

5. Not Fully Mission Capable If column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission.

Be sure to observe all special information and notes that appear in your table.

OPERATOR PREVENTIVE MAINTENANCE CHECKS, continued

Table 4-1 Preventive Maintenance Checks

Item No.	Interval	Location Item to Check/Service	Procedure	Not Fully Mission Capable If:
1	B/D/A	AR-2A Exterior	-Check housing for separation between the front and the rear section of the housing, missing screws and missing switch knobs, azimuth and elevation adjuster covers.	A gap appears between the front and the rear section of the housing, missing switch knobs, or adjuster covers
WARNING: DO NOT STARE DIRECTLY INTO THE VISIBLE OR INFRARED LIGHT BEAM				
2	B/A	Exit Port Lens	-Check for cracked, dirty or broken lenses	If cracked or missing lens
3	B/A	Adjusters	-Check for broken, missing or stripped Adjusters.	Adjusters broken, missing or stripped or laser fails to move.
4	B/A	Battery Compartment	-Check for corrosion, presence of O-ring, spring, battery cap lanyard. Inspect threads for dirt or damage.	Corroded or broken contacts.
5	B/A	Battery Compartment O-ring	-Check O-ring for cuts, cracks. -Lubricate as needed.	
6	B/A	Install 1.5-volt AA Battery	-Install a known good battery	
7	B	Boresight Alignment	-Confirm that the aiming laser can be boresighted or zeroed on the weapon.	If laser cannot be zeroed
8	B/A	Remote Cable Switch	-Activate the laser.	Fails to activate laser
9	A	Textile Bag	Check for torn fabric.	
10	A	Battery	Remove battery	

CHAPTER IV

SECTION II OPERATOR TROUBLESHOOTING

4.2 GENERAL

The purpose of troubleshooting is to identify the most frequent equipment malfunctions, probable causes and corrective actions required. Table 4-2 lists the common malfunctions which may be found during the operation or maintenance of the AR-2A and accessory equipment. Perform the tests, inspections and corrective actions in the order listed. This manual cannot list all malfunctions that may occur; or all tests, inspections and corrective actions.

OPERATOR TROUBLESHOOTING, continued

Table 4-2 Operator Troubleshooting

Malfunction	Test / Inspection	Corrective Action	Ref. Para.
1. Laser beam fail to come on or stay on	a. Verify battery installation	-Tighten battery cap -Install new battery	3.2.a
	b. Inspect battery cap for damage or corrosion	-Notify Unit Maintenance	-
	c. Inspect battery contact spring in the battery compartment for damage or corrosion.	-Notify Unit Maintenance	-
	d. Possible internal failure	-Notify Unit Maintenance	-
2. Laser beams have become weak (not as bright)	a. Verify that the Exit Port Lens is not obscured by mud / dirt	-Clean Exit Port Lenses	4.3.b
	b. Verify proper battery installation	-Tighten battery cap -Install new battery	3.2.a
	c. Verify Exit Port Lens is not scratched or pitted	-Notify Unit Maintenance	-
3. Laser beam does not move	Verify adjuster function	-Clean as required -Notify Unit Maintenance	4.3.a
4. Remote Cable Switch inoperable	a. Verify function of Remote Cable Switch	-Notify Unit Maintenance -Return for repair	-

Table 4-2 Operator Troubleshooting (cont.)

Malfunction	Test / Inspection	Corrective Action	Ref. Para.
5. POINT beam cannot be zeroed to weapon	a. Verify Mount is properly positioned/secured to front sight	-Properly position and secure. Confirm that the AR-2A is parallel with the barrel. Remount on weapon tightening the mounting screws in the correct order if necessary	3.3
	b. If laser is loose: -Tighten hex screws on mounting bracket -Tighten laser thumb screw	-Notify Unit Maintenance	-
	c. Inspect mount base for corrosion or dirt	-Clean as required - Notify Unit Maintenance	4.3.a
	d. Verify AR-2A is properly secured to dovetail mount	-Notify Unit Maintenance	-
	e. Verify Dovetail Mount is not damaged	-Notify Unit Maintenance	-
	f. Check for beam movement	-Notify Unit Maintenance	-

CHAPTER IV

SECTION III OPERATOR MAINTENANCE

4.3 GENERAL



DO NOT store the AR-2A with the battery installed.



