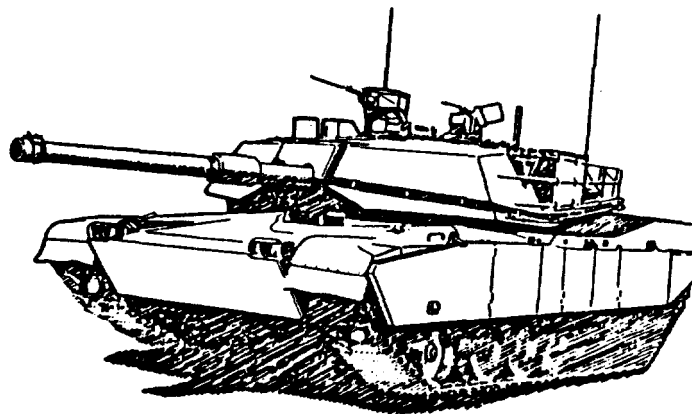


OPERATOR'S MANUAL
FOR
MULTIPLE INTEGRATED LASER
ENGAGEMENT SYSTEM
(MILES)
SIMULATOR SYSTEM, FIRING, LASER: M82
NSN 1265-01-137-7697
FOR
M1/M1A1 ABRAMS TANK



DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

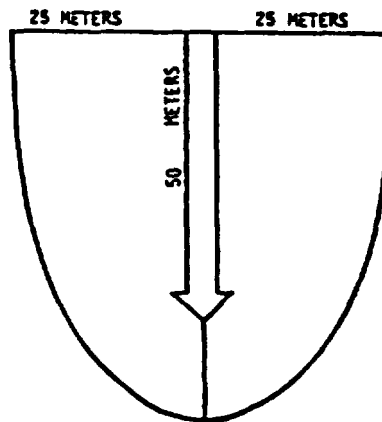
JULY 1988

WARNING

TANKERS, WEAR YOUR EARPLUGS

Do not load MILES-equipped weapons with live or the wrong blank ammunition. **IMPROPER AMMUNITION** may cause **FATAL INJURIES** to personnel. Refer to the M240 and M2 Machine Gun Operator's Manuals (TM 9-1005-313-10 and TM 9-1005-213-10) for information on the use of blank ammunition.

**HOFFMAN DEVICE
DIRECTION OF FIRE**



Stay **25 METERS** from the sides and **50 METERS** from the front of the Hoffman Device muzzle. The **MUZZLE BLAST** can damage your ears and **FLYING DEBRIS** can injure you.

Although the laser light emitted by MILES equipment transmitters is considered eye safe by the Bureau of Radiological Health, suitable precautions must be taken to avoid possible damage to the eye from overexposure to this radiated energy. Precautionary measures include the following:

- **AVOID VIEWING LASER SOURCE at CLOSE RANGE** (less than 12 meters). Increasing the distance from the eye to the laser source greatly reduces the risks of overexposure.
 - **AVOID VIEWING LASER SOURCE** directly along the **OPTICAL AXIS** of radiated beam.
 - **ESPECIALLY AVOID VIEWING LASER SOURCE** directly along the optical axis of the beam through stabilized optics such as **BINOCULARS, TELESCOPES, OR PERISCOPES** at ranges of less than 110 METERS.
-

Tape mounting primer is highly flammable. Do not spray near heat, sparks, or open flame. No smoking. Use only in well-ventilated areas.

For Information on FIRST AID, see FM 21-1 1.

TECHNICAL MANUAL
No. 9-1265-373-10-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 15 JULY 1988

OPERATOR'S MANUAL
FOR
MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM
(MILES)
SIMULATOR SYSTEM, FIRING, LASER: M82
NSN 1265-01-137-7897
FOR
M1/M1A1 ABRAMS TANK

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander U.S. Army Simulation, Training, and Instrumentation Command (STRICOM), ATTN: AMSTI-LSM, 12350 Research Parkway, Orlando, FL 32826-3276. A reply will be furnished to you.

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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* Supersedes TM 9-1265-373-10-1 dated 15 December 1983

HOW TO USE THIS MANUAL

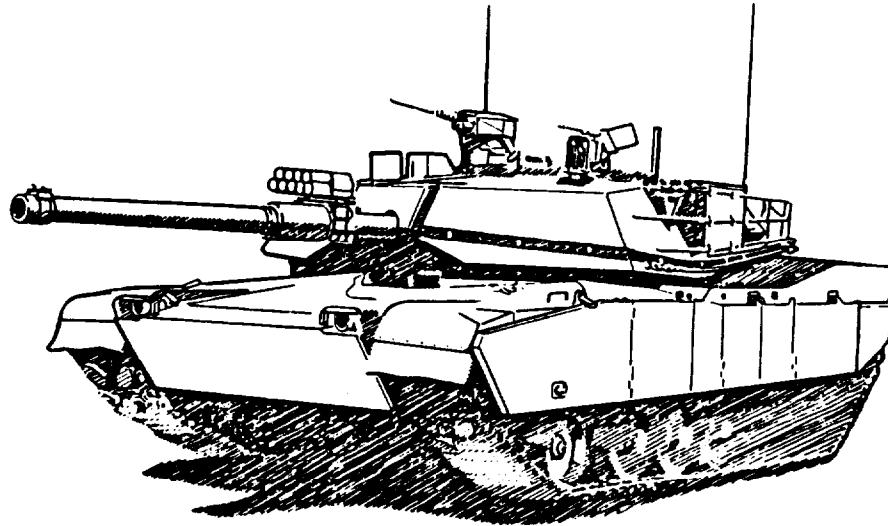
The first part of this manual (TM 9-1255-373-10-1) briefly explains the purpose of the equipment and how it is used. This is followed by step-by-step guidance for every task needed to install, test, align, operate and remove the MILES M1 equipment. A special index precedes each set of tasks. These can be used as checklists to ensure that all tasks have been completed.

NOTE

Unless otherwise specified, procedures in this technical manual apply to both the M1 and the M1A1 tanks (even though only the M1 Tank is mentioned).

CHAPTER 1 INTRODUCTION

SECTION I. GENERAL INFORMATION



SCOPE

Type of Manual. This manual shows you how to install, operate and maintain MILES simulator system equipment for the M1 Abrams Tank. Step-by-step instructions are given for all procedures necessary to use the system.

This manual covers only authorized operator maintenance. Any maintenance problems not covered should be referred to organizational maintenance personnel.

Skills Needed to Use this Manual

To use this manual you should be able to:

1. Aim and fire all M1 or M1A1 Tank weapons (see TM 9-2350-255-10 or TM 9-2350-264-10).
2. Install M240 and M2 machine guns (see TM 9-1005-313-10 and TM 9-1005-213-10).
3. Install blank-fire adapters on the M240 and M2 machine guns.
4. Install Hoffman MGT/WESS firing device. Know how to interface with M1 trigger cable assembly (see TM Simulator, Tank Gun Fire Device 17-61, Hoffman Werke Jan. 79 and revised 1 Apr. 79).
5. Complete DA Form 2404.

If you cannot do these tasks, ask your NC0 or instructor to show you how. When you can do all these tasks, go on with this manual.

Purpose of Equipment. MILES equipment for the M1 Abrams Tank consists of three battery-operated laser transmitters and a detector system. It permits realistic combat training without the hazards of using live ammunition.

Limitation on Equipment. MILES-equipped weapons have the same range and operational capabilities as the normal weapons, but a **dirty laser transmitter lens** may reduce the effective range of the transmitters.

Maintenance Forms and Records. Department of the Army forms and procedures used for equipment maintenance will be those described by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

Reporting Equipment improvement Recommendations (EIRS). If your MILES equipment for the M1tank needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail to us at Commander, U.S. Army Armament Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. We'll send you a reply.

Hand Receipt Manual. This manual has a companion document with a TM number followed by " - HR" (which stands for Hand Receipt). The TM 9-1265-373-10-1-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e., COEI, BII, and AAL) you must account for. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with procedures in Chapter 3, AR 310-2:

Commander
The U.S. Army Adjutant General Publications Center
2800 Eastern Boulevard
Baltimore, MD 21220

REFERENCE INFORMATION

This section includes the nomenclature cross reference list, list of abbreviations, and explanations of terms (glossary) used in this manual.

A. NOMENCLATURE CROSS REFERENCE LIST

<u>Common Name</u>	<u>Official Nomenclature</u>
Control Console (Loader's Control Assembly - LCA)	Console, Simulator System: For M1 Tank
Controller Gun	Controller's Gun, Simulator System, Laser
CVKI	Indicator Simulator System, Laser: Combat Vehicle Kill/Hit/Miss
Detector Belt Segments	Detector Belt Assembly, Segment No. 3 and Segment No. 6
Dry Fire Plug	Plug Assembly, Dry Fire
Helmet Harness	Detector Assembly, Simulator System, Laser: Man Worn
Hoffman Device	Main Tank Gun Weapons Effects Signature Simulator
M2 Machine Gun Transmitter	Transmitter Assembly, Simulator System, Laser: For M2 Machine Gun, M1 Tank
M240 Machine Gun Transmitter	Transmitter Assembly, Simulator System, Laser: For M240 Machine Gun
Torso Harness	Detector Assembly, Simulator System, Laser: Man Worn
105 mm/Coax MG Transmitter For (Main Gun Transmitter)	Transmitter Assembly, Simulator System, Laser: 105 mm/Coax Machine Gun
120 mm/Coax MG Transmitter For (Main Gun Transmitter)	Transmitter Assembly, Simulator System, Laser: 120 mm/Coax Machine Gun

B. LIST OF ABBREVIATIONS

CVKI	Combat Vehicle Kill Indicator
LCA	Loader's Control Assembly
MILES	Multiple Integrated Laser Engagement System
MWLD	Man Worn Laser Detector
NCOIC	Non-Commissioned Officer In Charge
TC	Tank Commander

C. GLOSSARY

Common Name

Control Console (Loader's Control Assembly - LCA)	MILES device used in vehicles to decode laser beam signals and fire main gun/coax machine gun transmitter.
Controller	Umpire or referee in a MILES training exercise.
Controller Gun	Device used to test MILES detector systems. Also used to disqualify soldiers or vehicles from an exercise.
Controller Key	Green key used by controller to reset MILES transmitters.
Combat Vehicle Kill Indicator	MILES device attached to armored vehicles to provide external flashing light. Indicates that vehicle is under opposing fire (NEAR MISS), has been "HIT" or "KILLED".
Fastener Tape	Hook and pile tape. Used to hold vehicle detector belts and other MILES equipment in place.
Helmet Harness	Part of the laser detector assembly worn on a combat helmet.
Hit	Simulated contact with opposing fire insufficient to disable vehicle or cause a fatality.
Kill	Simulated contact with opposing fire sufficient to disable vehicle or cause a fatality.

C. GLOSSARY (Cont.)

Laser Beam	Harmless, invisible beam of light which simulates weapon fire in MILES.
Laser Detector Assembly	Device that senses the laser beam directed at it.
Laser Transmitter	Device that sends the laser beam.
Man Worn Laser Detector	Helmet and torso assembly worn by personnel which senses a laser beam directed at it.
Near Miss	Simulated closeness to contact with opposing fire.
Orange Weapon Key	Used to turn on M2 machine gun transmitter. Silences intercom when inserted in control console. Also used to "SELF KILL" vehicle.
Simulator	Training device which takes the place of real equipment and which has many of its characteristics.
Torso Harness	Part of the laser detector assembly worn on the upper body.
Yellow Weapon Key	Carried by vehicle personnel wearing MWLDs. When continuous alarm sounds, it is put in the MWLD key receptacle to silence alarm.

SECTION II. EQUIPMENT DESCRIPTION

EQUIPMENT PURPOSE, CAPABILITIES, AND FEATURES

PURPOSE OF MILES SIMULATOR SYSTEM, LASER: M1 TANK

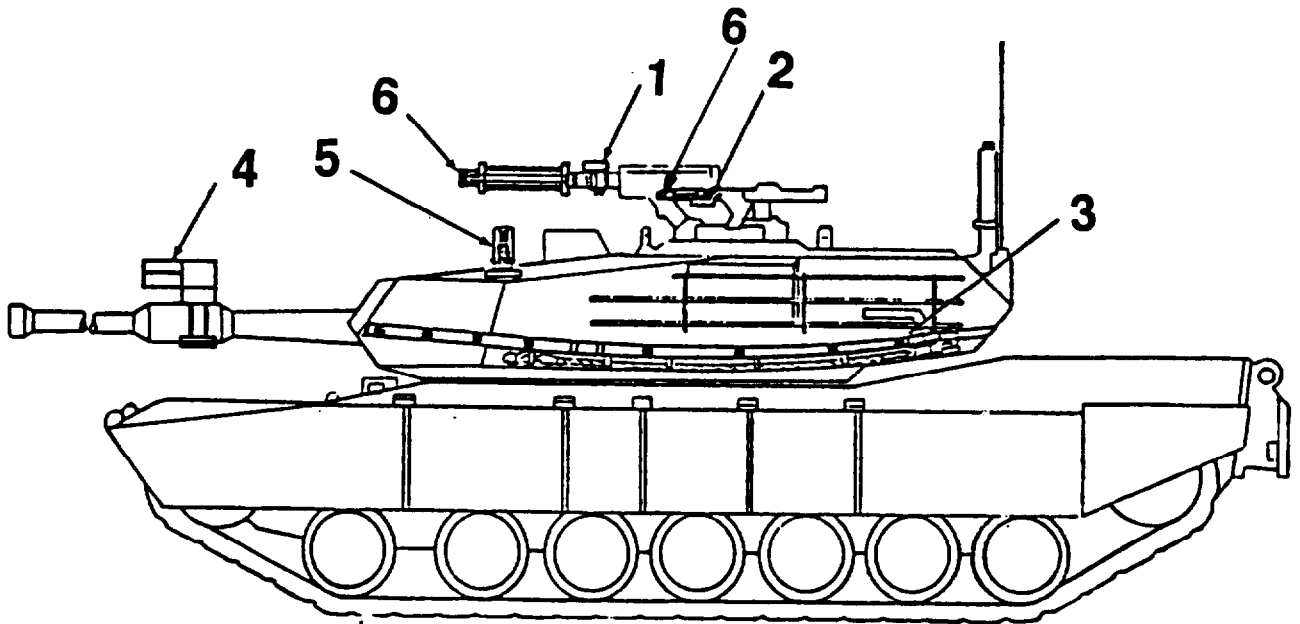
The MILES Simulator System, Laser: M1 Tank, permits the vehicle and crew to take part in realistic combat training exercises. Actual firing conditions of all vehicle weapons are simulated using laser beams. Blank ammunition and a Hoffman device add to the system's realism.

Laser detectors mounted on the M1 tank and worn by crew members sense enemy fire. MILES system electronics determines the accuracy and simulated damage of enemy fire. The system also detects the type of weapon directing enemy fire against the M1 vehicle.

FEATURES AND CAPABILITIES

- Easily installed and removed.
- Simulates firing capability of all M1 weapons.
 1. 105 mm or 120 mm main gun/coax M240 machine gun
 2. Tank commander's M2 machine gun
 3. Loader's M240 machine gun
- Blank fire and main gun Hoffman device add realism.
- Normal firing procedures used for all weapons.
- Detects all opposing fire.
 1. Attacking weapon accuracy
 - a. "NEAR MISS"
 - b. "HIT"
 - c. "KILL"
 2. Attacking weapon identification
- Uses eye safe battery-powered laser transmitters.
- Operates in temperatures from - 35°C (- 26F) to 62°C (144°F).
- Compatible with all other MILES training devices.
- High visibility CVKI strobe light signals vehicle "NEAR MISS," "HIT" or "KILL".

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



M2 Transmitter (1). Simulates firing effects of Tank Commander's M2 machine gun by transmitting a special coded laser signal. Mounts on cooling jacket of M2 machine gun.

M240 Transmitter (2). Simulates firing effects of Loader's M240 machine gun by transmitting a special coded laser signal. Attaches to barrel of M240 machine gun.

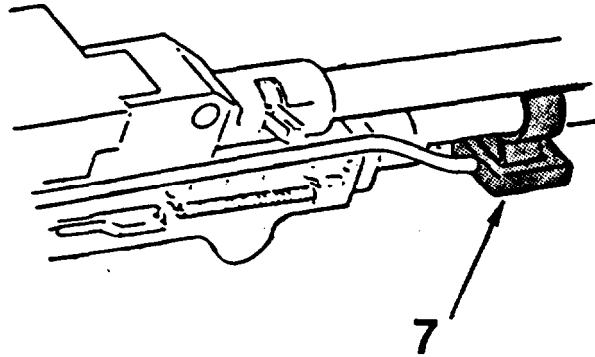
DetectionBeltSystem Receives laser pulses from MILES-equipped opposing weapons. Generates, amplifies and routes electrical signals to the control console for determining whether signal was a "NEAR MISS," "HIT" or "KILL". Mounts on sides, front and rear of M1 turret.

Hoffman Device Simulator (4). Simulates firing signature of main gun. Mounts on main gun cannon tube.

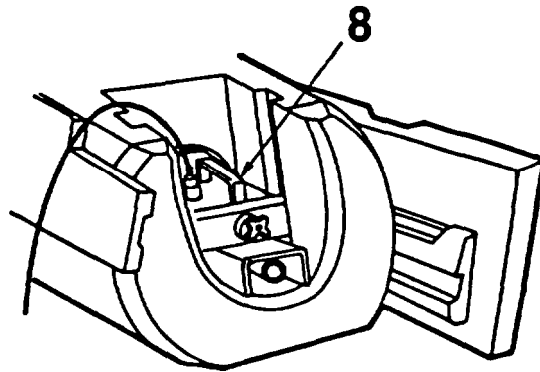
Combat Vehicle Kill indicator (5). Flashes strobe light for a "KILL", "HIT" or "NEAR MISS" indication. Mounts at left front lifting eye station.

Blank Firing Attachments (6). Permit using blank ammunition in M2 and M240 machine guns.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

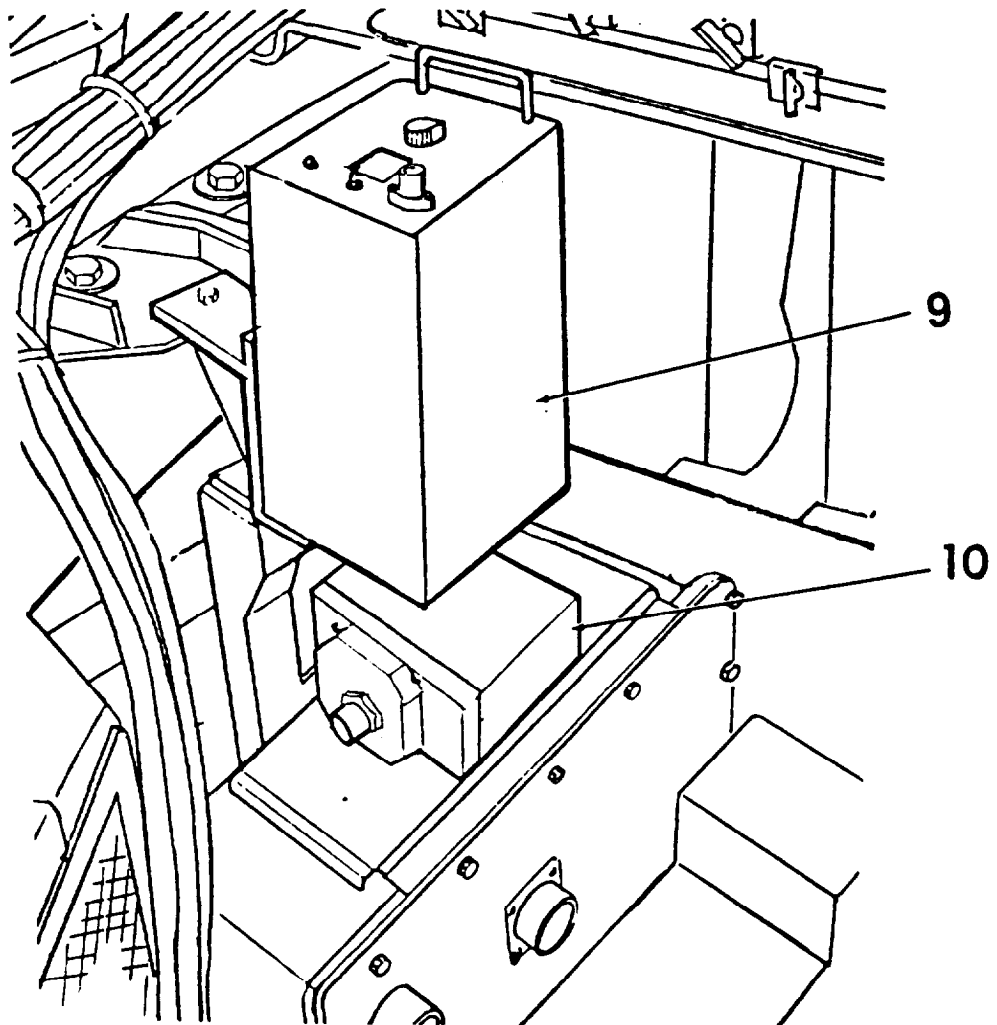


Coax Machine Gun Microphone (7). Actuates coax machine gun transmitter. Attaches to lower machine gun barrel.



Main Gun/Coax Machine Gun Transmitter (8). Simulates firing effects of the 105 or 120 mm main gun and coaxial M240 machine gun by transmitting a coded laser signal. Fits into main gun breech.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)



Control Console (Loader Control Assembly - LCA) (9). Receives detected laser pulse signals from detector assemblies. Decodes these signals, and actuates appropriate audio and visual alarms. Provides electrical signals to fire main gun/coax machine gun transmitter. Contains a key receptacle for initializing system, silencing intercom alarm and resetting system. Mounts on left side of turret on tank support plate.

Battery Box (10). Contains two 6-volt batteries for operating main gun/coax machine gun laser transmitter, control console and detector belts.

EQUIPMENT DATA

Table 1-1. MILES M1 Tank Equipment Data

Laser Transmitters	Weight (Pounds)	Dimensions (Inches)	Basic Load (Rounds)	Standard Kill Range (Meters)
M2 Machine Gun	5.50	7.3 x 6.3 x 9.3	1200*	25-800
M240 Machine Gun	5.50	5.25 x 3.0 x 6.3	600*	25-800
105 mm/Coax Machine Gun	6.62	10.7 x 5.5 x 5.5	55/9900*	200-2500/25-800
120 mm/Coax Machine Gun	6.62	10.7 x 5.5 x 5.5	40/900*	200-2500/25-800
*Dry Fire mode				
Detector Assemblies	Weight (Pounds)	Dimensions (Inches)	Number of Detectors	
Belt #3	2.50	160 x 2	8	
Belt #6	2.06	136 x 2	4	
Man Worn Helmet Harness	1.56	11 .0 (dia.) x 3.5	5	
Man Worn Torso harness	2.81	40x7.75 to 18x2	8	
Equipment	Weight (Pounds)	Dimensions (Inches)		
CVKI (without adapter)	11.62	14 x 7.3 (diameter)		
Control Console (LCA) (without adapter)	8.50	8.5 x 5.5 x 5.5		
Battery Box Assembly	1.31	7 X 5 X 4		

SECTION III. TECHNICAL PRINCIPLES OF OPERATION

BASIC PRINCIPLES OF OPERATION

The MILES system uses semiconductor laser beams to simulate actual weapon fire. An eye-safe invisible laser beam is sent out by each weapon's transmitter when it is fired. The laser beam is coded and simulates all of the weapon's capabilities including range, accuracy and destructive capability.

Laser detector systems are used to sense opposing fire. The detector systems register opposing laser beams and determine whether they have scored a near "NEAR MISS", "HIT" or "KILL". The systems activate alarms indicating the presence and damage of opposing fire.

The MILES system of laser beam transmitters and detectors allows safe realistic training exercises with a complete range of weaponry and vehicles.

M1 ABRAMS TANK CONFIGURATION

All weapons on the M1 Abrams Tank are equipped with laser transmitters that are fired using normal weapon operating procedures. The vehicle turret has special detector belts attached that sense opposing fire. A control console mounted inside the tank determines the extent of opposing fire and its effect. A flashing light (CVKI) mounted on the tank's exterior is activated by the control console when opposing fire is detected.

Crew members wear MWLD torso and helmet harnesses. These detect opposing fire directed against the individual crew member. When opposing fire is detected an audio alarm on the torso harness is set off.

MAIN GUN MILES FIRING

The main gun is fired using normal procedures. A Hoffman device is used to add realism to main gun firing. When the trigger is operated, both the Hoffman device and laser transmitter mounted in the gun breech fire together.

You must wait five seconds after firing the main gun before you can fire again. This simulates the time normally required to reload the weapon. The MILES system allows a basic load of 55 rounds for the 105 mm main gun and 40 rounds for the 120 mm main gun.

After firing the main gun, you can check to see how many rounds the MILES system has left. This is done by turning the switch in the control console to main gun, pressing the display button, and reading the displayed number.

M240 COAX MACHINE GUN

The M240 coaxial machine gun is fired using normal procedures. The gun is loaded with blank ammunition. The sound of blank fire is sensed by a microphone which triggers the coax MG transmitter in the main gun breech. The laser transmitter will operate as long as blank ammunition is being fired.

LOADER'S M240 MACHINE GUN

The loader's M240 machine gun is aimed and fired using normal procedures. The gun is loaded with blank ammunition. The sound of blank fire is sensed by the M240 MG transmitter mounted on the machine gun's barrel. The laser transmitter will operate as long as blank ammunition is being fired.

COMMANDER'S M2 MACHINE GUN

The commander's M2 machine gun is aimed and fired using normal procedures. The gun is loaded with blank ammunition. The sound of blank fire is sensed by the M2 MG transmitter mounted on the machine gun's cooling jacket. The laser transmitter will operate as long as blank ammunition is being fired.

DRY-FIRE OPERATION

The laser transmitters on all MILES-equipped weapons can be fired without using blank ammunition or the Hoffman device. Usually, this dry-fire mode is used only to test and boresight the equipment. To operate M240 and M2 machine gun transmitters in dry fire mode a controller key must be used to set the transmitter. A dry fire trigger cable is used to fire those transmitters. A dry fire plug is used for testing the coax machine gun.

VEHICLE DETECTON SYSTEM

Three detector belts containing 20 detectors are mounted on the turret of the M1 tank. Opposing fire is sensed by the detectors. They generate electrical signals which are fed to a decoder in the control console.

The decoder identifies the type of weapon that fired the opposing laser beam. It determines whether the laser shot was accurate enough to cause a "HIT" or whether a "NEAR MISS" occurred. It also determines if the weapon was capable of causing damage to the target (an M16 rifle, for example, cannot disable a tank) and the probability of "KILL" for that weapon. The probability of "KILLING" a target is different for each attacking weapon.

VEHICLE DETECTION SYSTEM (CONT)

If a detector on the M1 is hit by laser fire, one of three things will happen:

1. Two tones will sound in the vehicle intercom and CVKI light mounted on the tank exterior will flash two times. This means a "NEAR MISS" occurred.
2. One to three tones will sound in the intercom and CVKI light will flash one to three times. This means a "HIT" but not a "KILL" occurred.
3. The intercom tone will sound continuously and CVKI light will flash continuously. This means a "KILL" occurred.

The tank crew can determine what type of weapon has fired on them by switching the MILES control console and pushing the display button. A code number will appear on the display indicating the attacking weapon following a "HIT" or "KILL." No code number appears for a "NEAR MISS."

The intercom tone is turned off after a "KILL" by removing the orange key from the M2 machine gun transmitter, inserting it in the control console receptacle and turning it. If the key is removed from the console the intercom tone will begin again. The CVKI light continues to flash until reset by a controller.

MWLD DETECTION SYSTEM

The M1 gunner, loader and tank commander each wear a helmet harness equipped with laser detectors and a torso harness equipped with laser detectors and an audio alarm. The driver does not wear a harness.

If the detectors on a crew member sense opposing MILES-equipped weapon fire, one of two things will happen:

1. The alarm on the harness sounds briefly. This means a "NEAR MISS" occurred. It is a warning to take cover.
2. The alarm sounds continuously. This means the soldier has been "KILLED". He must use a yellow key to turn off the alarm.

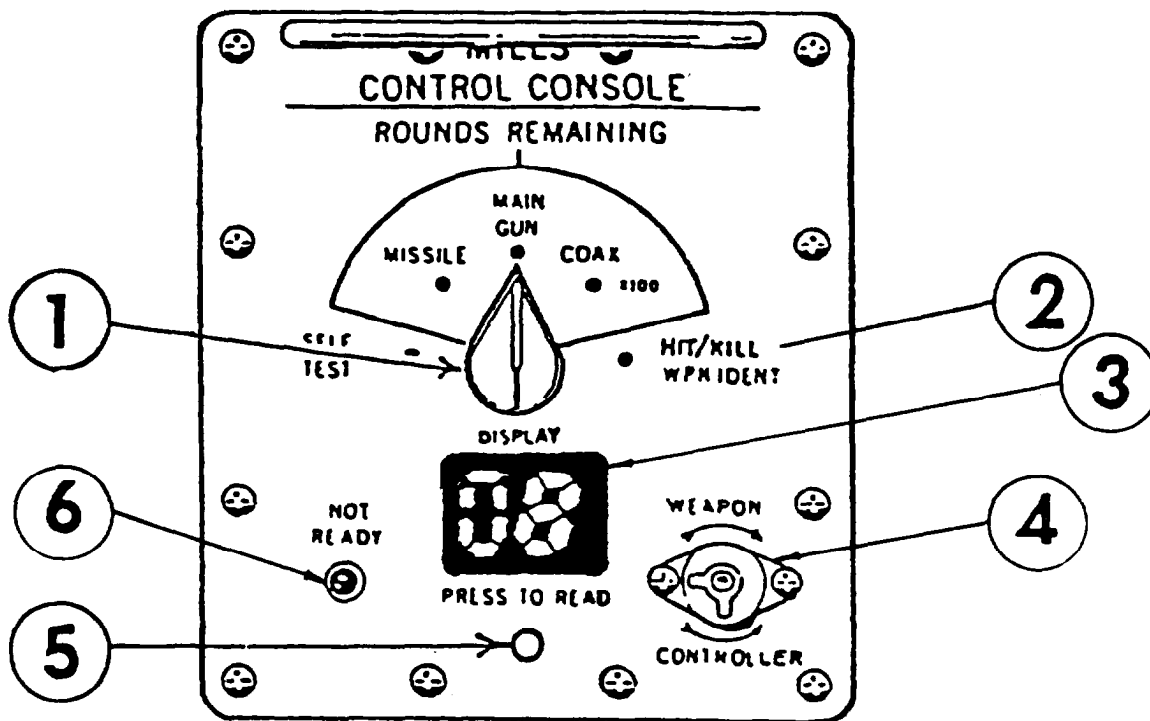
Two spare yellow keys are provided with the system and a third key is used in the M240 machine gun. The first two crew members "KILLED" use the spare yellow keys to turn off their alarms. The third crew member "KILLED" uses the key from the M240 transmitter. Removing the key from the transmitter prevents it from firing.

CHAPTER 2
OPERATING INSTRUCTIONS

SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

MILES/M1 CONTROLS AND INDICATORS. The MILES M1 controls and indicators are only those associated with the control console (Loader's Control Assembly - LCA). All other controls and indicators, such as triggers and arming switches, are those actually associated with the M1 weapons.

CONTROL CONSOLE ASSEMBLY (Loader's Control Assembly - LCA) CONTROLS AND INDICATORS. Controls and indicators for the CCA are listed in table 2-1.



Control Console Assembly

Table 2-1. Control Console Assembly Controls and Indicators

Name	Description	Function	Operating Position	Illustration
SELF TEST	Rotary Switch	Performs self test	Turn to SELF TEST, press PRESS TO READ, display should read 88.	1
HIT/KILL WPN IDENT	Rotary Switch	Identifies weapon firing on you	Turn to HIT/KILL, press PRESS TO READ, display will show a number.	2
DISPLAY	Display	Displays numbers	N/A	3
WEAPON CONTROLLER	Key Receptacle Rotary Switch	Used to reset or silence alarm	Turn weapon key to WEAPON to silence alarm. Turn controller key to CONTROLLER to reset.	4
PRESS TO READ	Pushbutton Switch	Activates display	Press to activate display	5
NOT READY	Light Emitting Diode (LED)	Lights when not ready, "killed," or for 5 seconds after each firing of the main gun	N/A	6

SECTION II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

GENERAL. Preventive maintenance checks and services will ensure that the MILES equipment will always be ready for operation and perform satisfactorily throughout its mission. Preventive maintenance checks consist of performing a systematic inspection to discover defects or malfunctions discovered by the crew during use of the MILES equipment, or as a result of performing maintenance checks and services, will be reported using the proper forms (refer to DA PAM 738-750).

- a. **Before you operate.** Always keep in mind the CAUTIONS and WARNINGS. Perform your “before” (B) PMCS.
- b. **While you operate.** Always keep in mind the CAUTIONS and WARNINGS. Perform your “during” (D) PMCS.
- c. **After you operate.** Be sure to perform your “after” (A) PMCS.
- d. If your equipment fails to operate, ask your Controller to check your equipment.

Report any discrepancies using the proper forms. See TM 38-750.

SPECIAL INSTRUCTIONS FOR INFREQUENTLY USED EQUIPMENT.

If M1 MILES equipment is unused for 60 days, remove from transit case and perform:

Outside Tasks 9, 11, and 13

Inside Tasks 2, 4, 6, 6, and 10

M2 Machine Gun Task 2

M240 Machine Gun Task 2

MWLD Tasks 3 and 4

Postoperational Task 7

Table 2-2. Operator/Crew Preventive Maintenance Checks and Services

B - Before D - During A - After W - Weekly M - Monthly

Item No.	Interval					Item to be Inspected	Procedures - Check for and have repaired or adjusted as necessary	Availability - Equipment Is Not Ready If:
	B	D	A	W	M			
1	•		•			Belt Segments (3)	Wipe all detectors clean. Inspect harnesses for damage that would prevent normal operation.	Physical evidence of broken detectors, wires, or connectors
2	•		•			CVKI	Cracks in plastic lens Receptacle damaged	Cracks are evident Cable connection cannot be made
3	•					Cable Assembly (3)	Worn or bare wires, damaged connectors	Cable connections cannot be made
4	•	•	•			Transmitter Assemblies (3)	Inspect for dirty or damaged lens. Clean lens with soft, dry cloth	Damage would prevent normal operation
5	•					Control Console	Inspect for cracks in display window. Weapon key turns freely in WEAPON KEY receptacle. No evidence of switch damage	Display, receptacle, or switch inoperative
6	•					Battery Box	Inspect for damaged connectors. Connectors and interior battery contacts intact. Battery acid	Damage would prevent normal operation
7	•					Batteries	Inspect for acid leaks	Battery leaks

Section III. OPERATION UNDER USUAL CONDITIONS

GENERAL. Before the MILES equipment can be used, it must be properly installed on the M1 Abrams Tank. To speed up procedures, work is organized into various tasks. While some crew members are performing one set of tasks, others can be performing another set.

Before you begin, read all steps in the task and look at each drawing carefully. To help perform a task, most steps have reference numbers to drawings. Do each step just the way you are instructed and in the order in which it occurs in this manual.

DON'T JUMP AHEAD. DON'T SKIP ANY STEPS

If your MILES equipment has a problem you can't fix using this manual, report it on DA Form 2402. To get a replacement, turn in the faulty equipment and the completed form.

TASK ASSIGNMENT. The tank commander assigns crewmen to tasks. The crewman turns to the appropriate section in this manual and performs the required steps in order. Occasionally, the manual may tell a crewman to wait until he has made sure that another crewman has completed an earlier task. On some tasks, two crewmen may have to work together.

Certain steps must be done with the controller present. A controller key, carried only by the controller, is required to reset the system. The tank commander will determine when to call the controller.

Those tasks involving the controller must be done in this order:

1. MWLD Task 5 (Install Batteries in MWLD Harness)
2. Test Task 1 (Test Operation of MWLD)
3. Test Task 2 (Test MILES System)
4. Alignment Task 2 (Align M2 and M240 machine guns)

The tank commander, loader, and gunner wear man worn laser detector (MWLD) assemblies.

The tank commander should coordinate the tasks, give assistance to any crewman who needs it, and check to make sure everything gets done.

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Preinstallation Task: Obtain Equipment.

Obtain all equipment needed to install and operate MILES M1 Tank system from your NCOIC. Unpack transit case and verify that all equipment is present and not visibly damaged. Check against illustrations in Appendix B, Components of End Item.

Obtain all expendable supplies and materials (Appendix D) and special tools (Appendix E).

Obtain Hoffman device system for main gun (Appendix C) and blank fire adapters and ammunition trays for all vehicle machine guns.

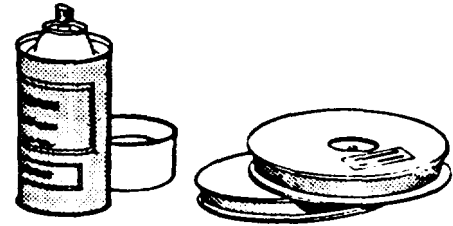
OUTSIDE INSTALLATION TASKS - INDEX

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15. Install Hoffman 10-Pole Connecting Cable	2-27

Perform these tasks in the order given.

Outside Task 1: Clean and Prime Vehicle. Hook and pile fastener tape must be installed on the vehicle as a base for mounting detector belts. Installation kit, including tape primer and fastener tape, is required to complete this task. Vehicle surface must be cleaned before applying tape.

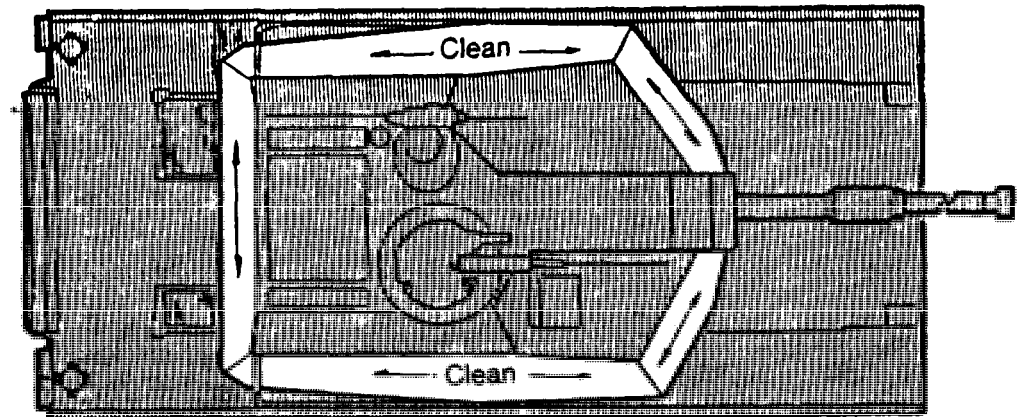
Installation kit (tape primer and fastener - tape)



NOTE

Before spraying tape primer, be sure you know where to mount the tape. Location of tape is illustrated in Outside Task 2 steps.

If vehicle is already equipped with fastener tape, go directly to Outside Task 3: Inspect Fastener Tape.



Clean areas where tape will be installed. Use water, brush, and rags. Tape will not stick to dirty or greasy surfaces.

WARNING

Primer is highly inflammable, Do not spray near heat, sparks, or open flame. Use only in well ventilated area.

Spray a heavy coat of tape primer on cleaned areas. Allow primer to dry 3 to 5 minutes before applying fastener tape.

NOTE

The tape has a protective paper backing which must be removed before installing. For small lengths, the entire backing may be removed before installing tape. For long lengths of tape, however, it is recommended that the backing material be removed while the tape is being installed. This will prevent adhesive on the back of the tape from accidentally sticking to itself.

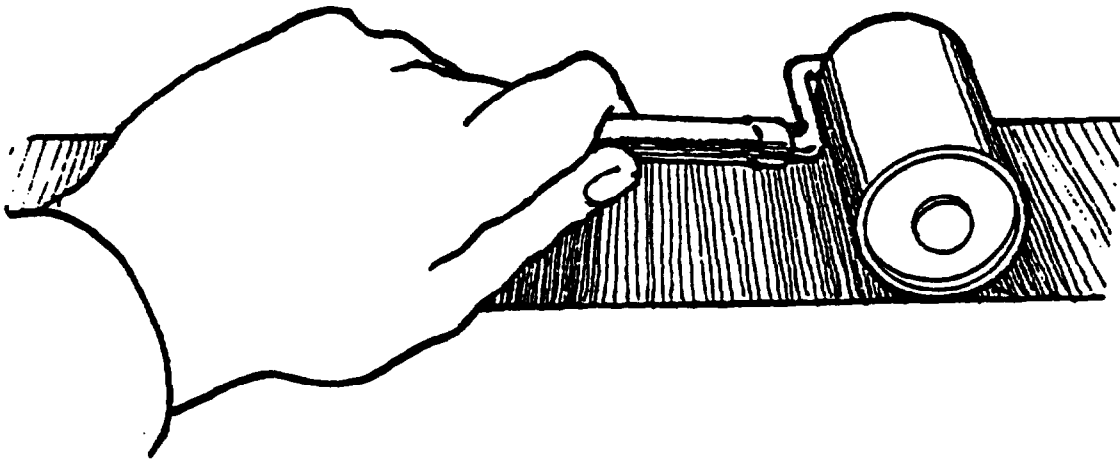
Outside Task 2: Install Fastener Tape.

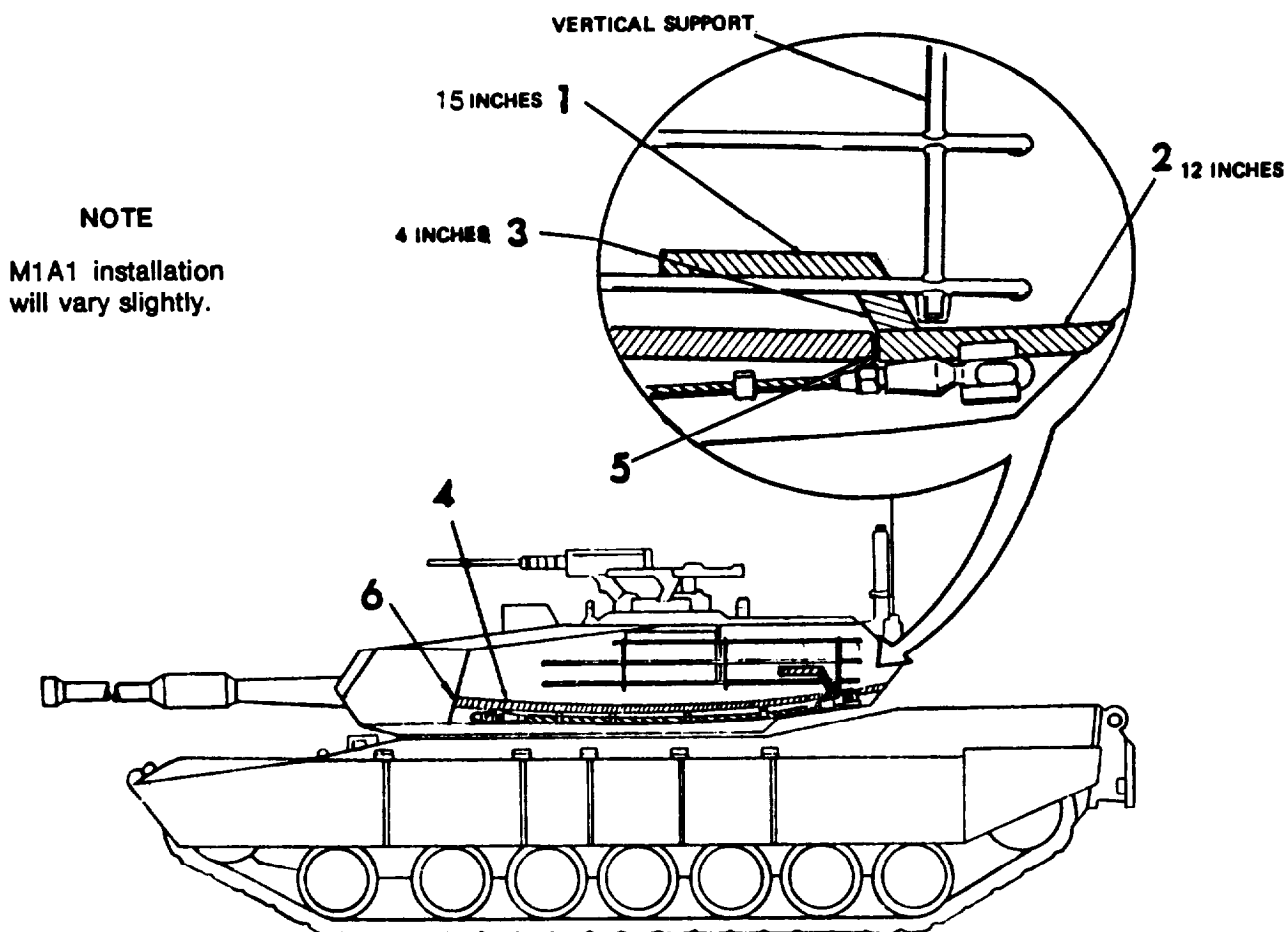
Unroll some fastener tape.

Cut three lengths of fastener tape - one 4 inches long, another 12 inches long, and the third 15 inches long.

NOTE

After tape is placed on primed areas, it must be pressed very hard with roller (Item 1, Appendix E). Use roller as shown.



Outside Task 2: Install Fastener Tape (Cont).

Begin at left rear corner of tank turret. Apply the 15-inch length of fastener tape on side of turret immediately above lower railing (1). Begin at rear vertical railing support and work forward.

Apply the 12-inch length of tape immediately below vertical railing support (2). Begin the tape at left rear corner of turret and work forward.

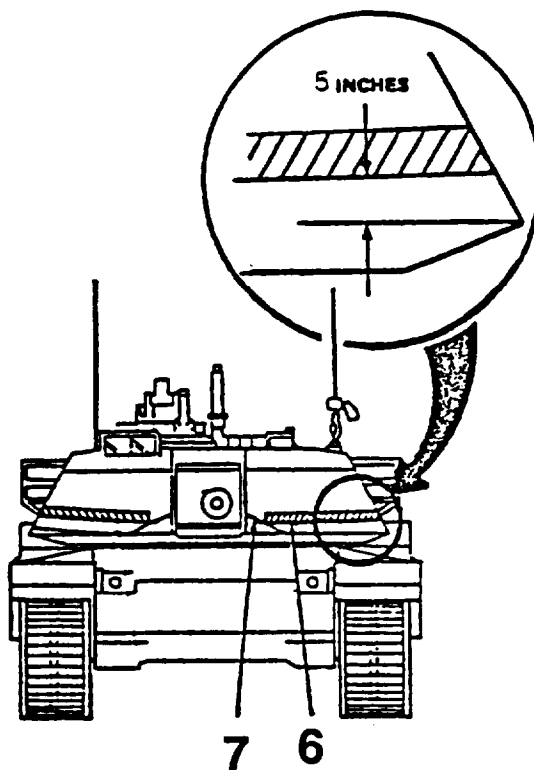
Apply the 4-inch length of tape in a diagonal fashion (3) so that the ends of the tape touch the ends of the first two tapes applied.

Beginning at rear vertical support continue applying additional tape along left side of the turret working toward the front (4). Leave no space; butt the ends of the tape (5). Install tape immediately above the towing cable hangers. End tape at crease line (6) of turret.

Outside Task 2: Install Fastener Tape (Cont).

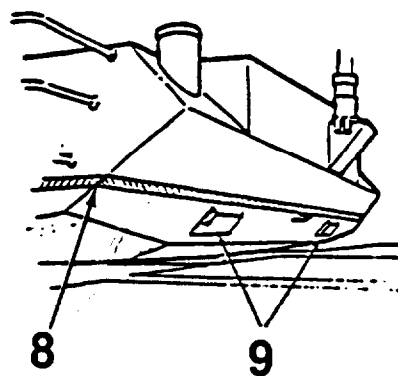
Continue adding tape along the **front approximate/v 5 inches from bottom of turret**

End tape at crease line (7) in turret.



Return to left rear of turret and apply tape in a straight line along the rear beginning at the end of the side tape (8).

Tape should go just above the two blow-out ports (9) on the rear of the turret.



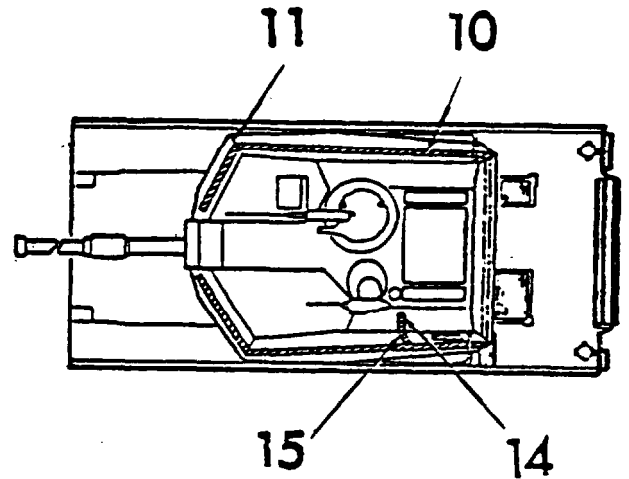
NOTE

Variations may be necessary on tanks with bustles.

Outside Task 2: Install Fastener Tape (Cont)

Continue applying tape along the right side of turret immediately above the towing cable (10).

End tape at right front turret crease line (11).



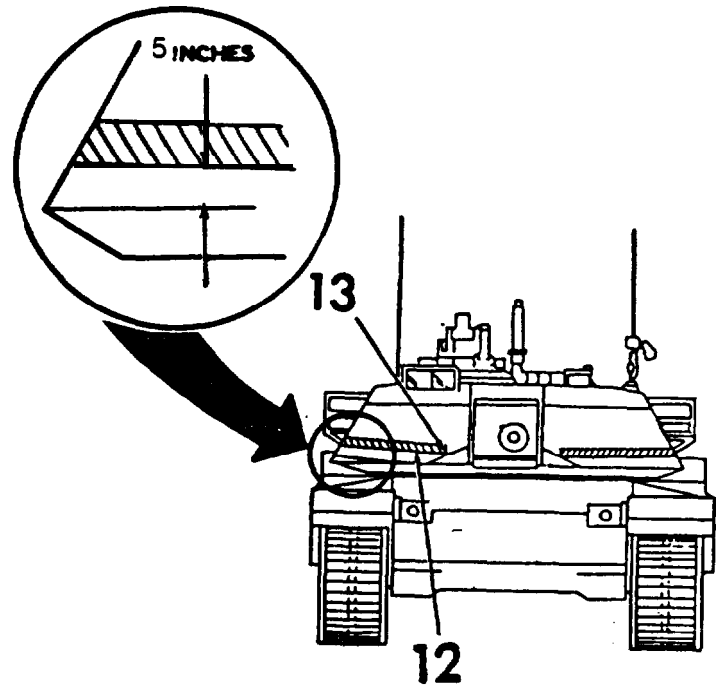
Continue adding tape along the front approximately 5 inches from bottom of turret (12).

End tape at crease line (13) in turret.

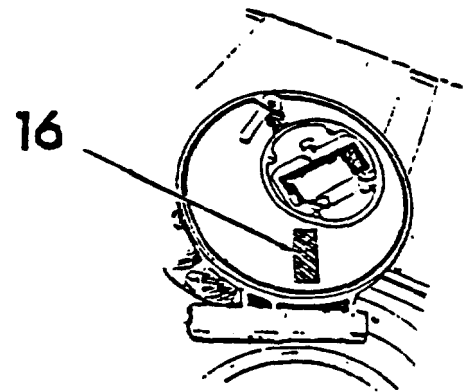
Cut two 12-inch strips of tape, and one 6-inch strip.

Apply one 12-inch strip on top of turret behind loader's hatch (14) as shown.

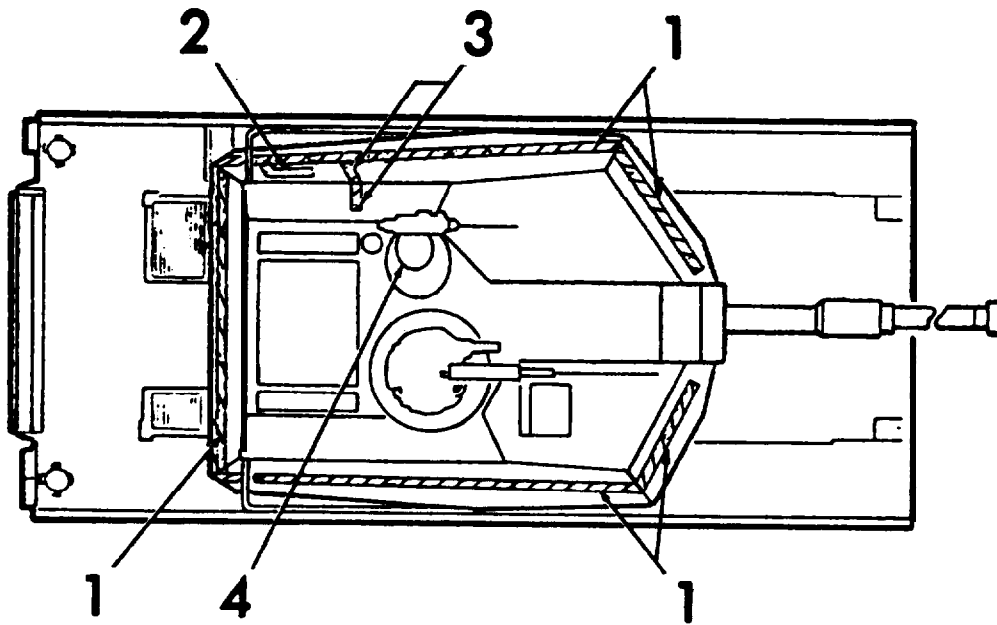
Apply the second 12-inch strip down the side of the turret (15) as shown.