The use of gun cleaning agents that contain perchloroethylene or methylene chloride may permanently damage the AR-2A system.

The AR-2A is a rugged, compact laser device that is designed to operate in severe military environments. The exterior housing is made of aircraft grade aluminum and the outer components are made of chemically resistant materials that will not be harmed by chemicals normally encountered during military operations. Operator maintenance is limited to the inspection and cleaning of the AR-2A external surfaces, replacement of the battery before each mission and removal of the battery after each mission.

4.3.a External Cleaning

Clean the exterior of the AR-2A by flushing with water and wiping with a soft cloth. Such cleaning should be done whenever the AR-2A becomes dirty or after exposure to salt water.

4.3.b Exit Port Lens Cleaning

To clean the laser Exit Port Lenses, gently wipe using a soft cloth or disposable applicator dampened with water.

4.3.c Battery Compartment

Before each use, inspect the battery and battery compartment for dirt, dust or corrosion. If dirty, clean using a soft cloth or disposable applicator.

4.3.d Battery Cap

Prior to water operations or emersion, inspect the O-ring seals in the battery cap to make sure they are free of sand or dirt particles. If the O-ring becomes cut, nicked or dried out, it should be replaced. If the battery cap is bent or scratched in the O-ring seating area, it should be replaced.

4.3.e Battery Removal and Replacement

Refer to Chapter III, Section I, Paragraph 3.2.a for Battery Installation procedures. No special tools or equipment are required to replace the battery.

4.3.f Battery Compartment O-ring

NOTE

Never use a sharp or metal object to remove O-rings as they damage the O-ring or the O-ring groove contact surface.

Before each use, inspect the battery compartment O-ring for nicks, cuts or damage. Lubricate the O-ring as needed using silicone grease as follows:

- 1.** Gently Remove the O-ring. Be careful not to stretch the O-ring.
- 2.** Check the O-ring for hair, sand, lint or other debris and wipe clean as necessary. Be careful not to stretch the O-ring. If the O-ring is cut or cracked it must be removed and replaced with a new O-ring.
- 3.** If possible, wash your hands prior to greasing the O-ring. Lubricate the O-ring using your fingertips and a small amount of grease until there is a thin film covering the complete surface. **DO NOT** stretch the O-ring.

OPERATOR MAINTENANCE, continued

4.3.f Battery Compartment O-ring (cont.)

- 4.** Before replacing the O-ring, visually inspect the groove in the battery compartment cap for hair, sand, lint, or other debris and wipe clean as necessary.
- 5.** Install the O-ring in the groove at the base of the battery compartment cap making sure that it is seated uniformly, with no twists or loose areas. Be careful not to stretch the O-ring.

CHAPTER V

SECTION I UNIT TROUBLESHOOTING

5.1 UNIT TROUBLESHOOTING

The purpose of troubleshooting is to identify the most frequent equipment malfunctions, probable causes and corrective actions required. Table 5-1 lists the most common malfunctions that may occur with the AR-2A. Perform the tests, inspections and corrective actions in the order they are listed. This manual cannot list all malfunctions that may occur; or all tests, inspections and corrective actions.