Apply the 6-inch strip on the inside of the loader's hatch (16).



Outside Task 3: Inspect Fastener Tape.



NOTE

If any fastener tape is missing from turret, mount tape on places it belongs. Use instructions given for Outside Tasks 1 and 2.

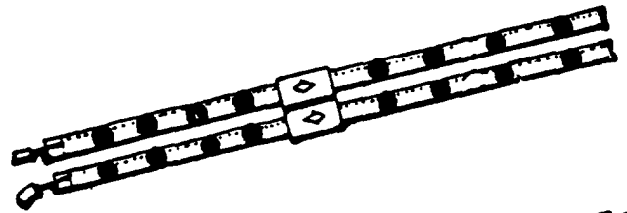
- Check that fastener tape is mounted on all sides of the turret in the places shown (1).
- Make sure that three strips of tape are attached to the left rear corner of the turret (2).
- Check that two strips of fastener tape are attached to the top and side of turret (3).
- Make sure a strip of tape is attached to the inside of loader's hatch (4).

Outside Task 4: Obtain Equipment. . Completion of Outside Tasks requires equipment listed and illustrated below. Locate and set aside this equipment.

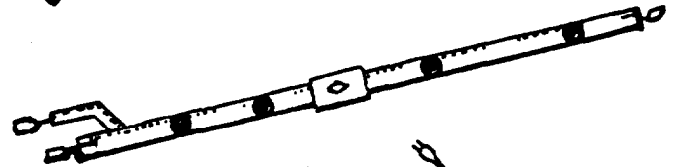
9 MOUNTING BLOCKS



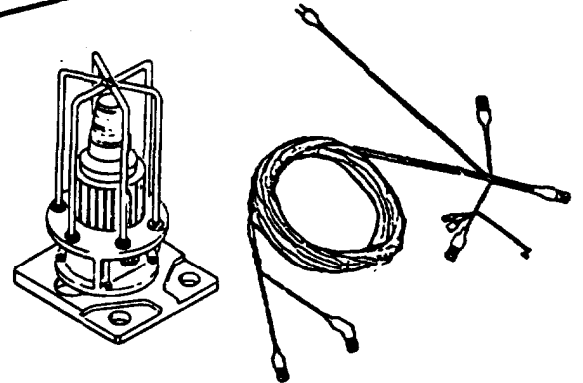
2 DETECTOR BELT SEGMENTS LABELED
NUMBER 3



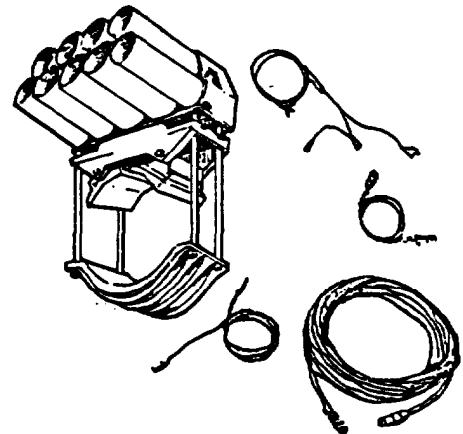
1 DETECTOR BELT SEGMENT LABELED
NUMBER 6



1 CVKI ASSEMBLY AND CABLE ASSEMBLY



HOFFMAN COMPONENTS (NOT PART OF
THE MILES SYSTEM)



Outside Task 5: Inspect and Service Detector Belt Segments. All three detector belt segments must be checked.

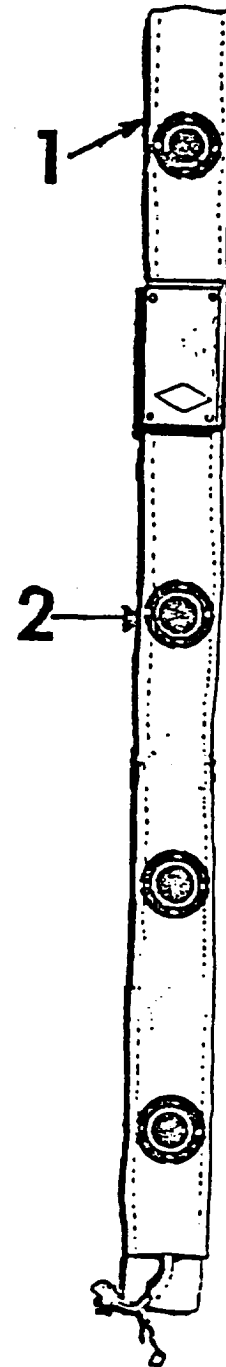
Look for any damage that would prevent normal operation of the belt segments (1).

Wipe detectors (2) clean. (Clean all detectors.)

Report any damage on DA Form 2404.

NOTE

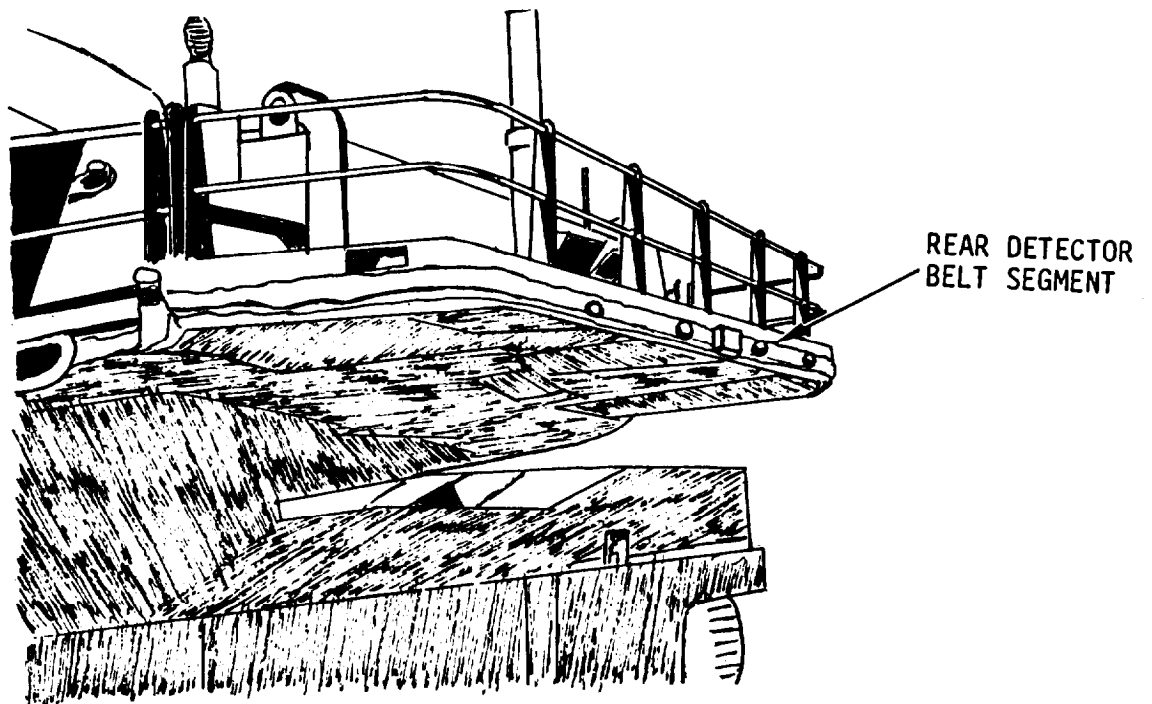
Replace belt segments only if not operable.



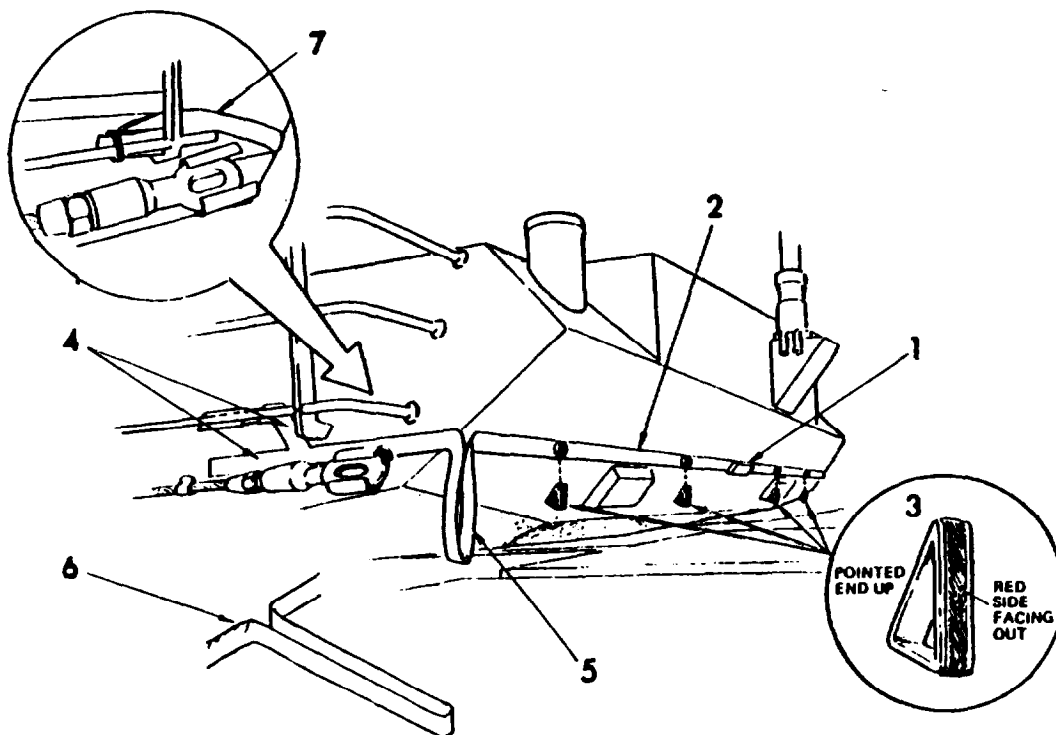
Outside Task 6: Install Rear Detector Belt Segment. Rear detector belt is designed for installation on M1 Tanks with or without a rear bustle. If your tank has no bustle skip to Subtask 6-B. If your tank has a bustle, see Subtask 6-A.

Outside Subtask 6-A: Install Rear Belt Segment - With Bustle.

Due to the variety of bustles, details are provided only for tanks without a bustle. If your tank has a bustle, modify the following instructions as necessary. Be sure the detectors are all horizontal. This may require the installation of wedge blocks on some or all detectors. A typical tank installation with a bustle is shown.



Outside Subtask 6-B: Install Rear Belt Segment- Without Bustle.



Locate detector belt segment labeled **No. 6**. Arrange belt so that you are holding the electronics box and that the end with the two connectors is on your left.

Firmly press the electronics box (1) against center of fastener tape on tank turret rear.

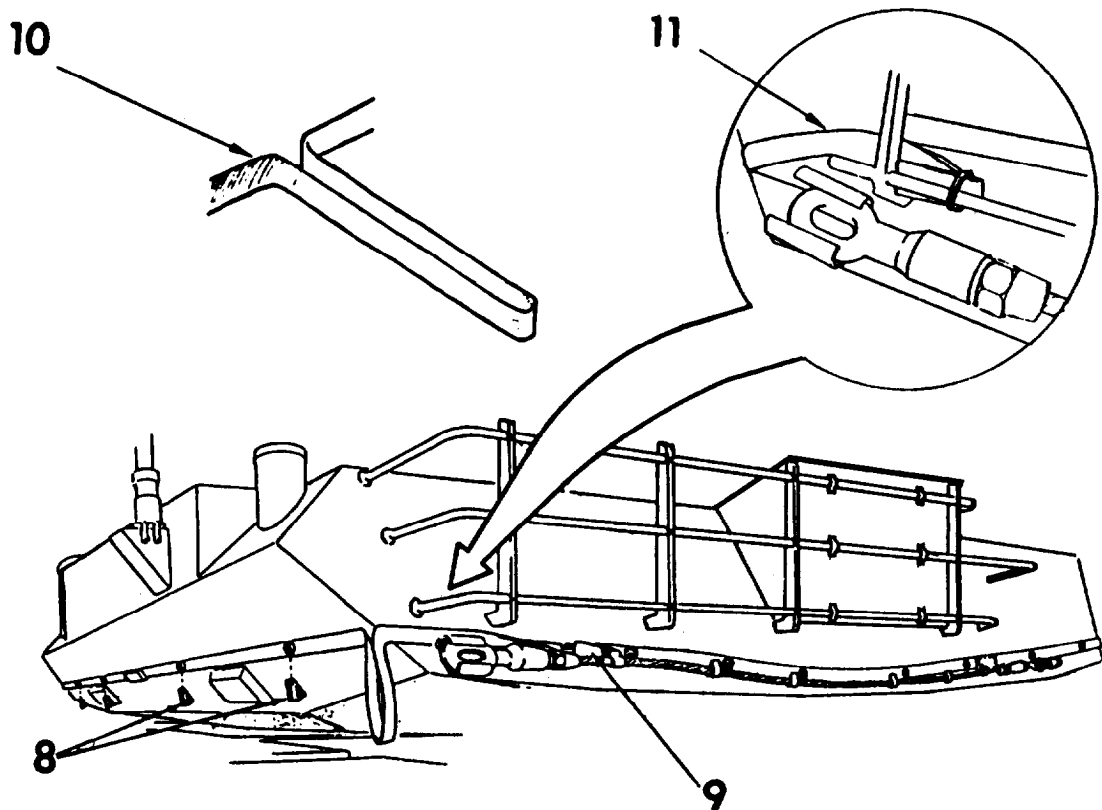
Working toward your left, press the detector belt (2) firmly against fastener tape.

Place a **wedge block (3) behind each detector** before pressing the detector against fastener tape. Install wedge blocks with the **red side OUT (facing you) and the pointed end UP**.

Stop pressing belt when you reach the left rear corner of turret. Locate the two connectors at the end of the belt. Press connectors against fastener tape located, in **front of vertical railing support (4)**. Slip belt between tow cable bracket and bustle rack bracket. **Do not force it.** If space is very narrow insert only belt edge between brackets.

You will now have about 24 inches of excess belt material (5). Press excess material together to make a 12-inch length (6).

Place excess belt material over lower railing and behind vertical railing support. Secure it to railing using fastener tie (7) attached to the belt. Readjust belt on fastener tape as required to make a secure installation.

Outside Subtask 6-B: Install Rear Belt Segment – Without Bustle (Cont).

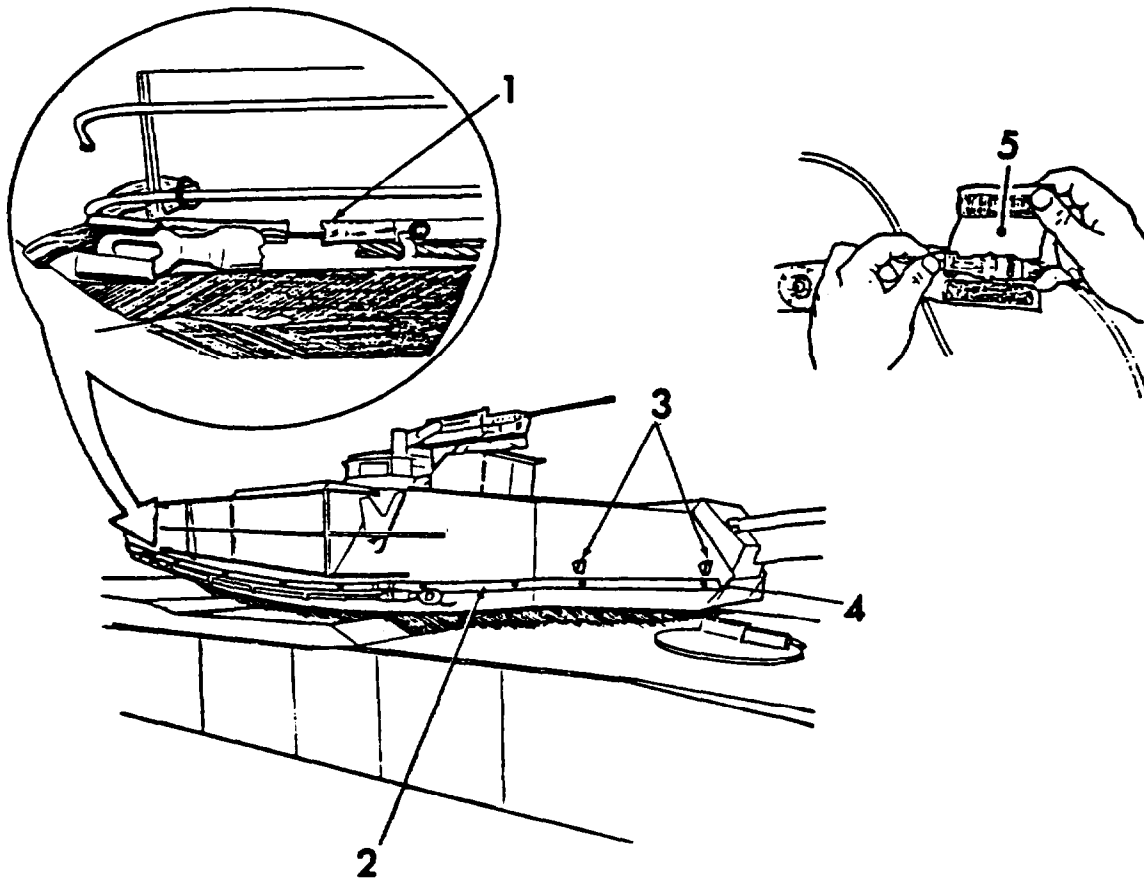
Return to the electronics box and working to your right, begin attaching detector belt to fastener tape. **Place a wedge block (8) behind each detector** in the same manner they were installed on left side.

When you reach right corner of the turret, jump to the end of the belt. Attach connector to fastener tape on right side of turret beginning at a point about in **the center of the two rear vertical railing supports** and work toward rear (9). **Do not force belt** between tow cable bracket and bustle rack bracket, If space is very narrow insert only belt edge between brackets.

You should now have about 24 inches of excess belt material. Press excess material together to make a 12-inch length (10).

Place folded material over lower railing and behind vertical railing support. Tie it to lower railing using the fastener tie attached to the belt (11). Readjust belt on fastener tape as required to make a secure installation.

Outside Task 7: Install Right Side Belt Segment.



Locate one of detector belt segments labeled No. 3 and two wedge blocks.

Starting in RIGHT REAR CORNER of turret, place the connector next to connector from the rear belt (1).

Work toward your right and press the detector belt firmly against the fastener tape (2).

Place a wedge block (3) behind last two detectors. Install wedge blocks with red side OUT (facing you) and pointed end DOWN.

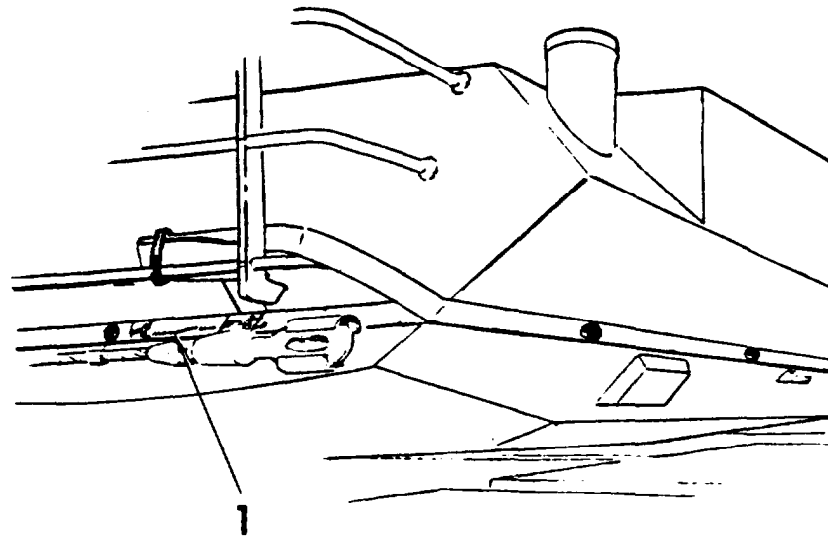
Right end (4) of belt should end up approximately **5 inches** from main gun.

Connect the side belt and rear belt connectors. Cover with protective flap (5).

Outside Task 8: Install Left Side Belt Segment.

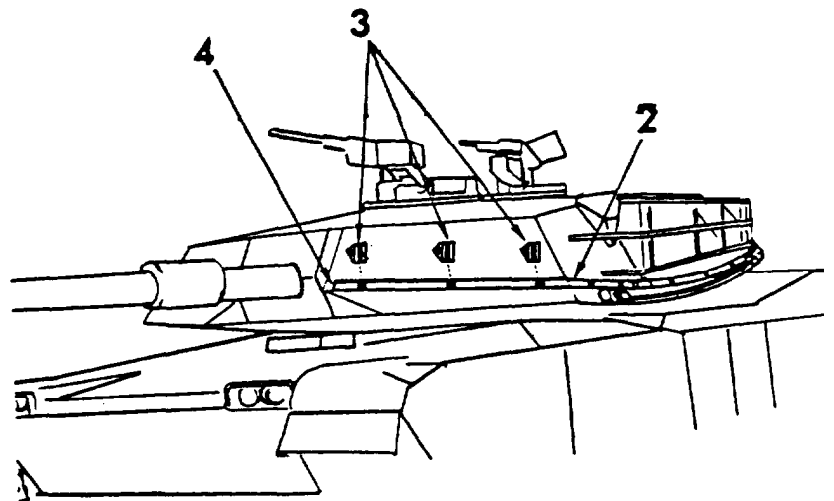
Locate second detector belt segment labeled **No. 3** and three wedge blocks.

Starting in **LEFT REAR CORNER** of turret, place connector next to lower connector from rear belt (1).



Work toward your left and press detector belt (2) firmly against fastener tape.

Place a wedge block (3) behind the last three detectors. Install wedge blocks with the **red side OUT** (facing you) and pointed end **DOWN**.

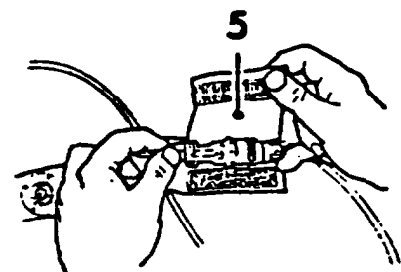


NOTE

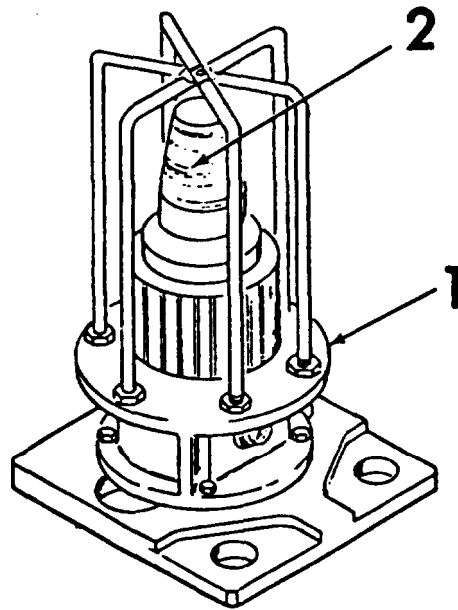
Last three detectors must be on the front surface of turret. If not, remove left side belt and reinstall.

Left end of the belt (4) should end up approximately **5 inches** from main gun.

Connect side belt and lower rear belt connectors. Cover with protective flap (5).



Outside Task 9: Inspect and Service CVKI Assembly,

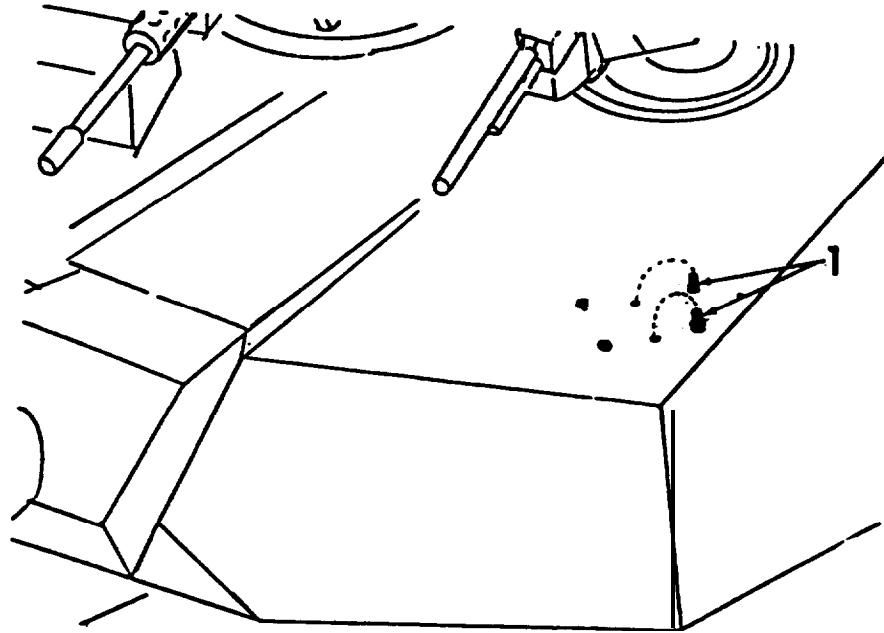


Inspect CVKI assembly (1) for any damage that would affect proper installation or operation.

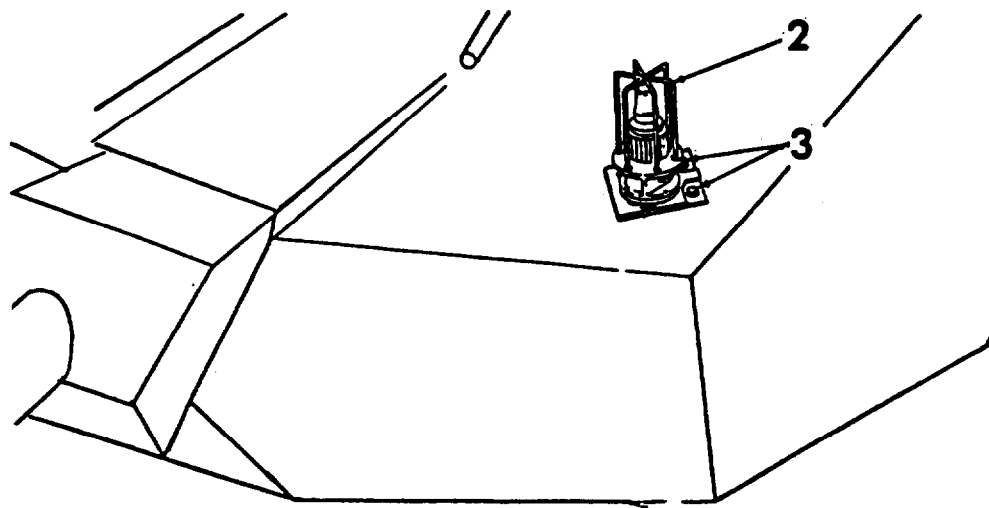
Inspect yellow lens (2) for cracks.

Report any damage on DA Form 2404. Replace only if lens is cracked or if unit is not operable.

Outside Task 10: Install CVKI Assembly.



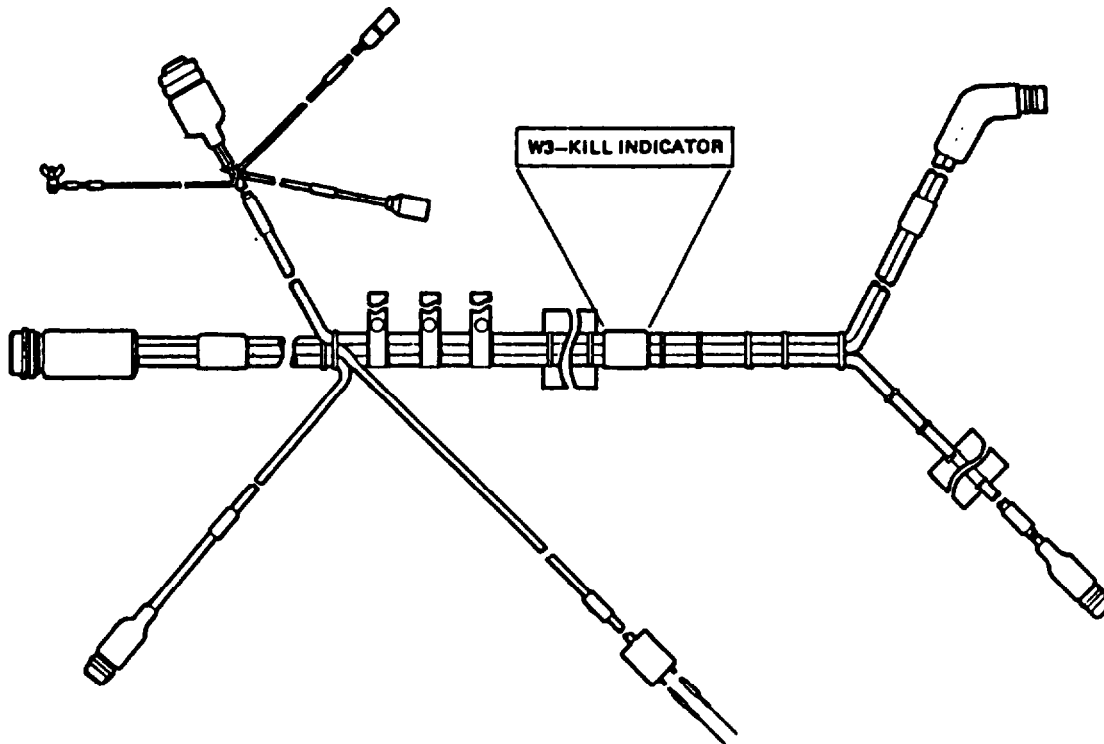
Using adjustable or socket wrench, remove two bolts (1) from the top left corner of turret. There are four bolts in that area but only the two shown have to be removed.



Set CVKI assembly (2) over bolt holes. Connector on CVKI must face the rear.

Replace the original bolts (3) and tighten securely with wrench.

Outside Task 11: Inspect CVKI Cable Assembly.



Find cable assembly labeled KILL INDICATOR.

Each connector should have label showing where it goes.

Check all connectors for obvious damage.

Report any damage on DA Form 2404. Replace CVKI cable assembly only if not operable.

Outside Task 12: Install CVKI Cable Assemblv.

Remove periscope window (1) from loader's hatch. Safely store window for later installation following training exercise. Leave hatch open.

On the CVKI cable assembly (2) locate the two connectors labeled P2 DETECTOR BELT and P3 KILL INDICATOR.

From inside the hatch, feed the two connectors through open periscope window to the outside.

Continue feeding cable through periscope window until fastener pad attached to cable is positioned over fastener tape on the inside of hatch (3). Secure pad to tape.

Climb outside turret and close loader's hatch (4).

Attach both cables to handle on loader's hatch using cable tie that is attached to one of the cables (5).

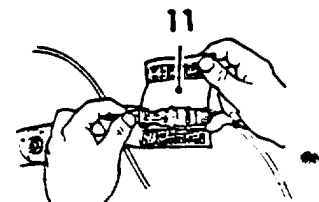
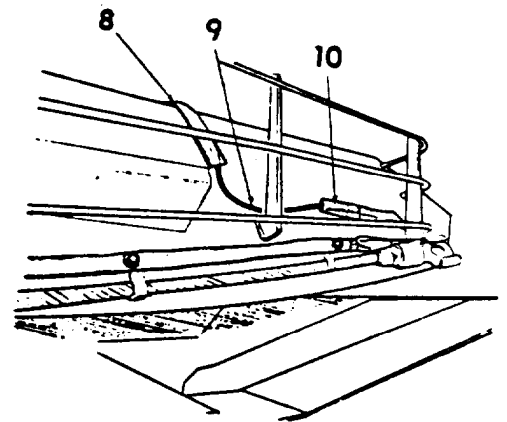
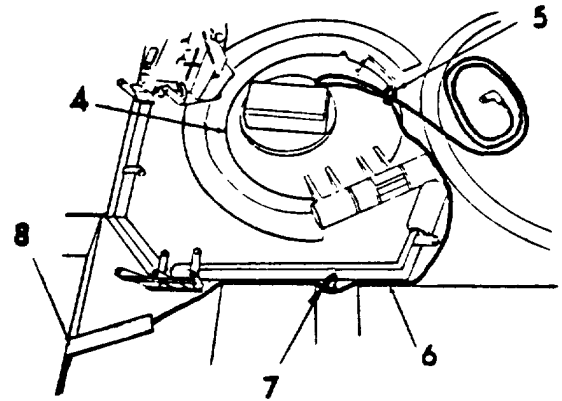
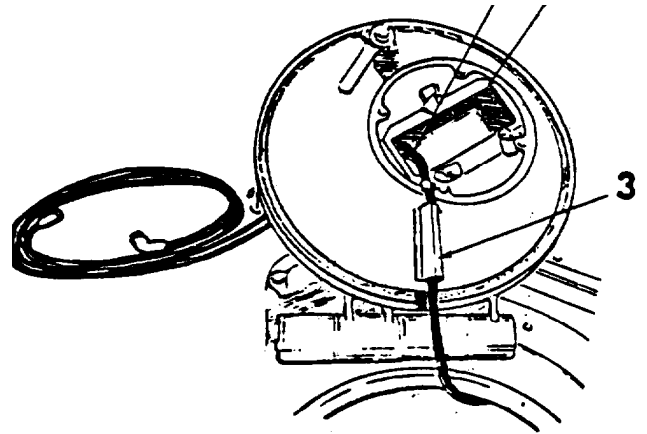
Locate cable labeled P2 DETECTOR BELT. Route cable around hinge and push it into space between armor plate and V-shaped metal assembly (6). Attach cable tie to mounting bracket (7).

Secure cable to the two 12-inch fastener strips that are glued to turret (8). One pad is on the side and the other on top of turret.

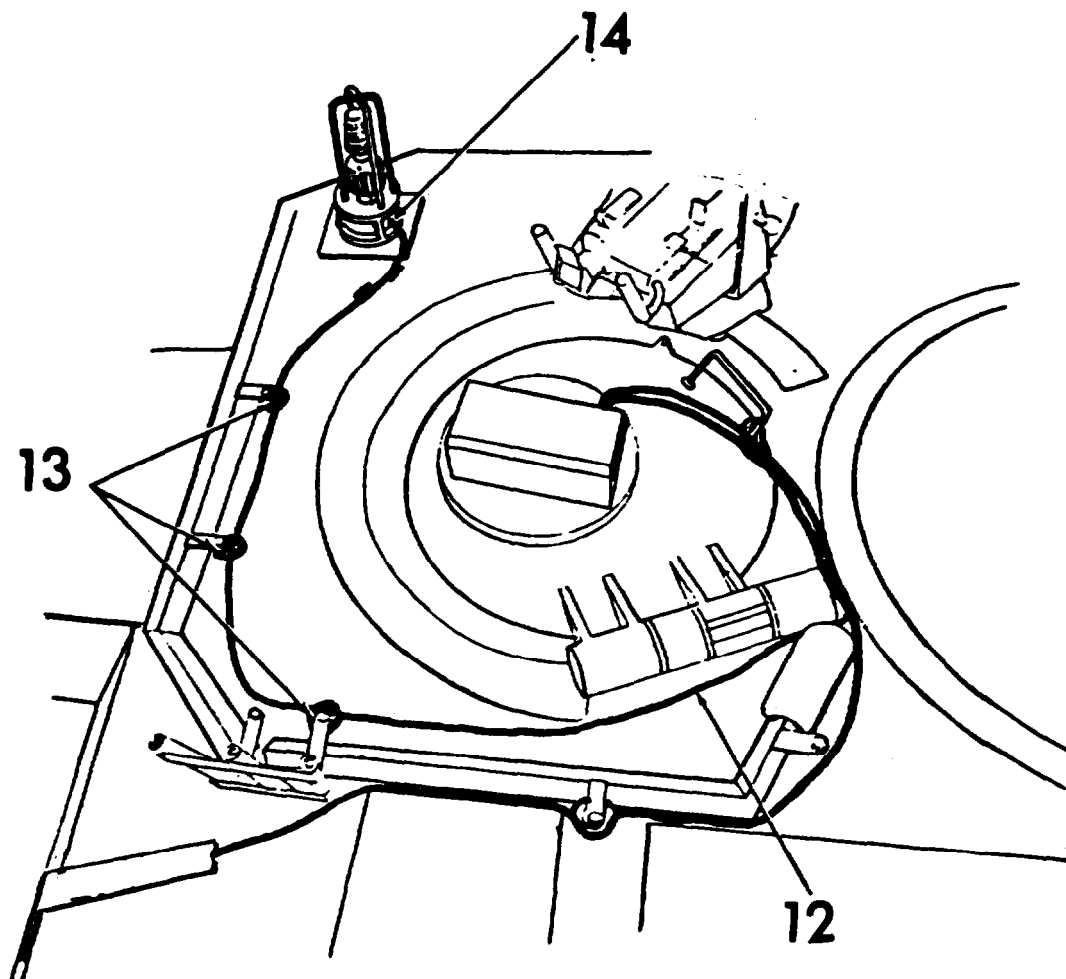
Route cable along side of turret (9).

Connect plug labeled P2 DETECTOR BELT into the UPPER connector on the rear detector belt (10).

Put plug under protective flap (11).



Outside Task 12. Insta II CVKI Cable Assembly (Cont),



Return to loaders' hatch. Route cable labeled P3 KILL INDICATOR between hinge on loader's hatch and V-shaped metal assembly. Follow route shown (12).

Attach cable ties to three mounting brackets as shown (13).

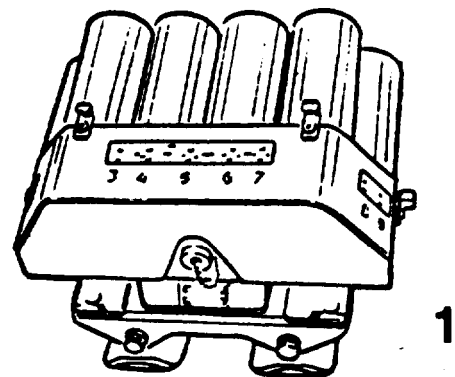
Attach plug labeled P3 KILL INDICATOR to connector on rear of CVKI (14).

Outside Task 13. Inspect Hoffman Simulator Bodv.

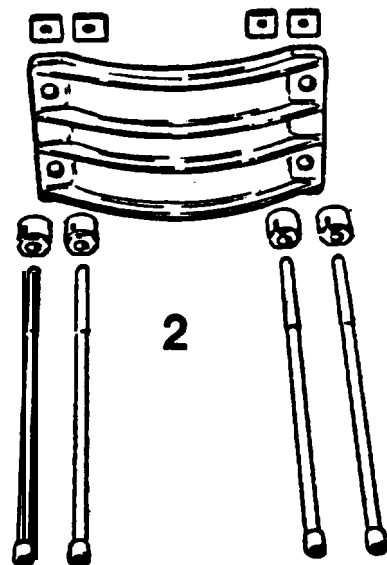
NOTE

Refer to Hoffman Service Instruction Manual, No. 61176 for unpacking instructions.

Inspect simulator body (1) for damage to firing drums, rubber cladding on supports, and two-pole and four-pole connectors.



Inspect clamp assembly (2) for damage to threads, clamping force indicators, and rubber cladding.



WARNING

Emergency repair of damaged cables in the field is not permitted.

Inspect 10-pole connecting cable (3) for damage to plugs and insulation.



Report any damage on DA Form 2404. Replace Hoffman device only if not serviceable.

Outside Task 14: Install Hoffman Simulator Body

Set simulator body (1) on main gun evacuator. Move it as far to rear of evacuator as possible and hold steady.

Insert the four special nuts (2) into matching recess of the baseplate.

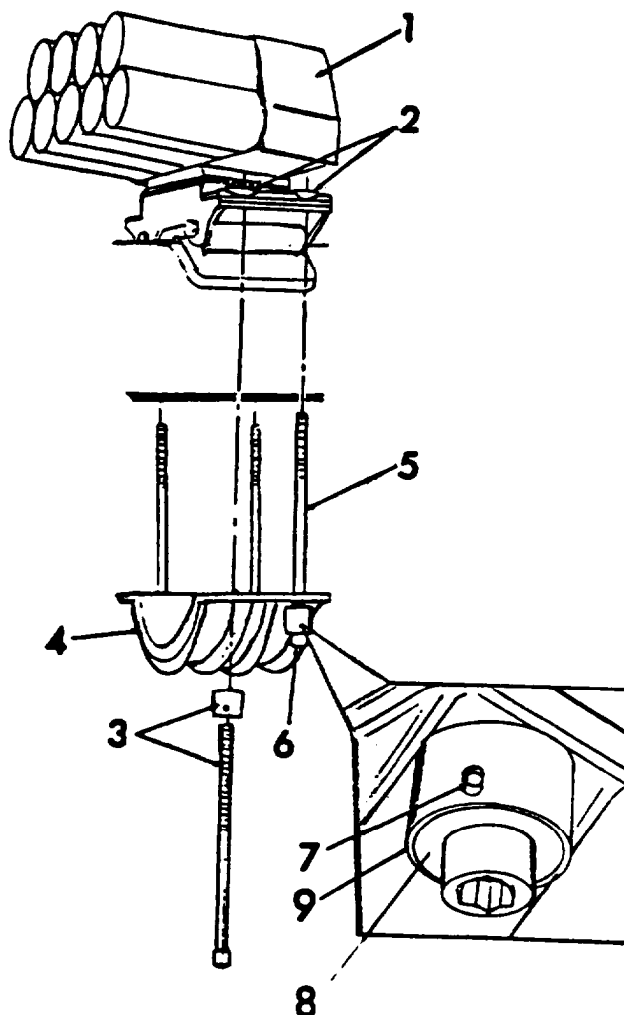
Slip a clamping force indicator onto each of the four long clamping screws (3). Make sure the end of the clamping force indicators with the smaller diameter is toward the head of the screw.

Hold clamp (4) in place against the bottom of evacuator.

Insert the four clamping screws (5) (with clamping force indicators in place) through holes in clamp and screw onto special nuts.

Using hexagon wrench provided with Hoffman device accessories, tighten clamping screws (6). Alternate to opposite corners as you tighten.

Continue tightening until all four force indicators (7) have moved to their end position. End position is reached when base (8) and sleeve (9) are level. Replace hexagon wrench in the Hoffman storage container.

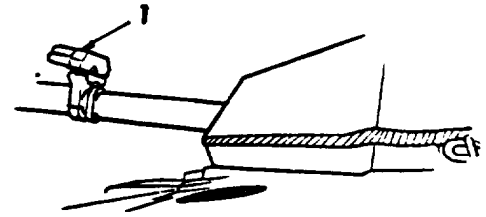


CAUTION

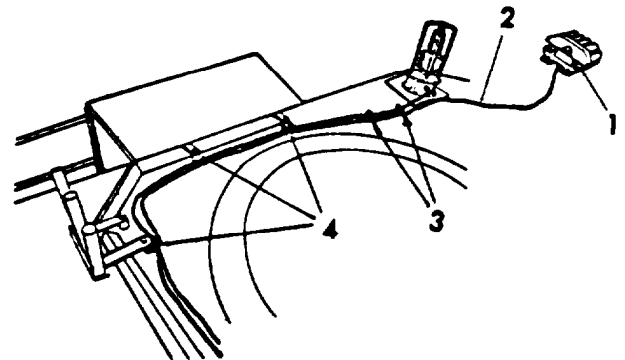
Do not overtighten clamping screws. Overtightening could damage bore evacuator.

Outside Task 15: Install Hoffman 10-Pole Connecting Cable.

Unscrew dust cap from the 10-pole socket on rear of simulator body (1). Insert female plug end of 10-pole cable into socket. Screw down firmly by hand. Retain dust cap and replace it on the socket following the exercise.

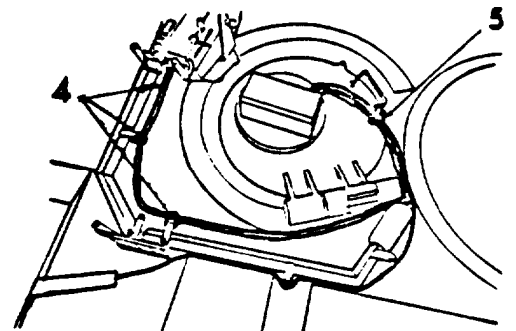


Route cable along the top of main gun barrel and toward MILES CVKI (2).



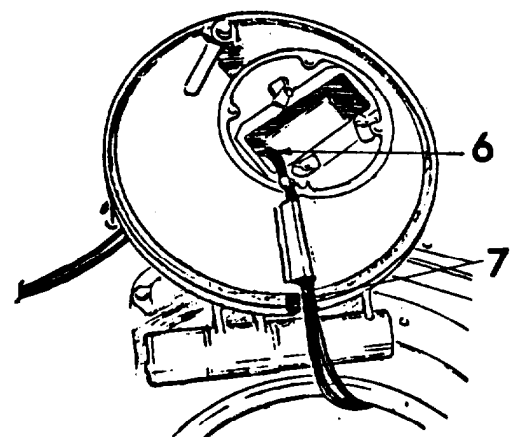
Follow path of CVKI cable and secure Hoffman cable with unused CVKI cable ties (3) and CVKI cable ties attached to mounting brackets (4).

Attach cable to handle on loaders hatch using same tie that is holding MILES cables (5).



Open loaders hatch and feed cable through open periscope window (6).

For the time being, allow remainder of cable to hang inside turret (7).

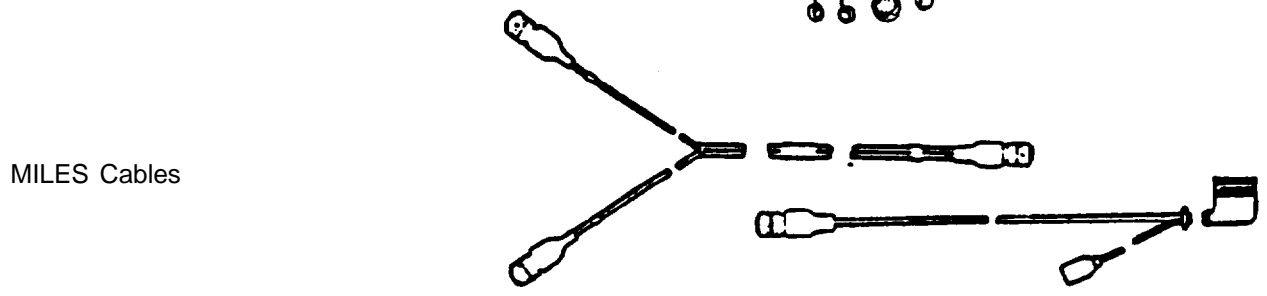
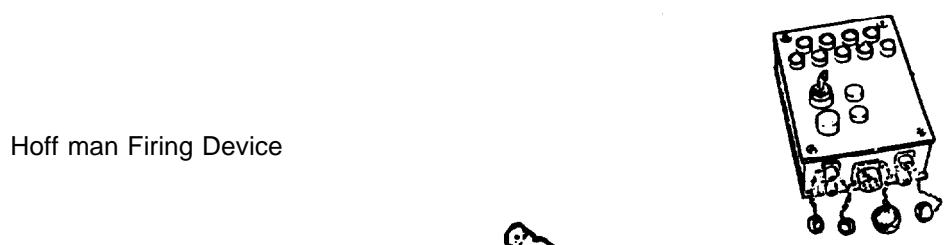
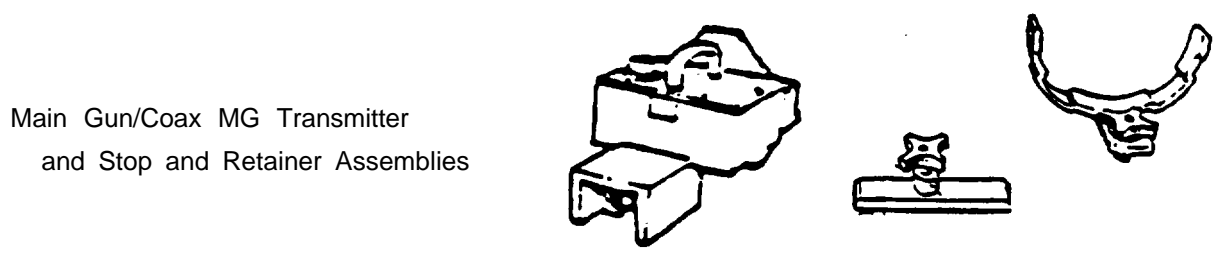
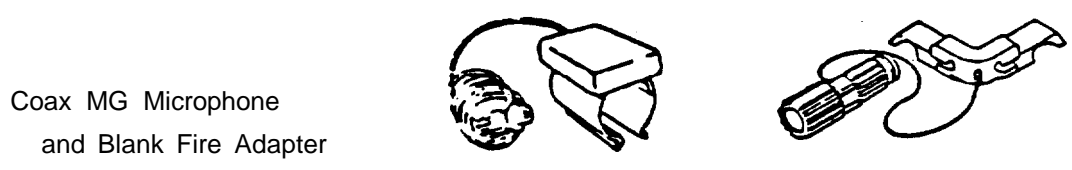
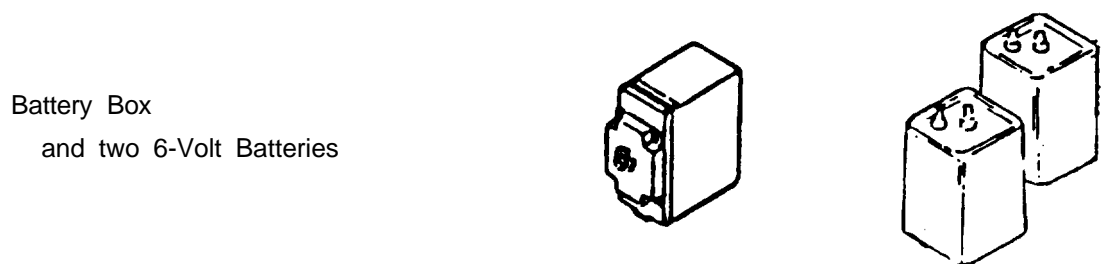
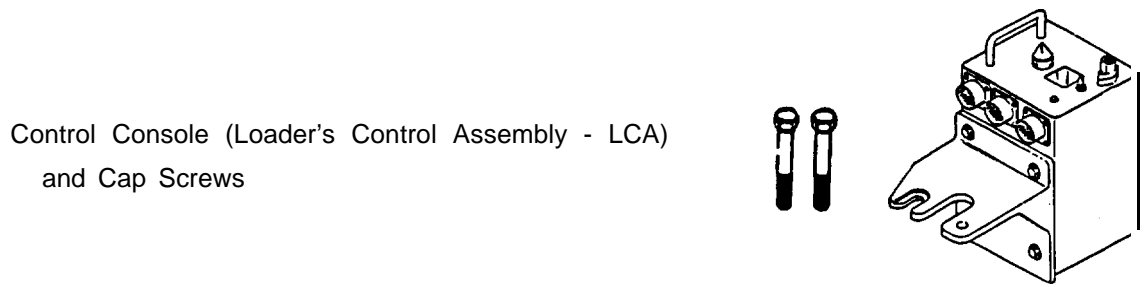


INSIDE INSTALLATION TASKS - INDEX

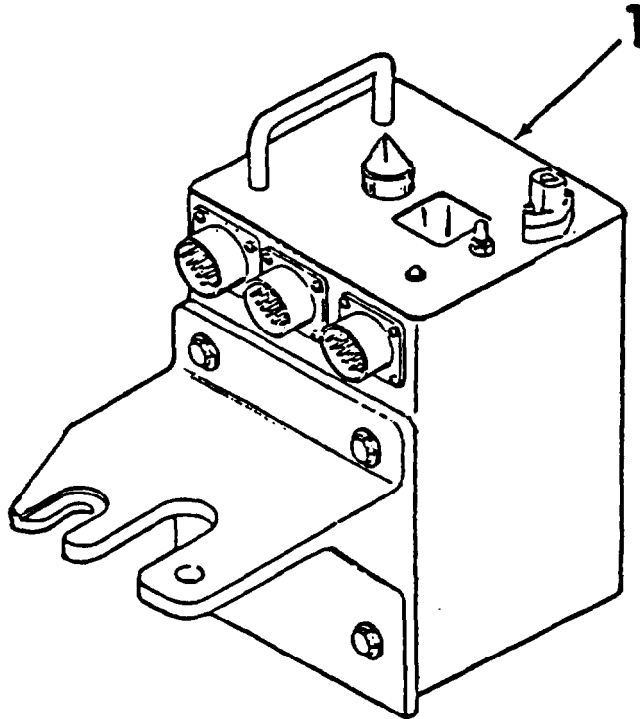
	<u>Page</u>
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3. Install Control Console	2-31
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5. Install Battery Box	2-33
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7. Install Coax MG Microphone	2-34
8. Inspect Main Gun/Coax MG Transmitter	2-35
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11. Install Hoffman Firing Device	2-38
12. Inspect Trigger and Breech Cables	2-39
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Perform these tasks in the order given.