5.1 UNIT TROUBLESHOOTING, continued

Table 5-1 Unit Troubleshooting

Malfunction	Test / Inspection	Corrective Action	Ref. Para.
1. Laser beam fail to come on or stay on	a. Inspect battery compartment for corrosion	-Clean battery compartment	5.2.c
	b. Inspect battery cap contact for corrosion	-Clean battery cap contact	5.2.d
	c. Inspect battery cap and housing threads for contamination.	-Clean battery cap and housing threads	5.2.d
	d. Possible internal failure	-Replace battery cap -Return for repair	5.7
2. Laser beam have become weak (not as bright)	a. Verify that the Exit Port Lens is not obscured by mud/dirt	-Clean Exit Port Lenses	5.2.b
	b. Verify proper battery installation	-Tighten battery cap -Install new battery	3.2.a
	c. Verify Exit Port Lens is not scratched or pitted	-Replace battery cap -Return for repair	5.7
3. Low Battery Indicator Light remains on when new battery is installed	a. Inspect battery compartment for corrosion	-Clean battery compartment contacts	5.2.c
	b. Inspect Battery Cap contact for corrosion	-Clean battery cap contact	5.2.d
	c. Inspect battery cap and housing threads for contamination	-Clean battery cap and housing threads -Replace battery cap -Return for repair	5.2.e
4. Laser beams do not move	Verify adjuster function	-Clean as required -Return for repair	5.2.a 5.7
5. Remote Cable Switch inoperable	a. Possible remote cable failure	- Return for repair	5.2.g 5.7
6. Laser cannot be aligned, moves on the rail	Inspect weapon front sight. Reinstall AR-2A mounting bracket.	-Refer to appropriate weapons TM	

CHAPTER V

SECTION II UNIT MAINTENANCE

5.2 GENERAL

WARNING

**INVISIBLE LASER RADIATION
AVOID DIRECT EXPOSURE TO THE BEAM**



LASER WAVELENGTH: 810 - 840nm

- DO NOT stare into the infrared laser beam.
- DO NOT look into the infrared laser beam through binoculars or telescopes.
- DO NOT point the infrared laser beam at mirror-like surfaces.
- DO NOT shine the infrared laser beam into other individual's eyes.

CAUTION

The use of gun cleaning agents that contain perchloroethylene or methylene chloride may permanently damage the AR-2A system.

Unit Maintenance Procedures consist of operational tests, inspections, troubleshooting and the replacement of a limited number of parts (paragraphs 5.2.a through 5.2.f). All authorized repair parts can be installed at the unit level. An AR-2A failing to meet the tests and inspections should be replaced.

UNIT MAINTENANCE, continued

5.2.a External Cleaning

Clean the exterior of the AR-2A by flushing with water and wiping with a clean, soft cloth. Cleaning should be done whenever the AR-2A becomes dirty or after exposure to salt water.

5.2.b Exit Port Lens Cleaning

Use a lens cleaning kit to clean the VIS POINT, I/R POINT and I/R ILLUM lenses.

5.2.c Battery Compartment

Before each use, inspect the battery and battery compartment for dirt, dust or corrosion. Clean the battery compartment by wiping with a soft, clean cloth. If a damp cloth is used to clean the battery compartment make sure to allow the compartment to air dry completely before reinstalling the battery cap.

5.2.d Battery Cap

Prior to water operations or emersion, inspect the O-ring and the battery cap to make sure they are free of dirt, moisture or corrosion. Thoroughly clean the O-rings, battery cap and back of the battery compartment that seals against the O-ring using Isopropyl Alcohol. After cleaning, or if the O-ring becomes dried out, lubricate the O-ring using silicone grease. If the O-ring becomes cut or nicked, it should be replaced.

5.2.e Battery Compartment and Housing Threads

Inspect threading on the battery cap and housing for contamination. If the threading appears to be oily or dirty, clean with Isopropyl Alcohol using a soft, clean cloth.

5.2.f Battery Removal and Replacement

Refer to Chapter III, Paragraph 3.2.a for Battery Installation procedures. No special tools or equipment are required to replace the battery.

5.3 TESTS AND INSPECTIONS

See Operator Preventive Maintenance Checks and Services Table 4-1.