Inside Installation Task 1: Obtain Equipment. Completion of Inside Tasks requires equipment listed and illustrated below. Locate and set aside this equipment.

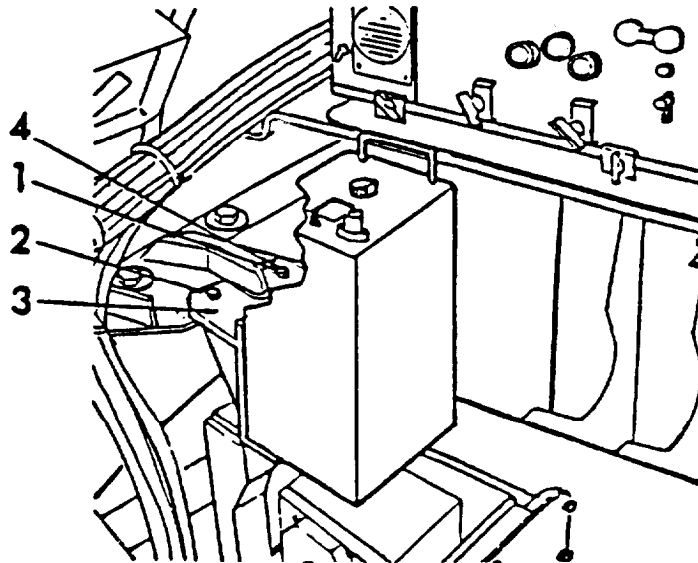


Inside Task 2: Inspect Control Console.



Inspect control console (1) for any damage that would prevent normal operation.

Report any damage on DA Form 2404. Replace console only if not operable.

Inside Task 3: Install Control Console.**CAUTION**

Do not remove **both bolts** on tank support plate at the same time.

With adjustable wrench, remove right bolt on tank support plate (1). Transfer lock washer and flat washer from tank's bolt to one of two bolts supplied with the MILES system. Insert MILES bolt into right bolt location of the tank support plate **and turn only one or two times** - only enough to catch the threads.

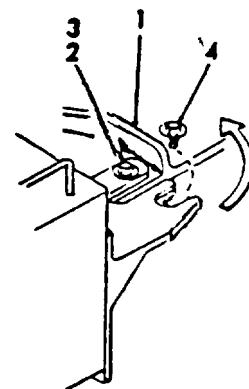
Remove left bolt (2) on tank support plate. Transfer lock washer and flat washer from tank's bolt to second bolt supplied with MILES system. Slip MILES bolt through left hole of control console mounting plate.

Position control console so that left screw can be inserted in left mounting hole (3). Tighten two or three turns.

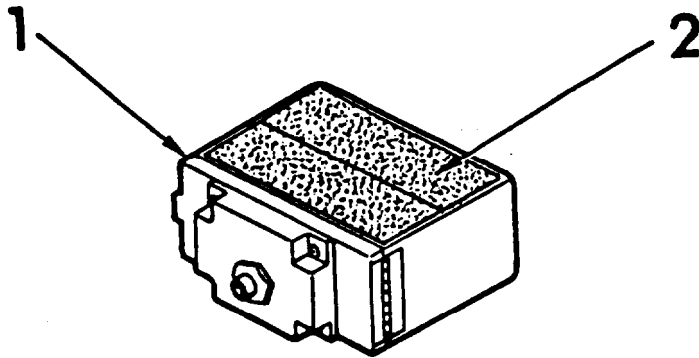
Rotate control console so that slot can be slipped under right screw and washer (4).

Securely tighten all screws.

Retain all unused tank hardware for reinstallation following removal of the MILES system. Retain any extra MILES bolts for return with equipment.



Inside Task 4: Inspect Battery Box.



Inspect battery box (1) for damage that would prevent normal operation.

Report any damage on DA Form 2404. Replace only if not operable.

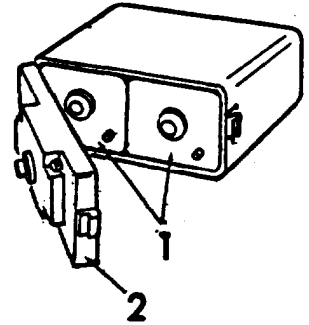
Make sure fastener tape (2) is attached to one side of battery box. If fastener tape is missing, do not attempt to install new tape. Report on DA Form 2404 and replace battery box.

Inside Task 5: Install Battery Box.

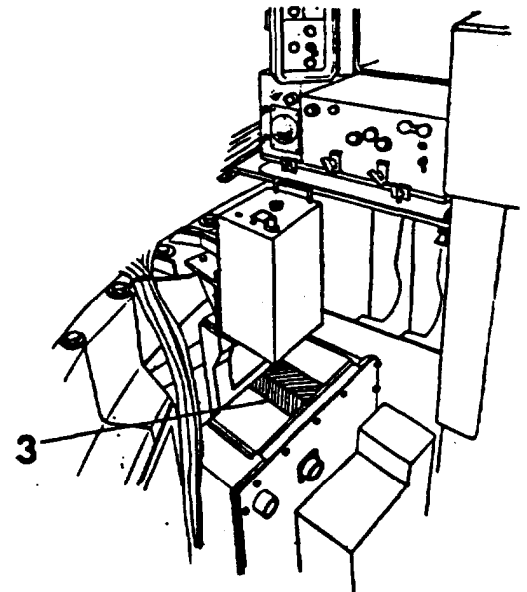
Insert two 6-volt batteries (1) in the box.

If a battery is sticky from acid leakage, ask your NCOIC for a replacement.

Close and latch cover (2).



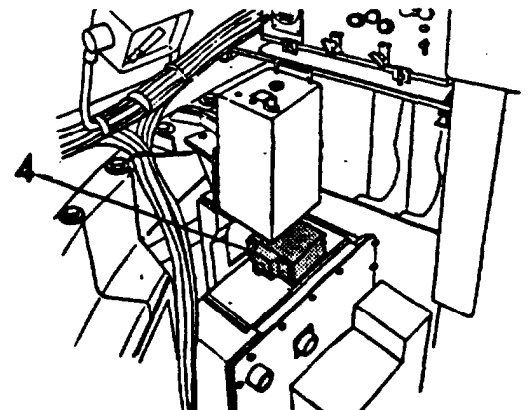
Install two 3-1/2-inch strips of fastener tape on circuit breaker cover of turret networks box (3). Center tape on cover. Use directions for Outside Tasks 1 and 2 to install tape. Make sure tape does not interfere when cover is opened.



WARNING

Primer is highly inflammable, Do not spray near heat, sparks, or open flame. Use only in well ventilated area.

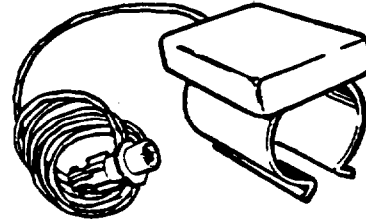
Firmly press battery box (4) to fastener tape. Make sure **connector faces toward rear** of turret and box is centered directly under control console.



Inside Task 6: Inspect Coax MG Microphone.

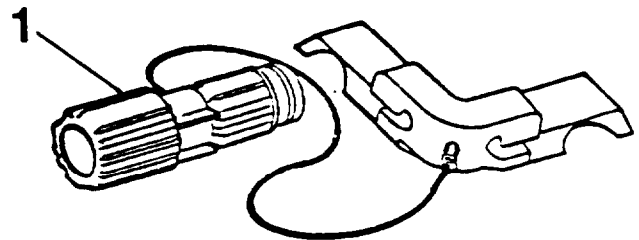
Inspect microphone for any damage that will prevent normal operation.

Report any damage on DA Form 2404.
Replace microphone only if not operable.



Inside Task 7: Install Coax MG Microphone.

Install blank fire adapter (1) on coax machine gun.

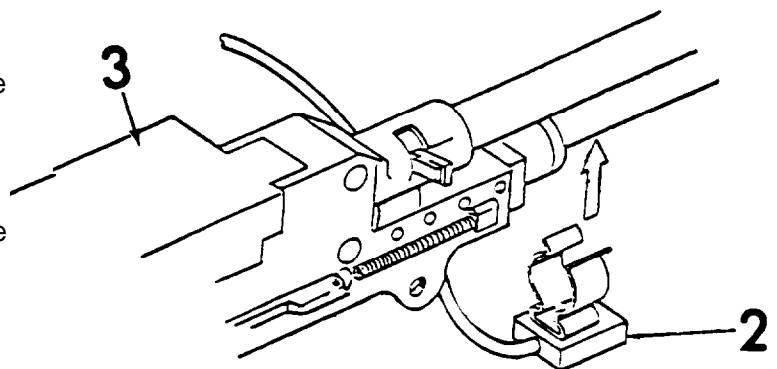


NOTE

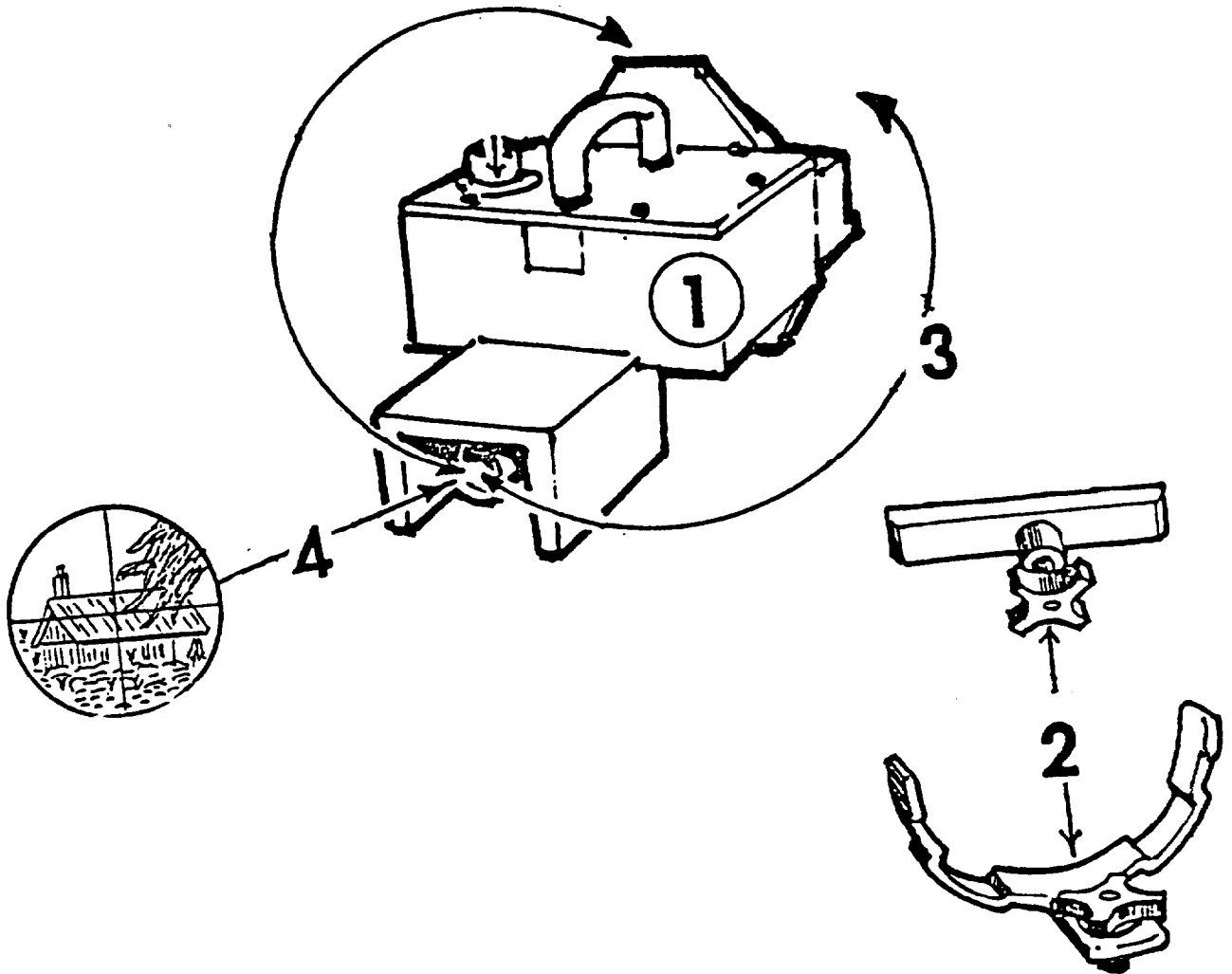
If necessary, the machine gun may be partially withdrawn from its mount to do this task.

Clip microphone assembly (2) to machine gun as shown.

Temporarily lay cable on top of machine gun (3). Keep cable away from barrel.



Inside Task 8: Inspect Main Gun/Coax MG Transmitter.



Inspect transmitter (1) and mounting brackets (2) for any damage that would prevent normal operation.

Remove any dirt or oil from lens with lens paper or a soft dry cloth (3).

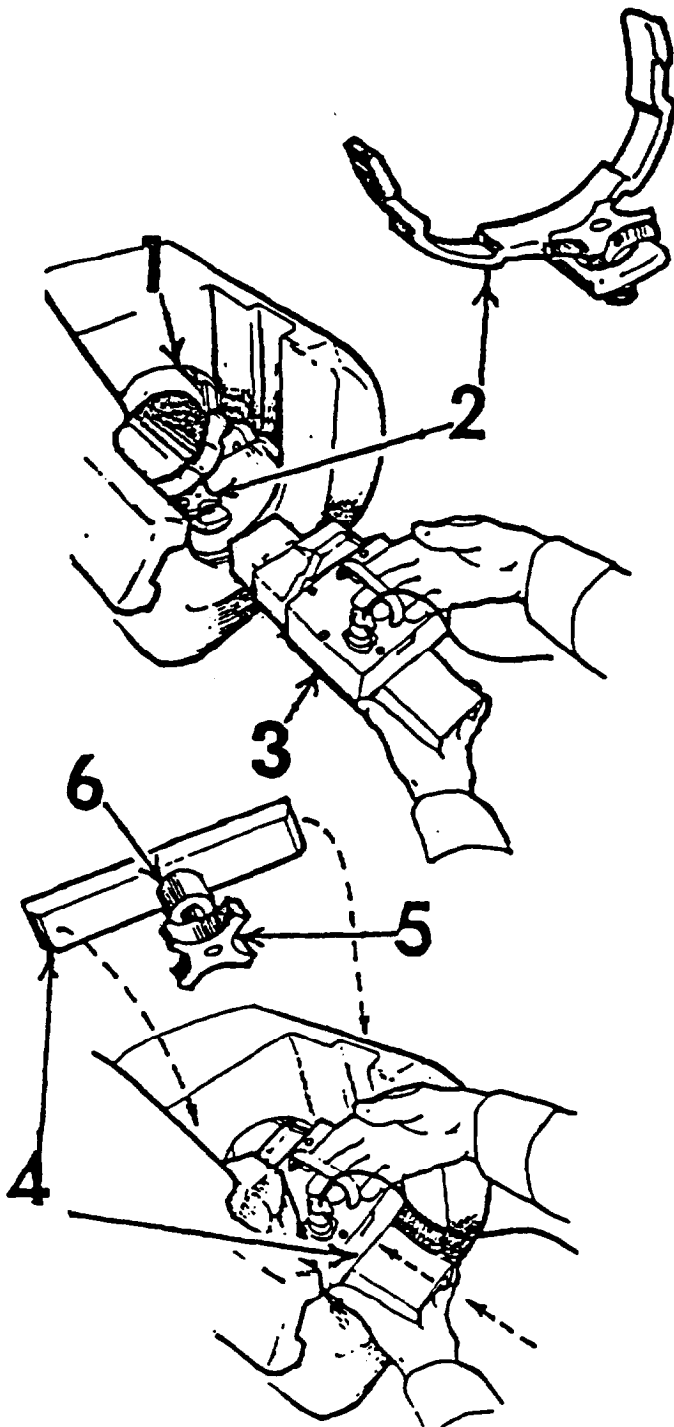
Look through telescope (4). Be sure you can see distant objects clearly.

Report any damage on DA Form 2404. Replace transmitter or mounting brackets only if not operable.

Inside Task 9: Install Main Gun/Coax MG Transmitter.

Different procedures are used for installing the 120 mm and 105 mm/coax transmitters. If your vehicle is equipped with a 120 mm main gun skip to Subtask 9B. If your gun is equipped with a 105 mm main gun go to Subtask 9A.

Inside Subtask 9A: Install 105 mm/Coax MG Transmitter.



Open main gun breech (1).

WARNING

Breech handle is under spring tension until breech block is fully opened and locked. Ask a crewmate to hold the breech handle until you complete the following Steps.

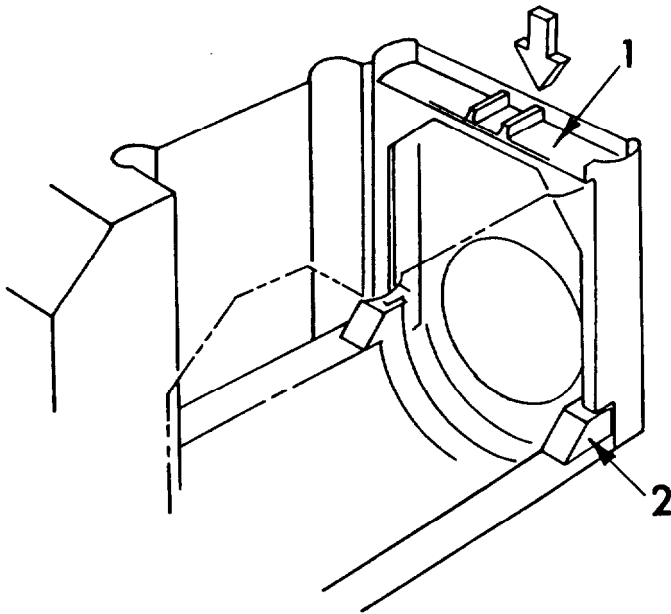
Install stop assembly extractor (2) as shown. Tighten knob.

Slide transmitter (3) into breech in the way shown. You may need to lift transmitter slightly to clear the knob. Push transmitter forward until it is flush against breech. Rock transmitter from side to side until it is in place.

Hold transmitter in the breech. Slide the retainer assembly (4) into breech block grooves.

Do not tighten knob (5) and jam nut (6) at this time because transmitter must be lifted out during TEST tasks to check its operation.

Inside Subtask 9B: Install 120mm/ Coax MG Transmitter.

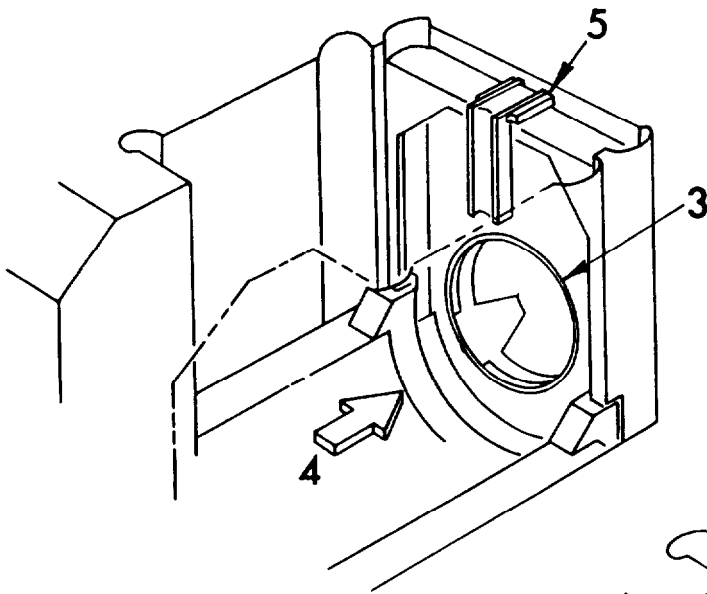


Insert the stop (1) downward in the forward end of the breech.

Engage the stop in front of the breech latches (2) so that the stop prevents the latches from moving forward.

Insert the adapter (3) forward into the breech as shown (4).

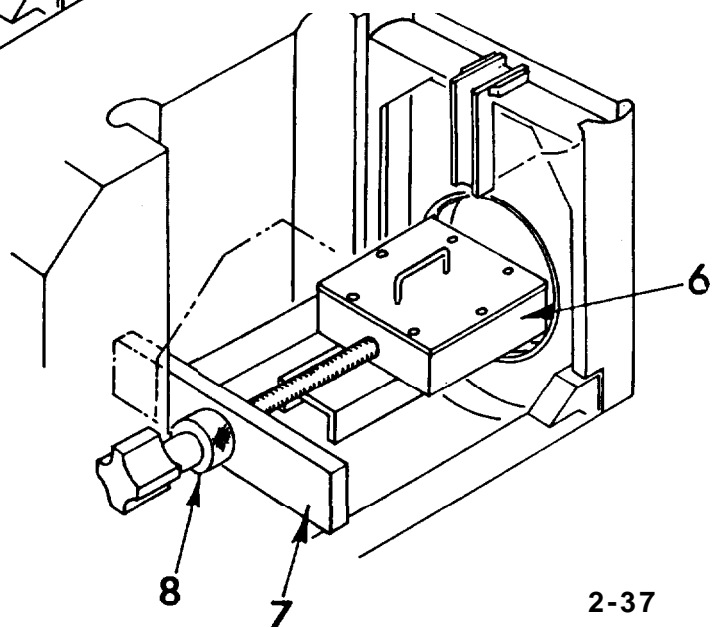
Engage the upper bracket of the adapter into the center slot (5) of the stop so that the adapter prevents the stop from moving upwards.



Insert the 105MM transmitter (6) into the adapter so that it rests firmly against the adapter.

Position the retainer (7) behind the transmitter and adjust the turning screw until it holds the transmitter firmly in place.

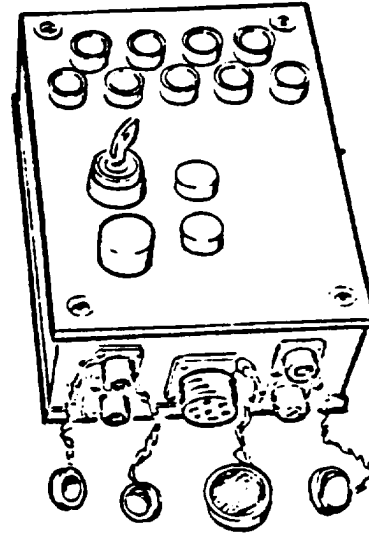
Tighten the jam nut (8) against the retainer.



Inside Task 10: Inspect Hoffman Firing Device.

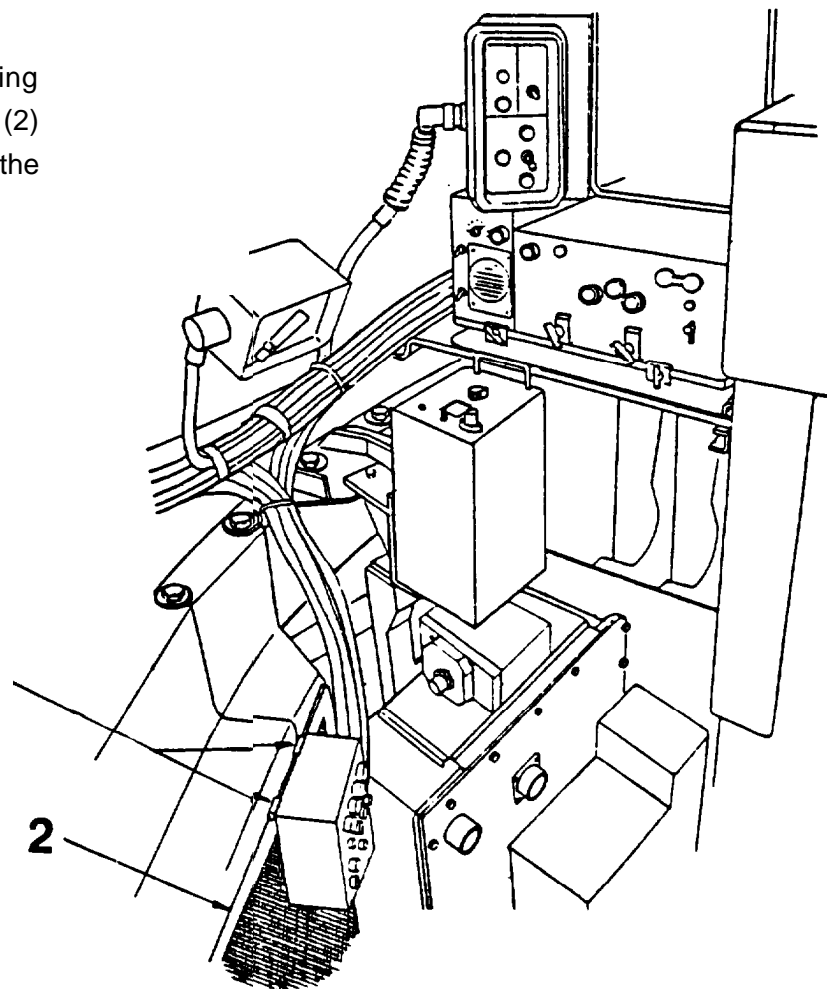
Inspect sockets, indicator lamps, lockout safety switch, yellow contact button, and mounting clips for any damage that would prevent normal operation.

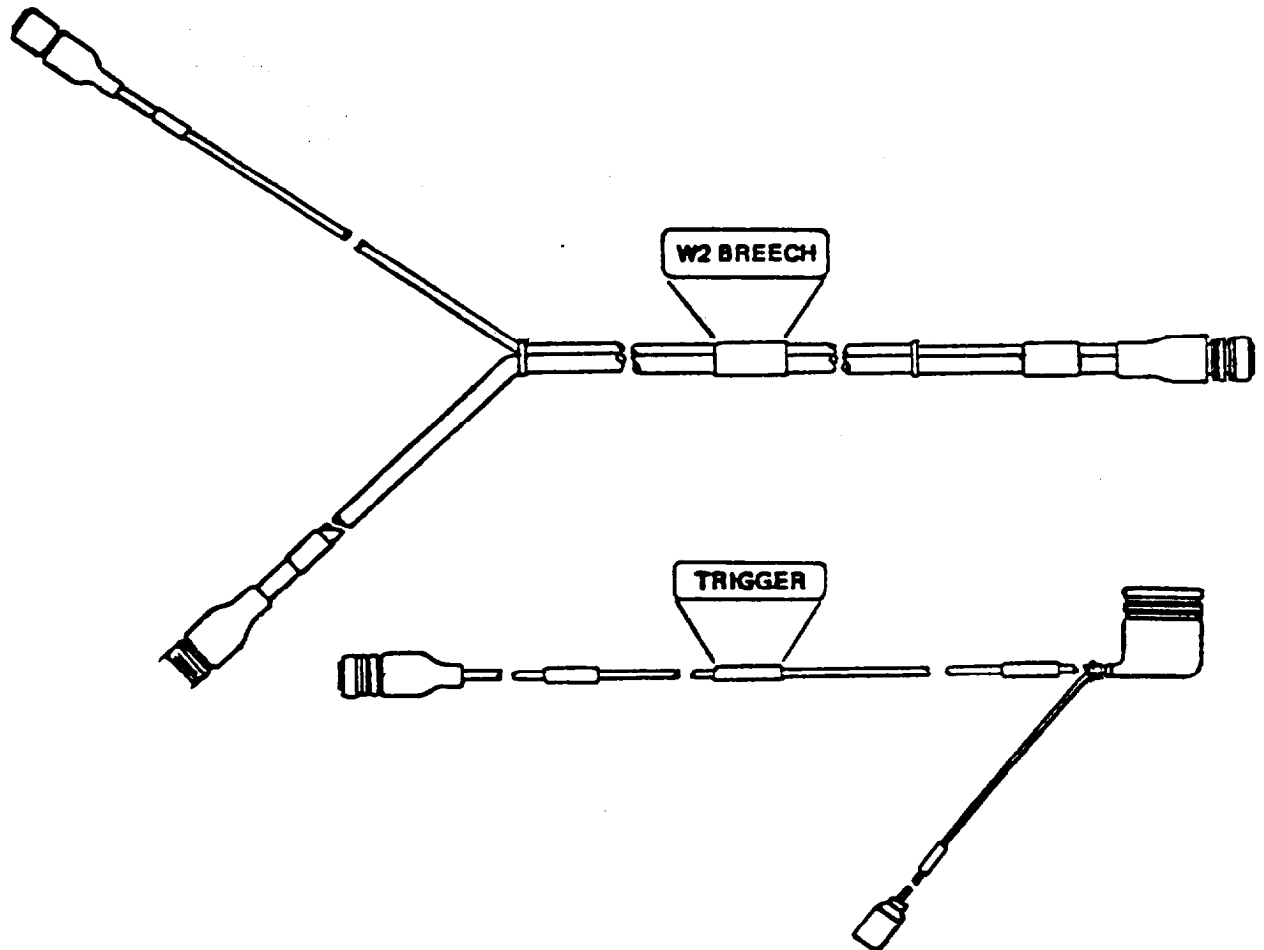
Report any damage on DA Form 2404 and replace Firing Device.



Inside Task 11: Install Hoffman Firing Device.

Slide clips (1) on rear of Firing Device over edge of protective (2) screen immediately to the left of the networks junction box.



Inside Task 12: Inspect Trigger and Breech Cables.

Find cable assemblies labeled W1 TRIGGER and W2 BREECH.

Check each cable assembly for worn insulation and bare wires.

Each connector should have a label showing where it goes.

Check all connectors for obvious damage.

Report any damage on DA Form 2404. Replace cable assemblies only if not operable.

Inside Task 13: Install MILES Cables. The MILES M1 Abrams tank system requires cable assemblies. To install them complete:

Inside Subtask 13-A: Complete Installation of CVKI Cable Assembly

Inside Subtask 13-A.I: Installation of 120 mm Adapter Cable

Inside Subtask 13-B: Install Trigger Cable Assembly

Inside Subtask 13-C: Install Breech Cable Assembly

Inside Subtask 13-D: Connect Hoffman Cables

Perform these subtasks in the order given.

Inside Subtask 13-A: Complete Installation of CVKI Cable Assembly.

NOTE

Before doing this task, check with the TC to make sure Outside Task 12 has already been done.

CVKI cable should be inside turret hanging through periscope window of loader's hatch. Pad on cable should be securely attached to fastener tape glued to inside of loader's hatch.

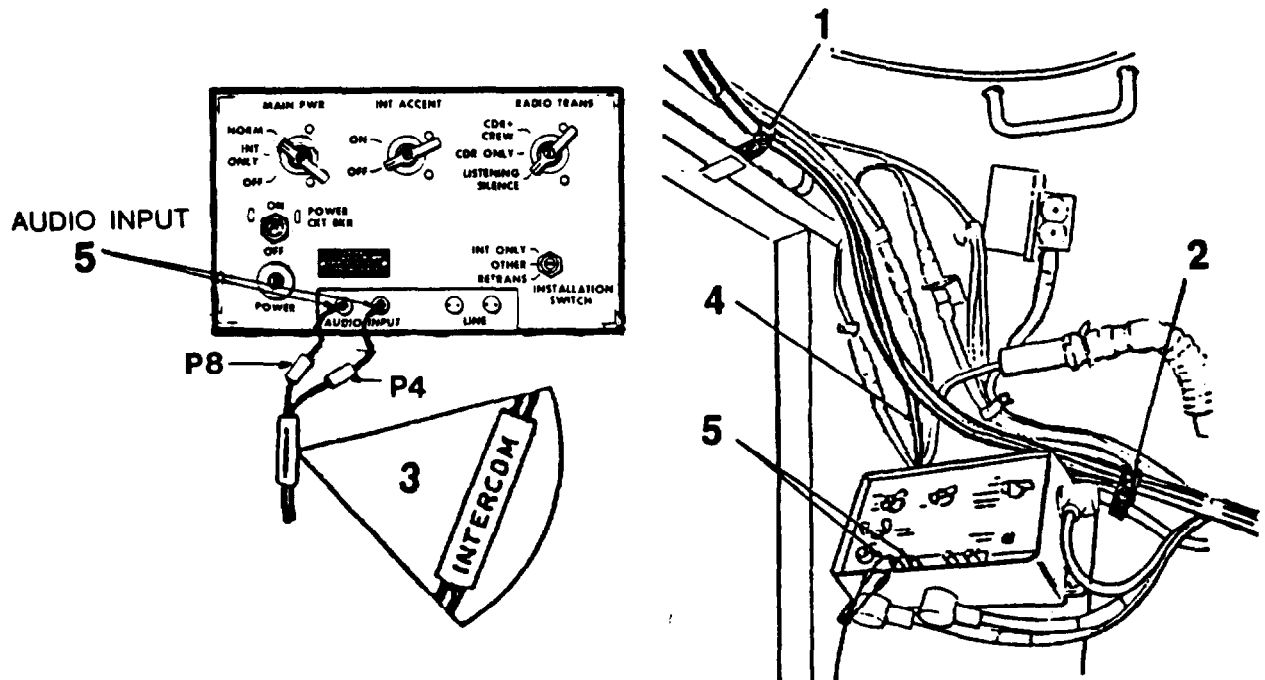
Route cable to your right just above ammunition door. Secure cable above ammunition door with a fastener tie (1).

Route CVKI cable behind and along top of intercom box. Secure cable to other convenient cables near intercom box with a fastener tie (2).

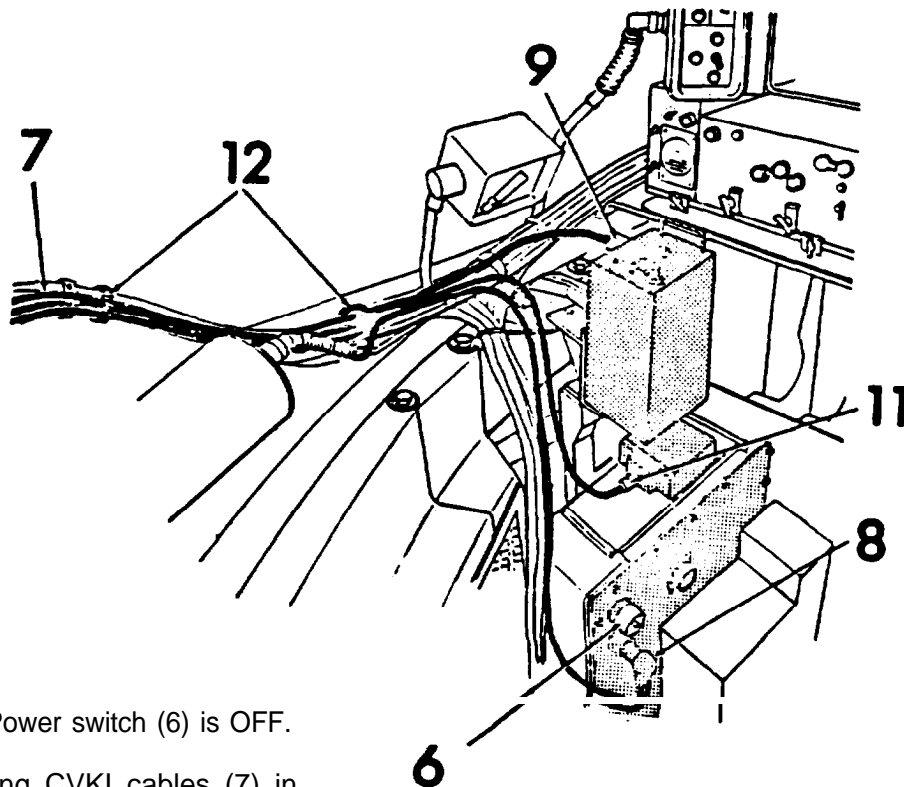
Locate plug labeled INTERCOM (3). It has two connectors labeled P4 and P8.

Route intercom cable (4) behind intercom box.

Plug connectors into AUDIO INPUT jacks (5) as shown. **Use the slots** - not the holes. Either plug can go in either jack.



Inside Subtask 13-A: Complete Installation of CVKI Cable Assembly (Cont).



Ensure Utility Power switch (6) is OFF.

Continue routing CVKI cables (7) in direction of control console following the path of existing vehicle cables.

Locate cable labeled P6 UTILITY CONNECTOR (8). Route this cable down toward turret networks box and plug into connector marked UTILITY.

On M1 Tank only, plug cable labeled P1 CONTROL CONSOLE J-3 into center connector (J3) on control console (9). (See Inside Subtask 13-A.1 for M1A1 Tank.)

Plug cable labeled P5 BATTERY (11) into receptacle on battery box.

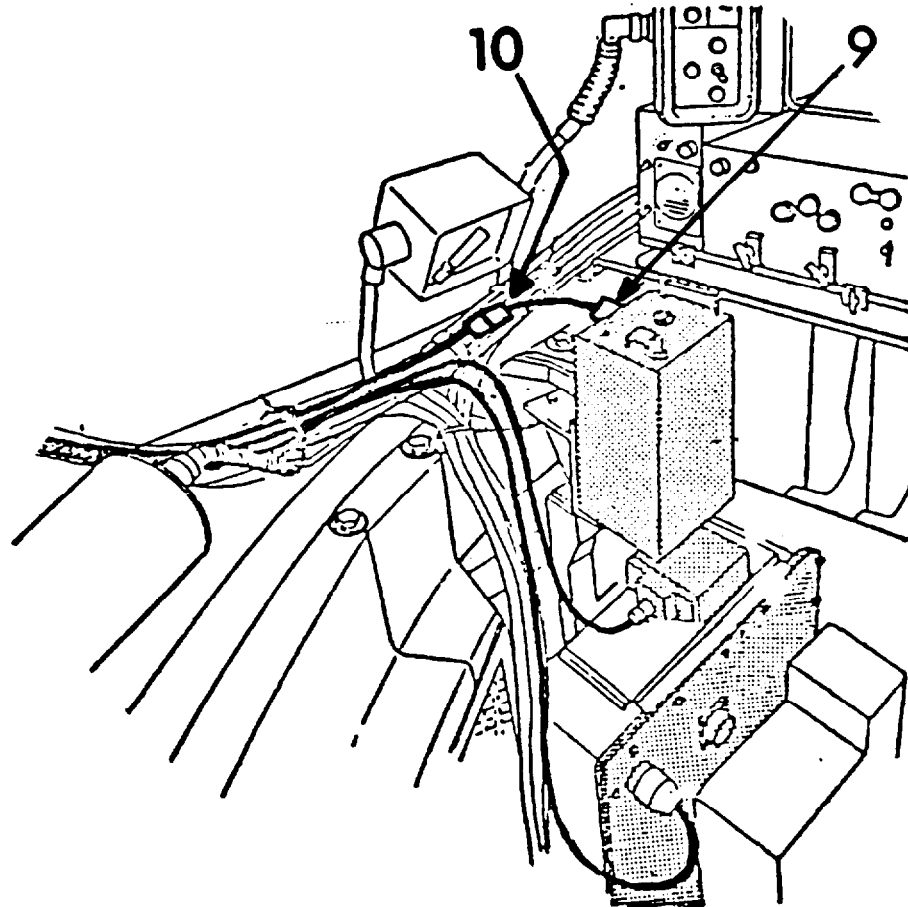
NOTE

There are three plugs remaining on cables labeled P7 HOFFMAN + 28V, P8 HOFFMAN + 28V, and P9 HOFFMAN RTN. If no Hoffman simulator is installed on your vehicle, these plugs are not used.

Secure MILES cables to existing cables with fastener ties in the two places shown (12).

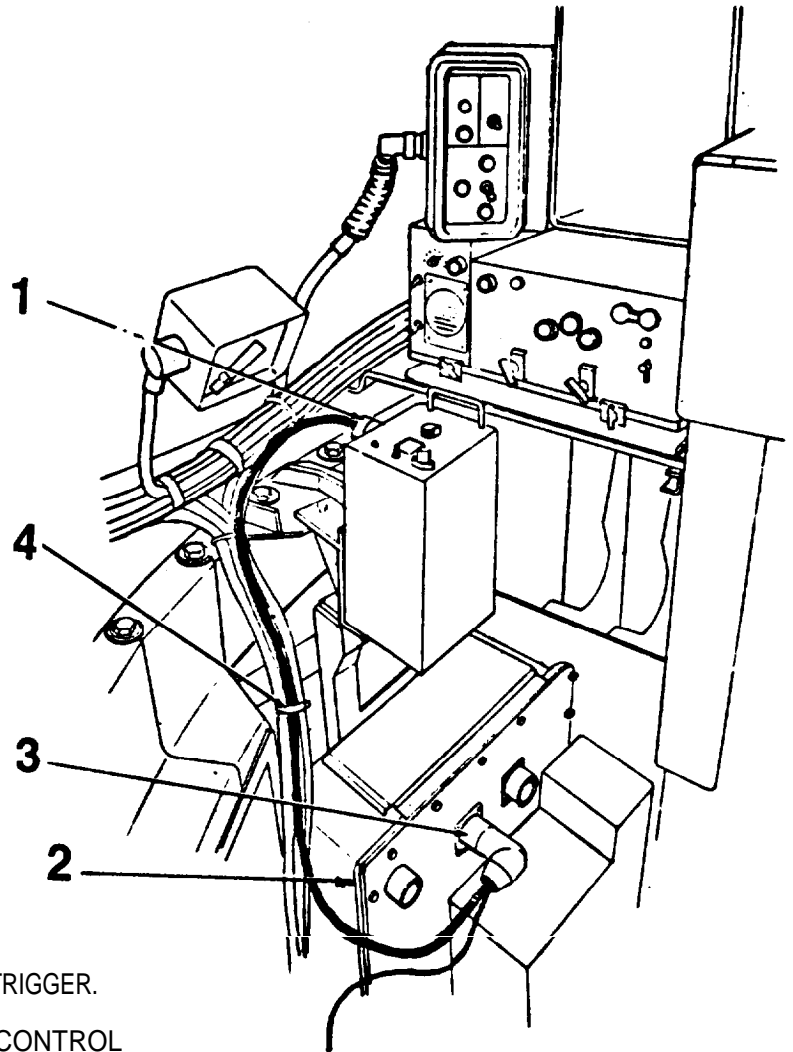
Turn Utility Power switch (6) to ON.

Inside Subtask 13-A.1: Installation of 120 mm Adapter Cable (M1A1 Tank Only).



On M1 A1 Tank only, connect 120 mm adapter cable connector P2 (10) into cable labeled P1 CONTROL CONSOLE J-3 connector.

Connect 120 mm adapter cable connector P1 into the center connector (J3) on the CONTROL CONSOLE (9).

Inside Subtask 13-B: Install Trigger Cable Assembly.

Locate the MILES cable labeled TRIGGER.

Connect plug labeled P-1 CONTROL CONSOLE J2 to J2 (connector closest to you) on control console (1).

Route cable to networks junction box (2).

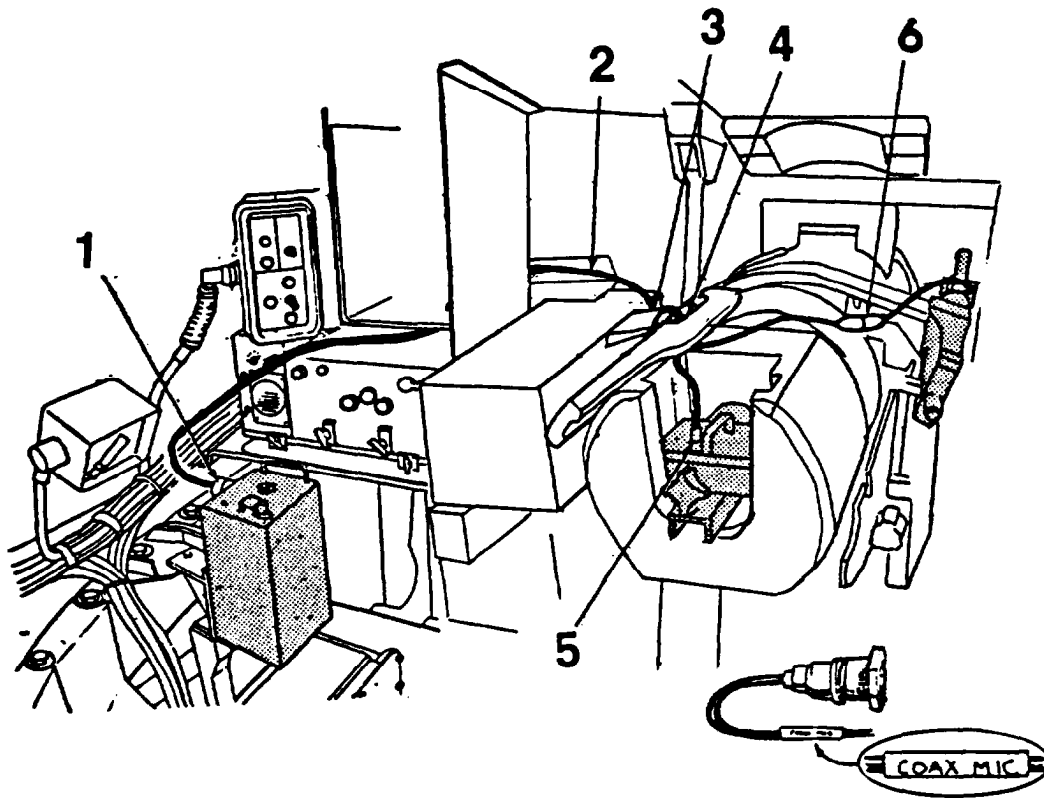
Connect plug labeled P2-TEST 1 to TEST 1 receptacle (3).

NOTE

There is one plug remaining on the cable labeled P3 HOFFMAN TRIGGER. If no Hoffman simulator is installed on your vehicle, this plug is not used.

Secure trigger cable and CVKI cable together with fastener ties (4).

Inside Subtask 13-C: Install Breech Cable Assembly.



Find cable labeled BREECH.

Connect plug labeled P1 CONTROL CONSOLE J1 to J1 receptacle on control console (1).

Route cable behind radio rack (2).

Feed cable under M240 ammunition feed tray (3).

Feed cable through hole in breech guide (4).

Connect plug labeled P2 BREECH XMTR to receptacle on main gun/coax transmitter (5).

Connect plug labeled P3 COAX MIC to cable from coax machine gun microphone (6).

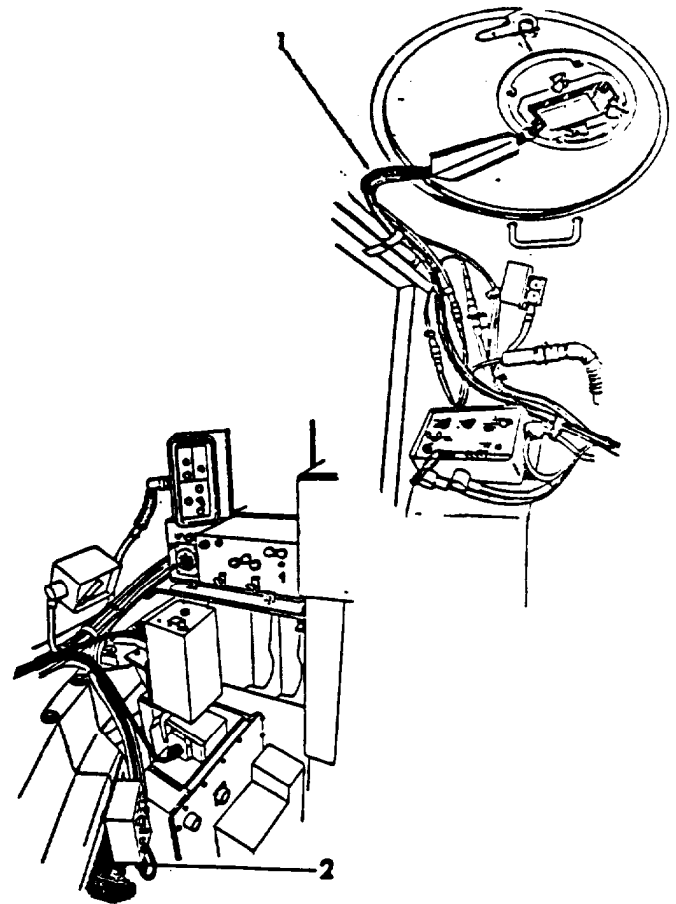
Inside Subtask 13-D: Connect Hoffman Cables.

NOTE

If your vehicle is not equipped with a Hoffman system omit this subtask.

Following path of the other MILES cables, route Hoffman lo-pole cable (1) above ammunition door, above intercom box, and along turret wall toward Hoffman firing device. Secure cable to other MILES cables using fastener ties. Connect the 10-pole socket to matching socket on bottom of Hoffman firing device (2). Tighten securely.

Connect the two-pole and three-pole cables to their respective sockets on bottom of Hoffman firing device (2).



NOTE

All of the following cables are located in the vicinity of the networks junction box.

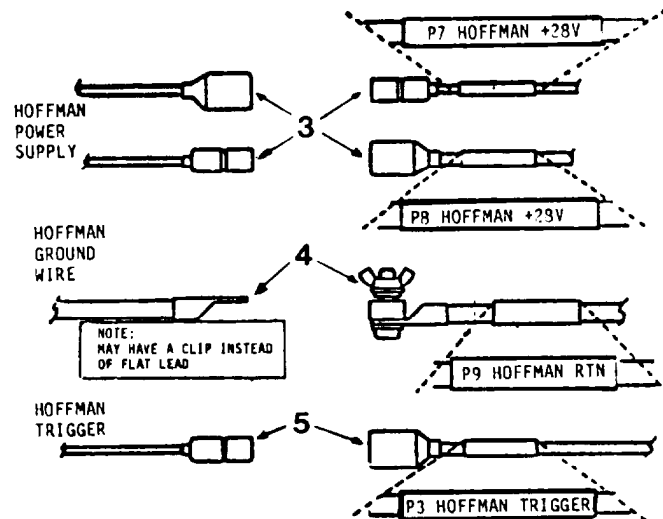
Connect MILES plugs labeled P7 HOFFMAN+28V and P8 HOFFMAN +28V to Hoffman power supply cables (3).

Connect Hoffman grounded wire to cable labeled P9 HOFFMAN RTN (4). Use wing nut supplied on MILES cable.

NOTE

Some Hoffman ground wires may have an alligator clip instead of a spade lead.

Connect MILES cable labeled P3 HOFFMAN TRIGGER to Hoffman trigger cable (5).



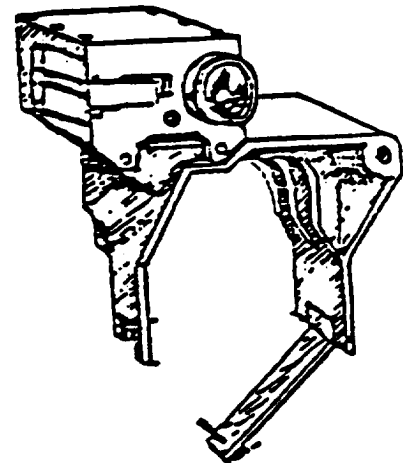
M2 MACHINE GUN TASKS - INDEX

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1. Obtain Equipment	2-46
2. Inspect and Service M2 MG Laser Transmitter	2-47
3. Put Battery in M2 MG Transmitter	2-48
4. Attach M2 MG Transmitter	2-49
5. M2 MG Blank Fire Operation	2-50

Perform these tasks in the order given.

MSMG Task 1: Obtain Equipment. Completion of M2 Machine Gun Tasks requires equipment listed and illustrated below. Locate and set aside this equipment.