5.4 REMOVAL AND REPLACEMENT OF PARTS

Unit Maintenance is authorized for the removal and replacement of a limited number of assemblies. All repair parts can be installed at the unit level. Special tools or equipment are not required for maintaining the AR-2A.

5.4.a Battery Removal and Installation

See Chapter III, Paragraph 3.2.a for procedures.

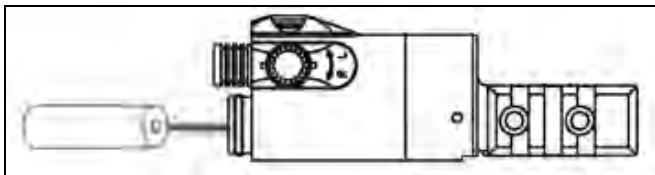


Figure 5-1 Battery Removal and Installation

UNIT MAINTENANCE, continued

5.4.b Remove and Replace Battery Cap

Unscrew battery cap. Stretch the end of the retaining strap over the battery compartment housing threads to remove.

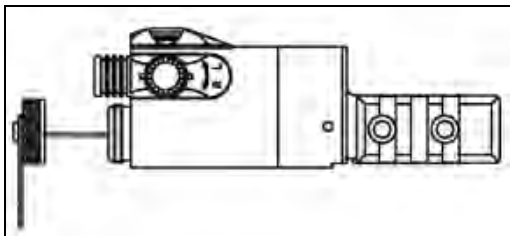


Figure 5-2 Remove and Replace Battery Cap

5.4.c Removal and Replacement of Battery Cap Retaining Strap

To install stretch the end of the retaining strap over the stud located on the battery cap. Stretch the other end of the retaining strap over the battery compartment threads.

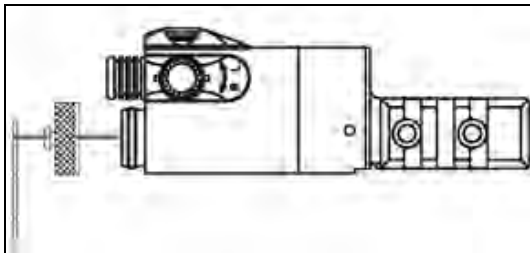


Figure 5-3 Remove and Replace Battery Cap Retaining Strap

UNIT MAINTENANCE, continued

5.4.d Remove and Replace Battery Cap O-ring

NOTE

NEVER use a sharp or metal object to remove O-rings as they may damage the O-ring or the O-ring groove contact surface.

Inspect the O-ring for nicks, cracks, cuts or abrasion. Also check to make sure that it feels soft. If damaged, replace the O-ring.

To remove pull the O-ring out of the groove at the base of the threaded portion of the battery cap and remove. Install the new O-ring by pulling it onto the battery cap so that it fits in the groove located at the base of the threaded portion of the battery cap.