M2 MG Laser Transmitter



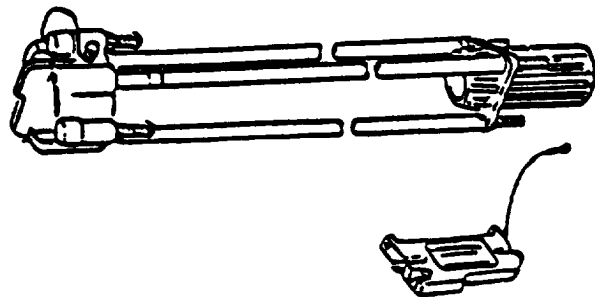
Orange Weapon Key (in rear of transmitter)



9 Volt DC Battery



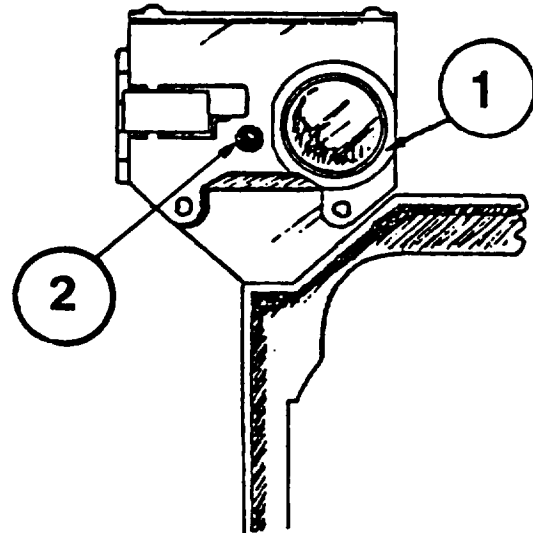
Blank Fire Attachment Components for M2 Machine Gun



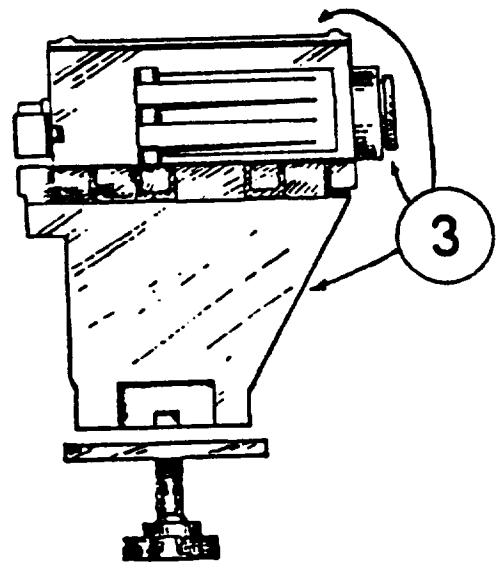
M2MG Task 2: Inspect and Service M2 MG Laser Transmitter.

Remove any dirt or oil from lens (1) with lens paper or a soft, dry cloth.

Make sure foam microphone cover (2) is dry and not caked with dirt or blank fire residue.



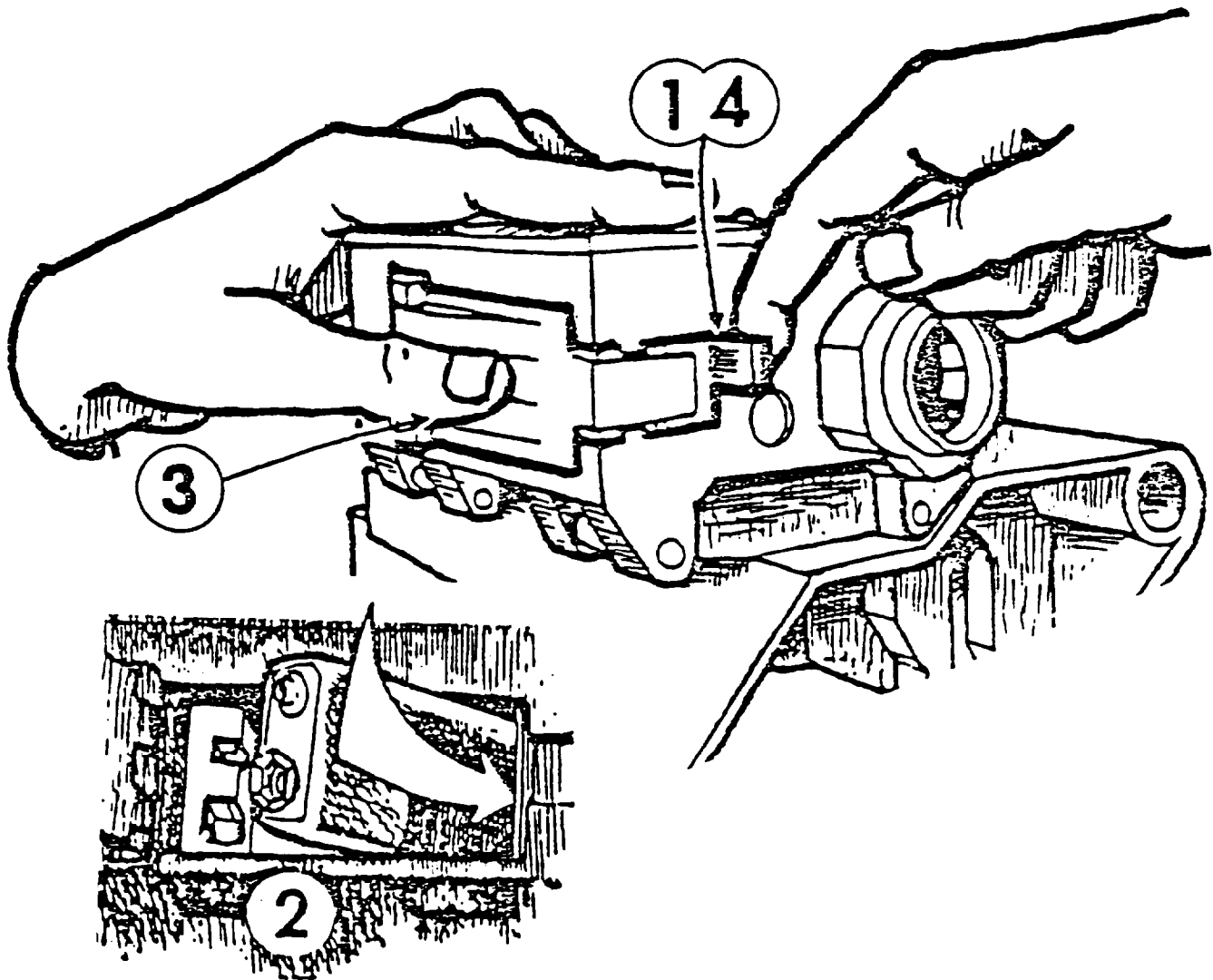
Check for damage that would prevent normal operation of the transmitter.



Wipe all surfaces clean (3).

Report damage on DA Form 2404. Replace transmitter only if unserviceable.

M2MG Task 3: Put Battery in M2 MG Transmitter.



Flip open latch (1).

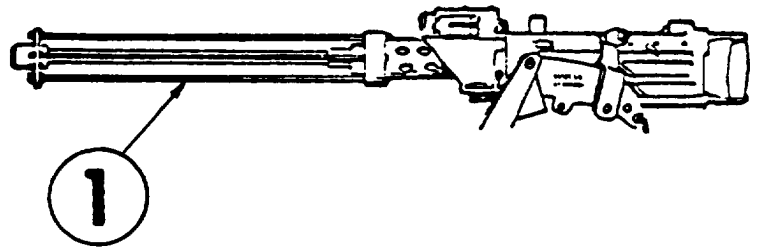
Open battery door and put in a battery as shown (2).

Press door closed (3).

Press latch closed (4).

M2MG Task 4: Attach M2 MG Machine Gun Transmitter.

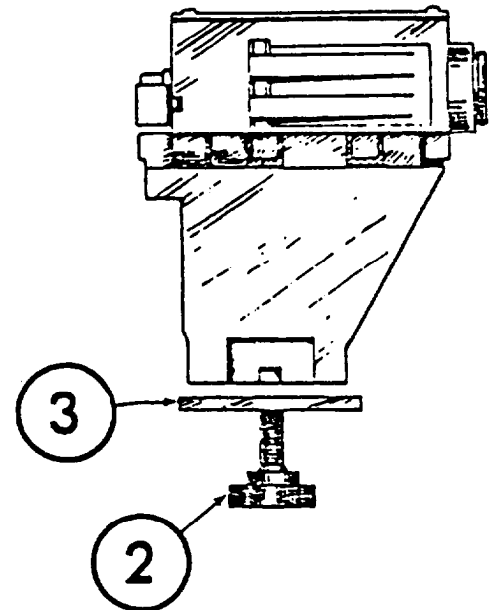
Attach blank fire adapter (1) per TM 9-1005-314-12&P.



Unscrew knob (2) from side of bracket.

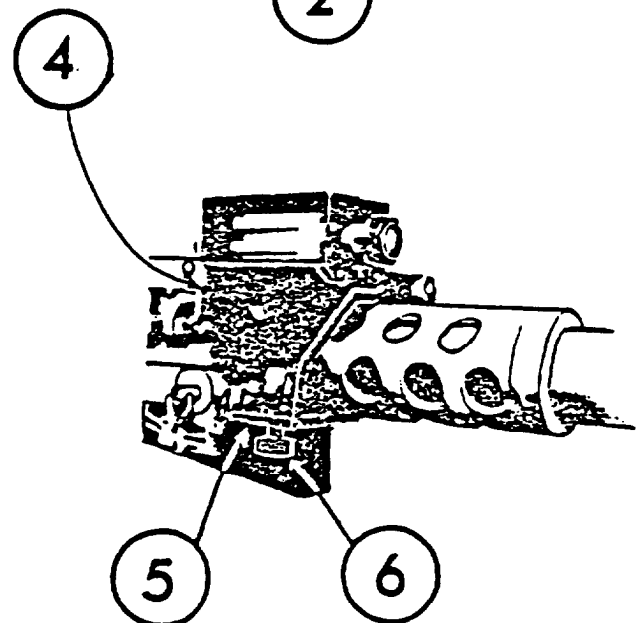
Swing bottom plate (3) down.

Put transmitter on barrel support flush up against receiver (4). Be sure lip of mounting bracket back sits behind barrel cooling jacket so that transmitter is held securely in place.



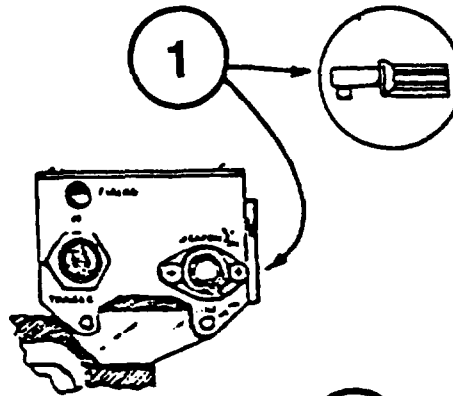
Swing bottom plate back up against transmitter mounting bracket (5).

Tighten knob (6) securely with your hand. Do not use a wrench.



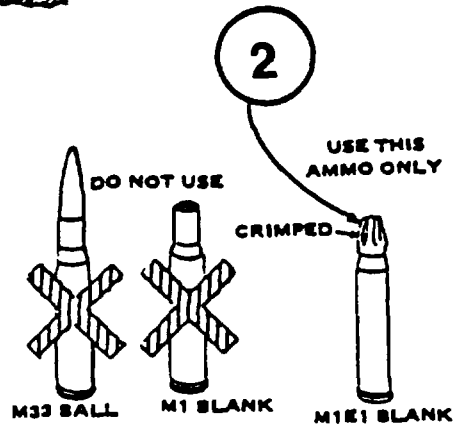
M2MG Task 5: M2 MG Blank Fire Operation.

Be sure orange key (1) is turned to WEAPON ON or transmitter will not fire.



Load the M2 with blank ammunition (2).

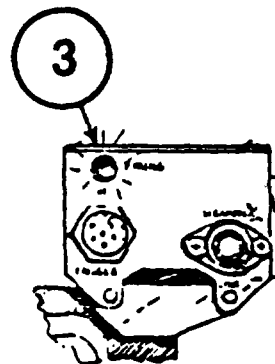
M2 is ready to fire. Firing is done normally. Sound of blanks being fired will trigger laser transmitter. Transmitter will operate only when blank ammunition is being fired.



Fire a short burst and watch firing lamp (3). It should light. if no light appears, turn to Troubleshooting, page 3-2.

NOTE

At least once a day use a clean dry cloth to remove blank-fire powder residue from transmitter lens. After firing is completed, M2 Machine Gun will be cleaned in accordance with instructions given in TM 9-1005-213-10.



M240 MACHINE GUN TASKS - INDEX

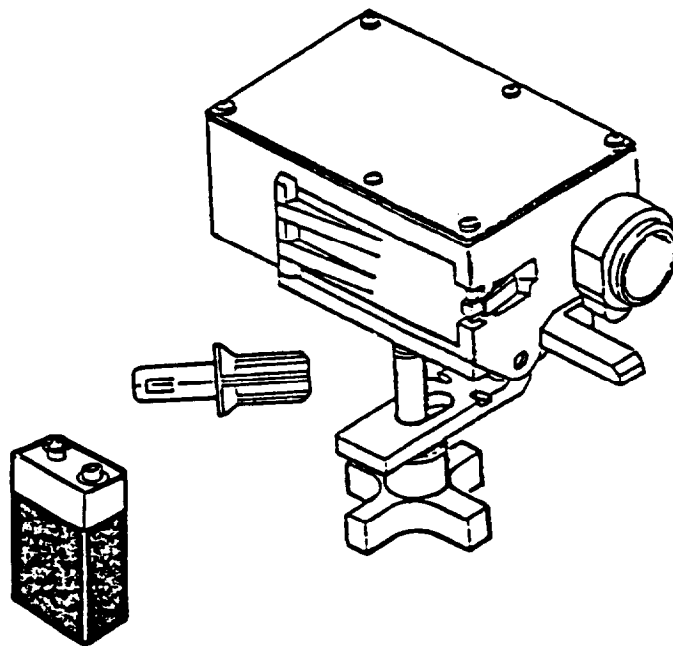
	Page
1. Obtain Equipment	2-51
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3. Put Battery in M240 MG Laser Transmitter	2-53
4. Attach M240 MG Transmitter	2-54
5. M240 MG Blank Fire Operation	2-55

Perform these tasks in the order given.

M240 MG Task 1: Obtain Equipment. Completion of M240 MG Tasks requires the equipment listed and illustrated below. Locate and set aside this equipment.

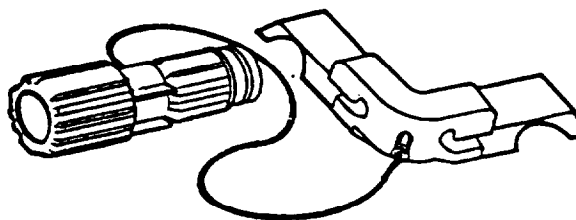
M240 MG Laser Transmitter

Yellow Key (in rear of transmitter)

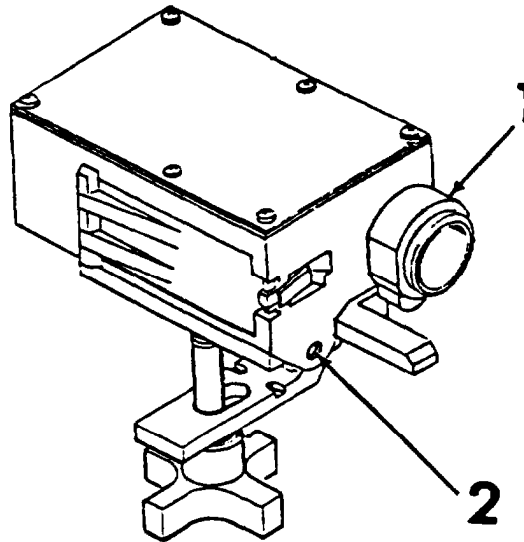


9 Volt DC Battery

Blank Fire Attachment Components for M240 Machine Gun



M240 MG Task 2: Inspect and Service M240 MG Laser Transmitter.



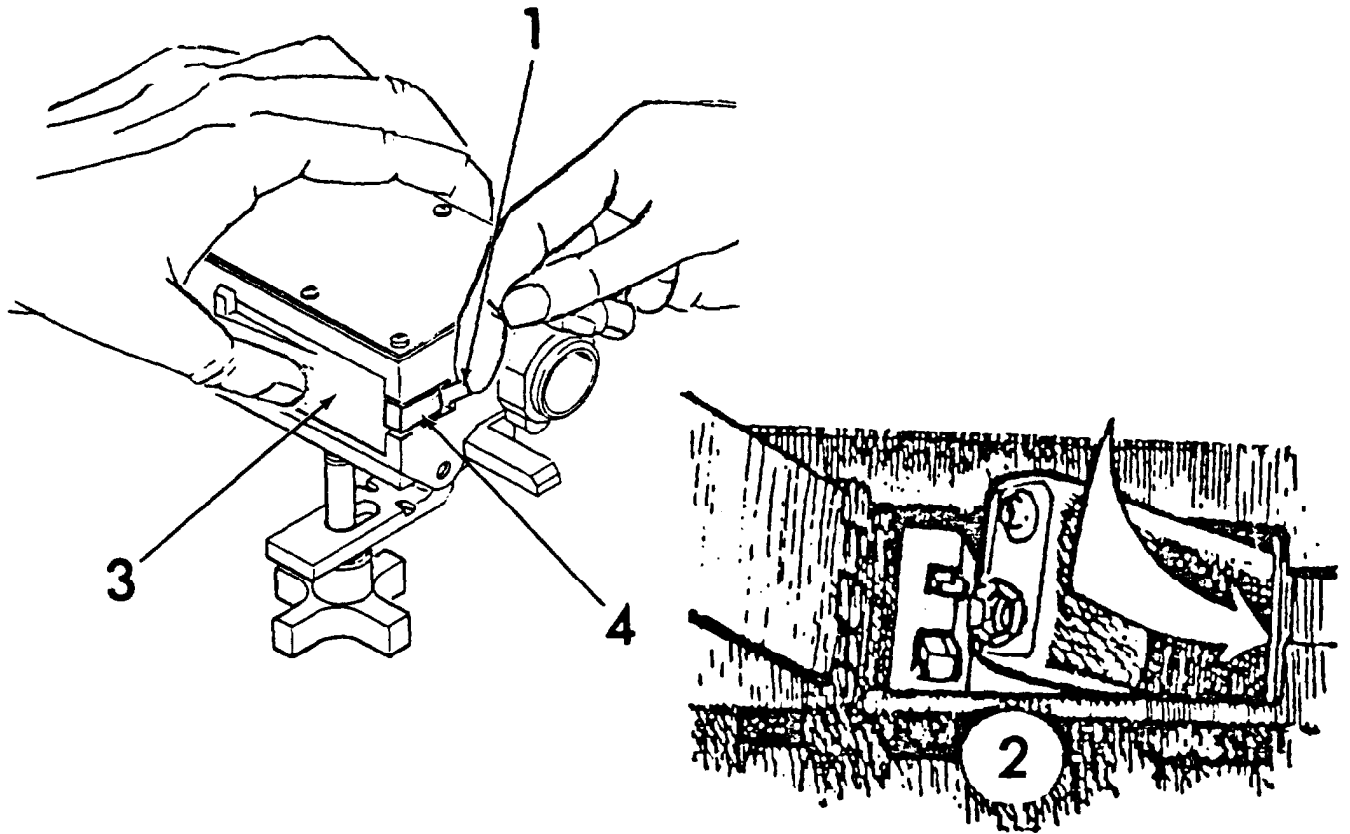
Remove any dirt or oil from lens (1) with lens paper or a soft, dry cloth. Make sure foam microphone cover is dry (2) and not caked with dirt or blank fire residue.

Check for damage that would prevent normal operation of transmitter.

Wipe all surfaces clean.

Report damage on DA Form 2404. Replace transmitter only if unserviceable.

M240 MG Task 3: Put Battery in M240 MG Transmitter.



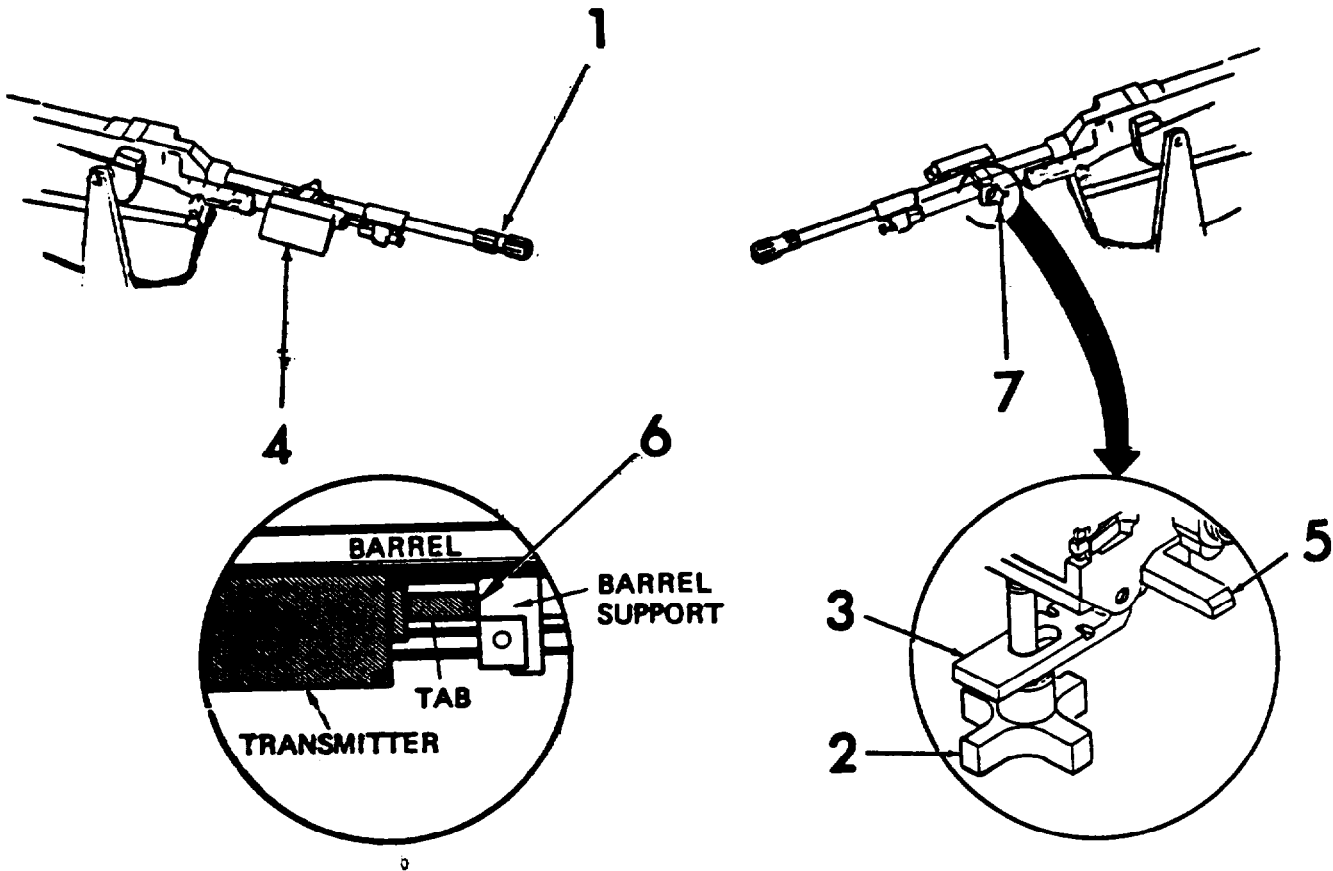
Flip open latch (1).

Open battery door and put in a battery as shown (2).

Press door closed (3).

Press latch closed (4).

M240 MG Task 4: Attach M240 MG Transmitter,



Attach blank firing adapter (1).

Unscrew barrel attach knob (2) on transmitter bracket.

Swing plate (3) open.

Put transmitter (4) on right side of barrel as shown.

Swing plate (3) back around barrel attach knob (2) but do not tighten,

Slide transmitter forward until positioning tab (5) on transmitter mounting bracket touches barrel support (6).

Securely tighten knob (7) with your hand. **Do not use a wrench.**

M240 MG Task 5: M240 MG Blank Fire Operation.

NOTE

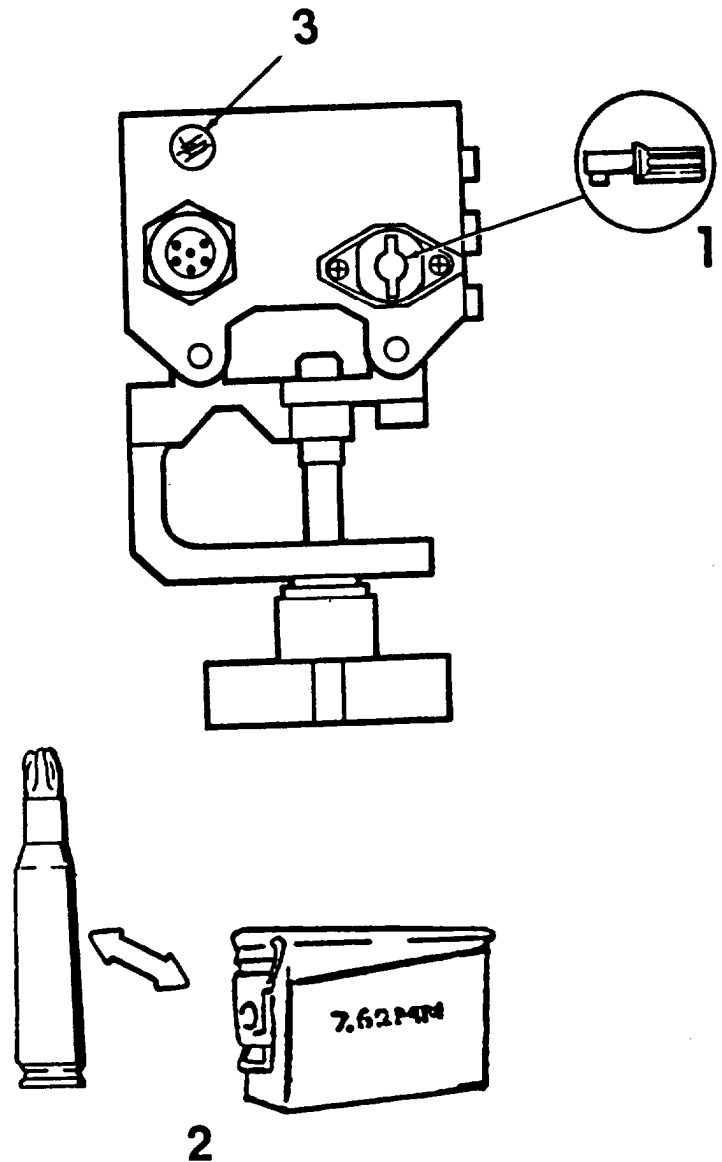
Make sure M240 MG Task 3 has been completed.

Turn yellow key (1) to WEAPON ON. Transmitter **will not fire** if this is not done.

Load M240 with blank ammunition (2).

M240 is ready to fire. Firing is done normally. Sound of blanks being fired will trigger transmitter. Transmitter will operate only when blank ammunition is being fired.

Ask another crewman to watch firing light (3) on transmitter as you fire a short burst. Lamp should light. If no light appears, turn to Troubleshooting, page 3-2.



NOTE

At least once a day use a clean dry cloth to remove blank fire powder residue from transmitter lens. After firing is completed, M240 Machine Gun will be cleaned in accordance with instructions given in TM 9-1005-213-10.