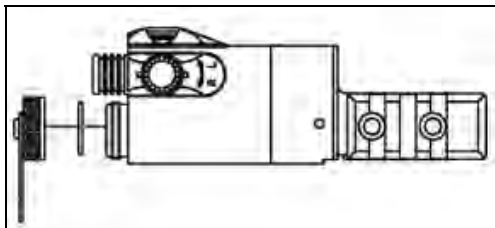


Figure 5-4 Remove and Replace Battery Cap O-ring

CHAPTER V

SECTION III SERVICE/PACKING AND UNPACKING

5.5 Warranty Information

Laser Devices, Inc. will furnish its standard form LIMITED WARRANTY in favor of its customers and the first end users of its products. The terms of the warranty are as follows: All LDI manufactured products (excluding flashlight bulbs, borelight inserts, battery and other items that are ordinarily consumed during the normal use of the product) have a ONE (1) year limited warranty on parts and workmanship from the date of purchase. The warranty is void if the serial number or the manufacturer's labels affixed to the product have been removed or if the product has been misused, modified, neglected or has been disassembled prior to return to the manufacturer. LDI will repair or replace defective products at its discretion. To the maximum extent permitted by law, LDI's election to repair or replace the device shall constitute the purchaser's sole remedy in the event of a defect. LDI disclaims all other warranties, expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose. Moreover, to the maximum extent permitted by law, LDI on behalf of itself, its suppliers, distributors, dealers and agents disclaims any and all other liability for damages, including without limitation, actual damages, consequential damages and indirect damages, for personal injury, wrongful death, pecuniary loss and any other physical or financial loss arising out of the use or the inability to use any LDI product even if Laser Devices, Inc. has been advised of the possibility of such damages. This limited warranty gives the purchaser specific legal rights which may vary by state and jurisdiction.

5.6 NON-Warranty Information

Non-warranty repairs are subject to an evaluation fee. AR-2A units that are not covered by the warranty will be tested and evaluated for failure. Customer permission and payment terms will be obtained prior to performing any repairs.

SERVICE/PACKING AND UNPACKING, continued

5.7 Return Instructions

5.7.a For service, repair or replacement email: Service@laserdevices.com, call 800-235-2162 (outside California) or 831-373-0701 (within California) and ask to speak with Service Representative (SR).

5.7.b To assist the SR with determining if the item is repairable, please provide the following information:

- 1.** Serial Number of the defective item
- 2.** Thorough description of the malfunction, defect or damage
- 3.** An explanation of how the malfunction, defect or damage occurred, if known.

If the SR determines that the item is under warranty or should be returned for repair, a Return Material Authorization (RMA) number will be provided.

5.7.c When returning the AR-2A for service or repair, the following procedures should be followed to prevent any additional damage:

- 1.** Be sure that the AR-2A is free of all contaminants such as dirt or any other foreign material.
- 2.** Remove the battery.
- 3.** Place the Exit Port Cover over the lens.
- 4.** Place the AR-2A in the Shipping Case or Carrying Case if available. If the Shipping Case is not available, individually package each AR-2A unit being returned in a suitable container.

5.7.d Place the AR-2A and a copy of the test report or detailed description of the failure in a suitable packing/shipping container. Mark the package with the RMA number. Ship the fastest, traceable, prepaid means to Laser Devices, Inc., 70 Garden Court, Monterey, California 93940.

APPENDIX A REPAIR PARTS

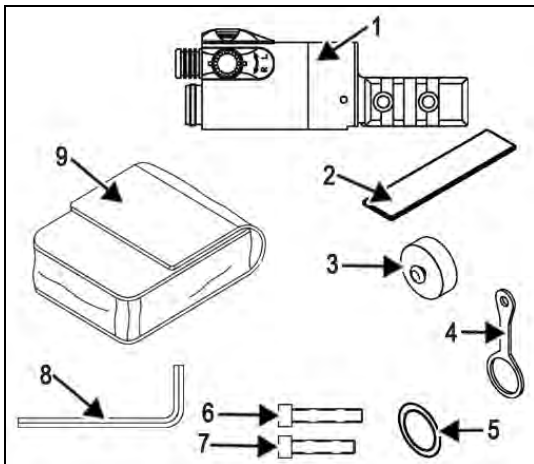


Figure A-1 Repair Parts

REPAIR PARTS, continued

Table A-1 Repair Parts List (AR-2A)

Item No.	Part No.	Description	QTY
1	A04066	ASSY, AR-2A	1
2	ITP-044	Loop Tape	1
3	2842	Battery Cap	1
4	3074	Battery Cap Strap	1
5	C02734	O-Ring	1
6	C01146	Hex Screw (10/32 socket head cap 1" full thread, black)	1
7	C01144	Hex Screw (10/32 x 7/8" socket head cap full thread, black)	1
8	C01007	Allen Wrench Short Arm (5/32")	1
9	A3186949	Bag, Textile	1



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