MWLD TASKS - INDEX

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2. Install Fastener Tape	2-57
3. Inspect and Clean Torso Harness	2-58
4. Inspect and Clean Helmet Harness	2-59
5. Install Batteries in MWLD Harness	2-60
6. Put on Torso Harness	2-61
7. Put Helmet Harness on Helmet	2-62

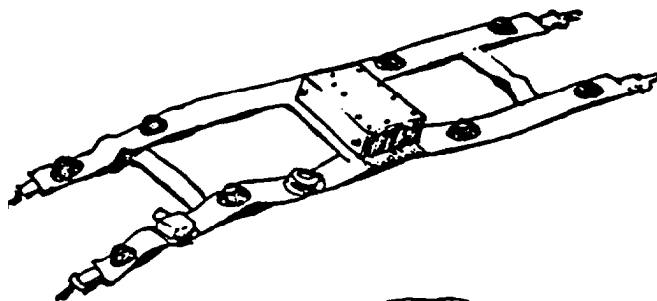
MWLD Task 1: Obtain Equipment. Completion of MWLD Tasks requires tank commander, loader and gunner to each obtain the equipment listed and illustrated below. Locate and set aside this equipment.

Tape Primer

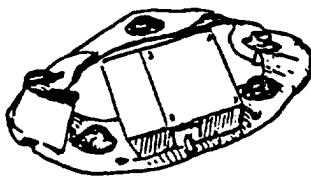
Fastener Tape



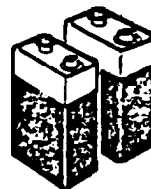
Torso Harness



Helmet Harness

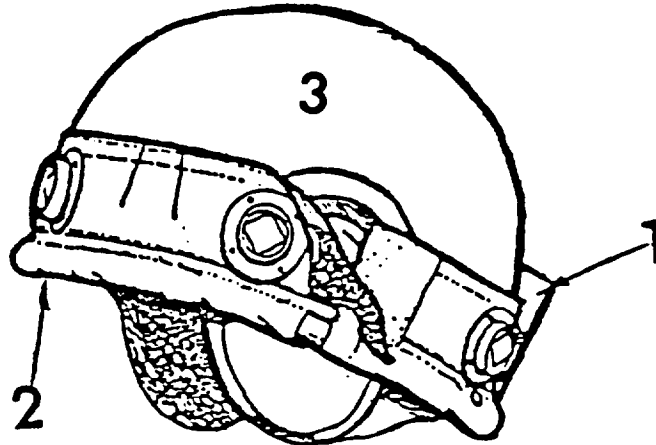


9 Volt Batteries (2 each)



MWLD Task 2: install Fastener Tape.

Crew helmets require three patches of fastener tape glued to the outside to hold the MWLD helmet harness in place. The fastener tape patches must be attached to the proper position on the helmet so that they will mate with three patches of fastener tape which are attached to the harness. Fastener tape is installed as follows:



Slip helmet harness over helmet so that electronics box (1) is at rear.

Make sure thick bottom edge (2) of harness completely covers and overhangs rim of helmet.

Pull harness tight. Mark helmet (3) where the three fastener patches on harness touch it.

Remove harness.

WARNING

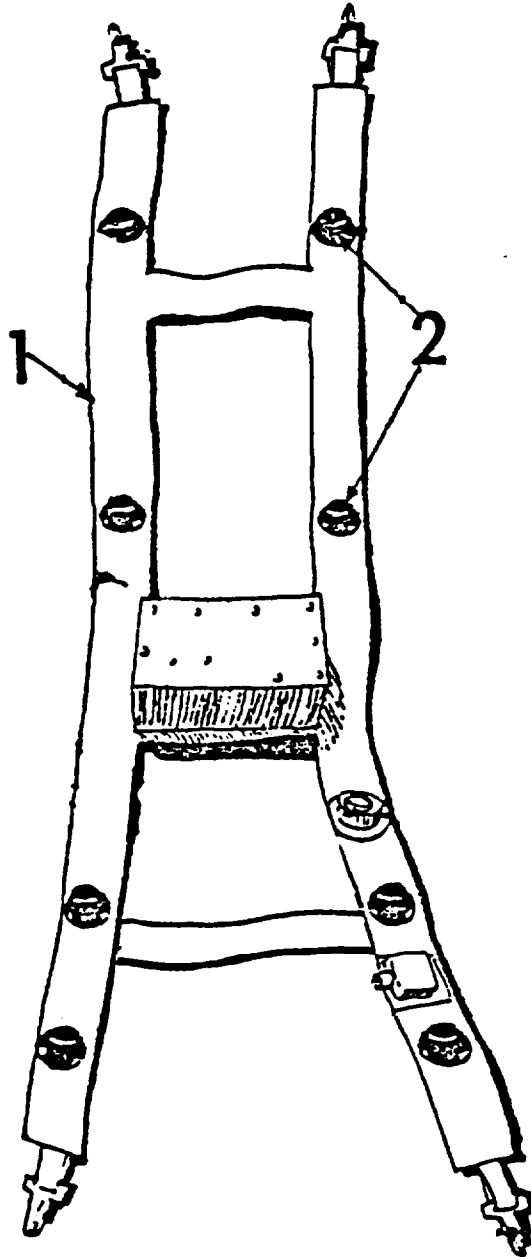
Primer is highly inflammable, Do not spray near heat, sparks, or open flame. Use only in well ventilated area.

Spray tape primer over marked areas where fastener tape will be attached. Allow spray to dry.

Use tape patches supplied with MILES adapter kit or cut three strips of fastener tape (approximately 2 inches long).

Remove backing paper and firmly press tape patches onto helmet.

MWLD Task 3: Inspect and Clean Torso Harness.

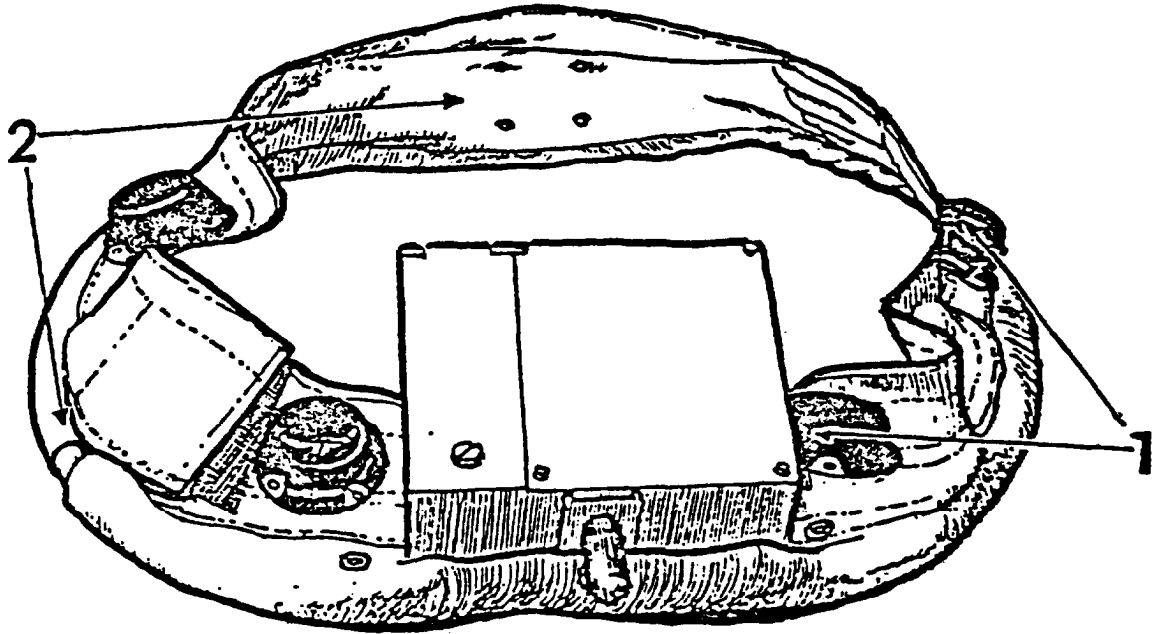


Inspect torso harness (1) for any damage that would prevent normal operation.

Wipe detectors (2) clean. (Clean all 8.)

Report any damage on DA Form 2404. Replace torso harness only if not operable.

MWLD Task 4: Inspect and Clean Helmet Harness.

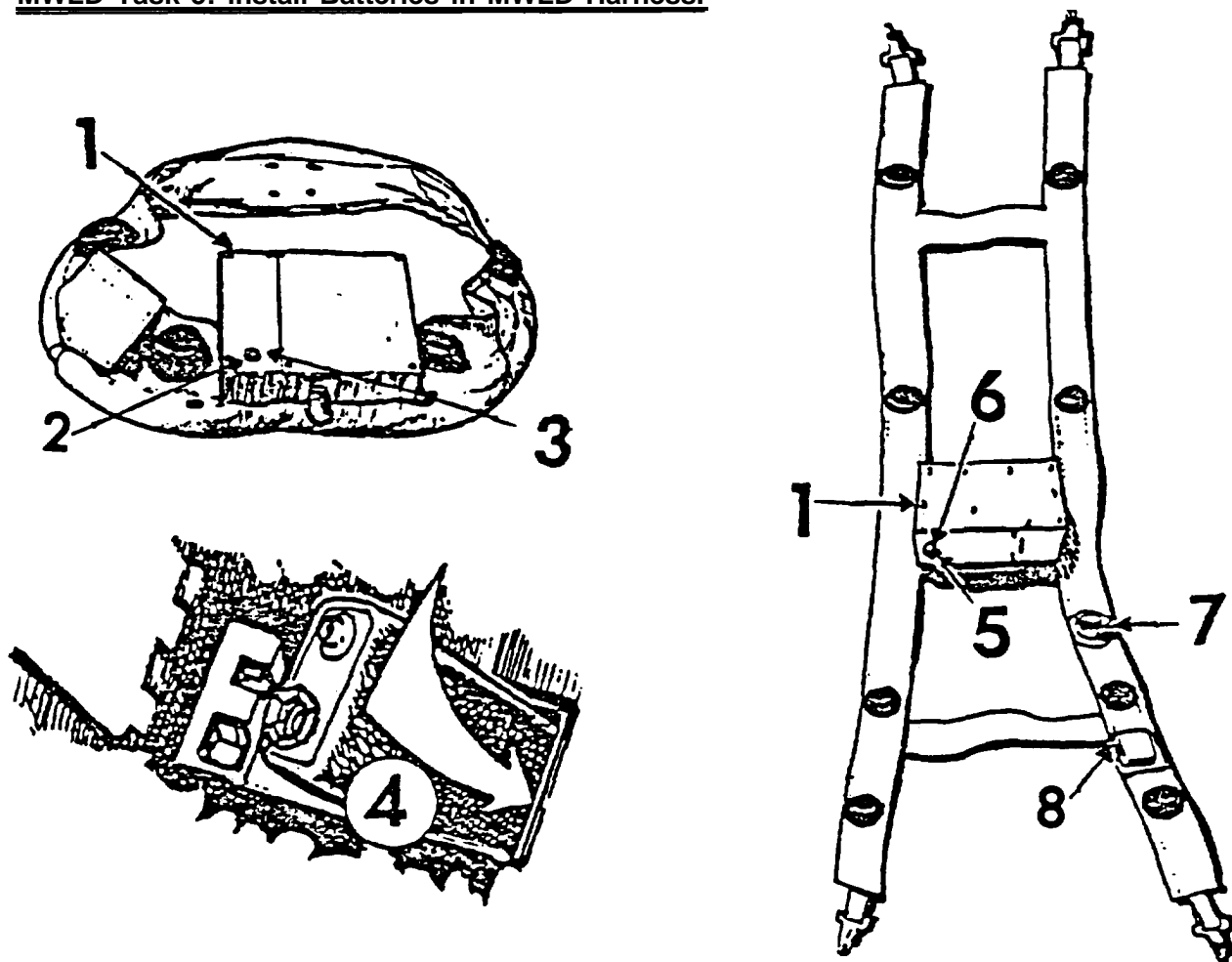


Wipe detectors (1) clean. (Clean all 5.)

Inspect helmet harness (2) for any damage that would prevent normal operation.

Report any damage on DA Form 2404. Replace helmet harness only if not operable.

MWLD Task 5: install Batteries in MWLD Harness.



Locate battery boxes (1) on both helmet and torso harnesses.

Put a battery in helmet harness first Loosen thumbscrew (2) and open door (3) on battery box. Put in battery as shown (4). Close door and tighten thumbscrew.

Loosen thumbscrew (5) and open door (6) on torso harness battery box. Put in battery as shown (4). When you put a battery in torso harness, an alarm (7) should sound. Ask controller to insert his green key in key receptacle (8) and silence alarm.

NOTE

BE SURE TO PUT A BATTERY IN BOTH THE TORSO AND HELMET HARNESES.

MWLD Task 6: Put on Torso Harness.

If you are wearing them, remove the suspenders from your web gear.

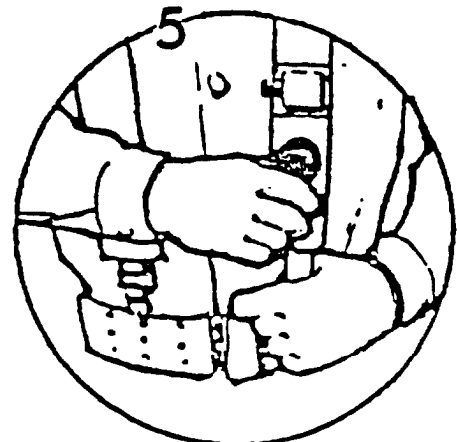
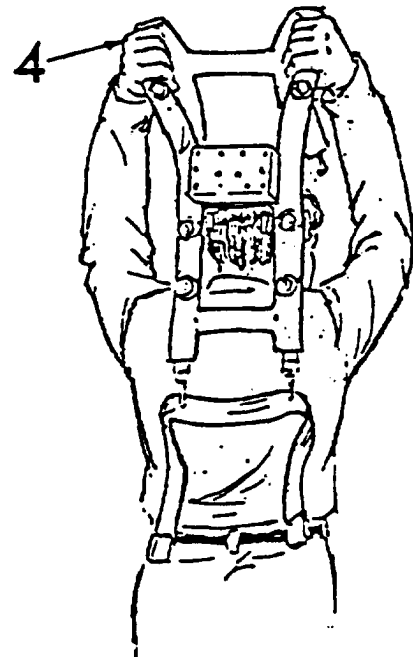
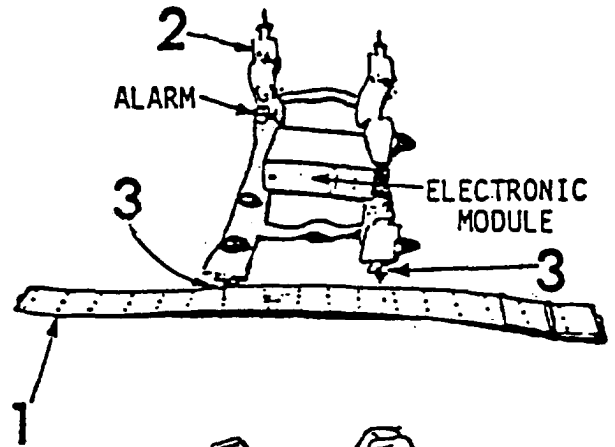
Remove your web belt (1) and lay it next to the harness as shown.

The harness (2) should look like this with the alarm above the electronic module.

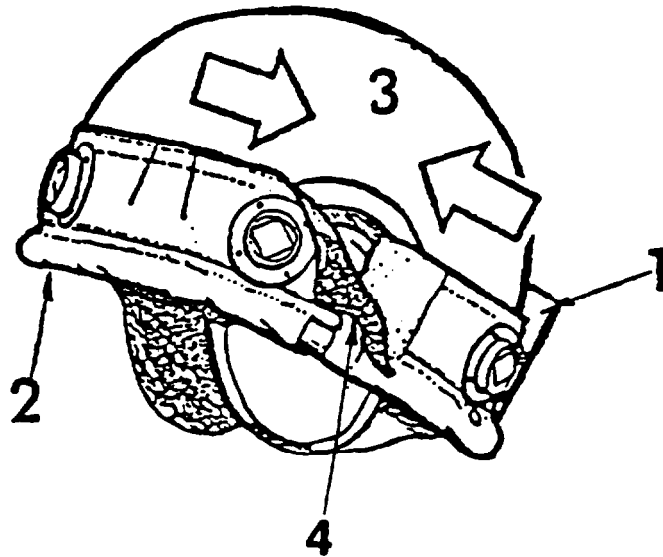
Fasten both clips (3) to the belt.

With your web belt at the bottom raise the harness (4) and then lower it over your head.

Connect the harness to your web belt (5). Adjust harness so battery box is at the back of your collar, at the collar line.



MWLD Task 7: Put Helmet Harness on Helmet.



NOTE

Your helmet must have three patches of fastener tape installed on the outside. If you do not have any fastener tape on your helmet, turn to MWLD Task 2 for instructions on installing the fastener tape.

Slip harness over helmet so that electronics box (1) is at rear.

Make sure heavy cable (2) overhangs the lip of helmet.

Adjust harness so that three pieces of fastener tape on inside of harness line up with fastener tape pieces attached to outside of your helmet.

Pull harness ends in direction of arrows (3) to tighten harness.

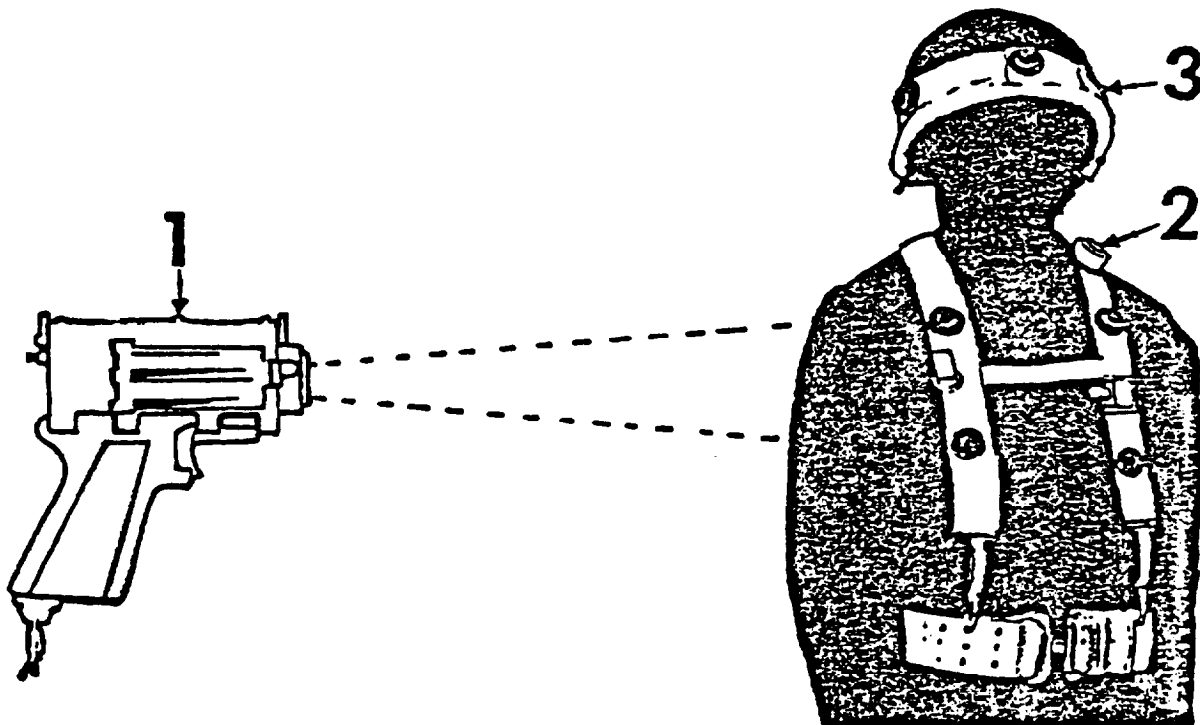
Fasten the fastener tape flap (4) tightly.

When you wear your helmet, fasten the chinstrap. Added weight of harness makes this necessary.

TEST TASKS - INDEX

	Page
1. Test operation of MWLD	2-63
2. Test MILES System	2-64

Perform these tasks in the order given.

Test Task 1: Test Operation of MWLD.

Ask controller to set his controller gun (1) to "NEAR MISS." Ask him to test your torso harness.

When he fires, your alarm (2) should sound briefly.

Ask controller to test helmet harness (3) for an alarm.

If alarms do not sound, turn to Troubleshooting, pages 3-2 and 3-3.

Test Task 2: Test MILES System. Testing of MILES system consists of the following subtasks:

- Test Subtask 2-A: Control Console Test
- Test Subtask 2-B: Trigger Interface Test
- Test Subtask 2-C: Main Gun Transmitter Test
- Test Subtask 2-D: Coax Machine Gun Transmitter Test
- Test Subtask 2-E: Belt Test

Perform these subtasks in the order given.

Test Subtask 2-A: Control Console Test.

NOTE

Before doing this task check with your TC to make sure all Outside, Inside, MG, MWLD tasks, and Test Task 1 have already been done.

Turn tank MASTER VEHICLE SWITCH and UTILITY POWER SWITCH on networks junction box to ON.

Press display button (1) on control console. Display (2) should show 00.

If display does NOT show 00, go to Troubleshooting, page 3-4.

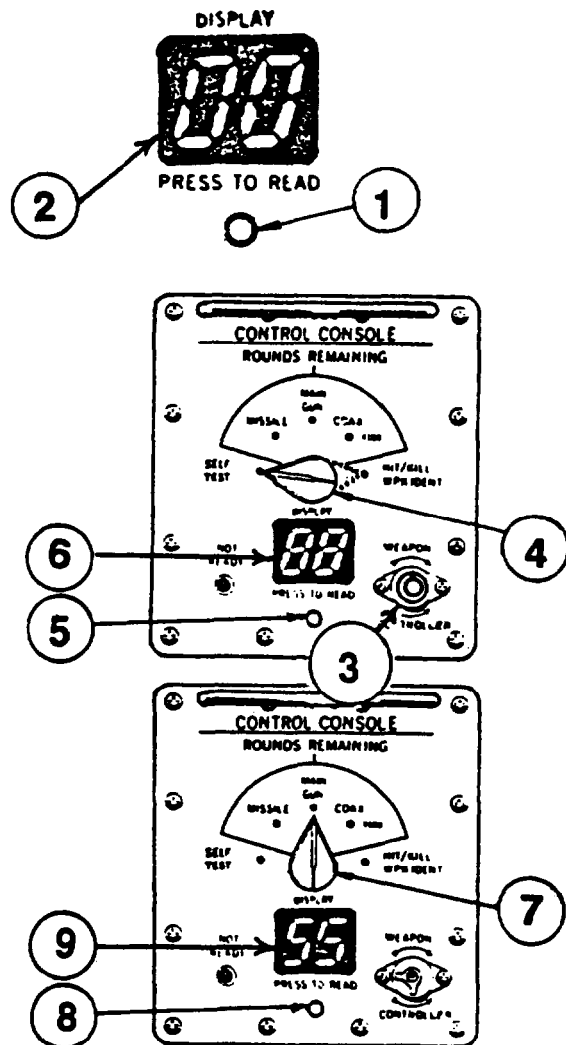
Ask controller to reset system by inserting his green key in key receptacle (3) on control console. Turn to CONTROLLER. Turn back and remove key.

Turn console switch (4) to HIT/KILL. Then turn to SELF-TEST. Press display button (5). Display (6) should show 00.

If display does NOT show 00, go to Troubleshooting, page 3-4.

Turn console switch (7) to MAIN GUN. Press display button (8). Display (9) should show 55.

if display does NOT show 55, go to Troubleshooting, page 3-4.



Test Subtask 2-A: Control Console Test (Cont).

Insert orange weapon key (10) into control console receptacle (11). Turn key, then turn key back and remove. Verify that a tone sounds in the vehicle intercom, the CVKI light flashes continuously and the display shows 99 and NOT READY light is on.

If no intercom tone, the CVKI does not flash or 99 is not displayed, go to Troubleshooting, pages 3-5 and 3-6.

Ask controller to reset control console.

Test Subtask 2-B: Trigger interface Test.

Turn MASTER VEHICLE POWER to ON.
 Set MAIN GUN SWITCH on GUNNER'S CONTROL PANEL to ON.
 Set MAIN GUN SAFETY on OFF, and fire main gun.

Press control console display button (1). Display (2) should show 54 (for MI) or 50 (for MI AI).

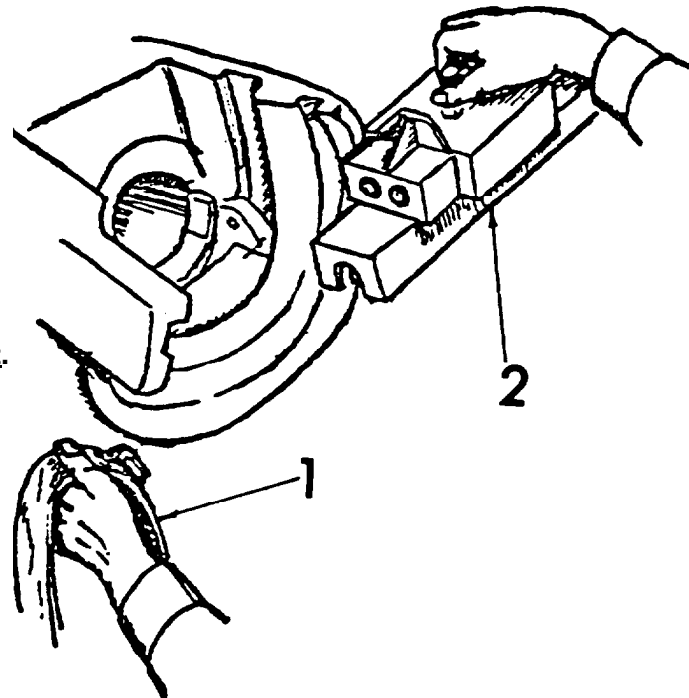
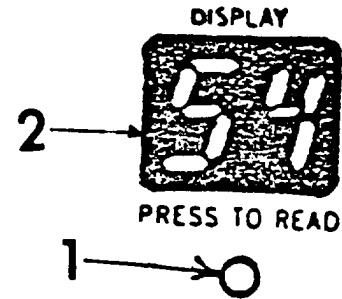
if display does NOT show 54 or 50, go to Troubleshooting, page 3-4.

Test Subtask 2-C: Main Gun Transmitter Test.

Temporarily remove transmitter from main gun breech.
 Hold torso harness (1) in front of main gun transmitter (2). Fire main gun trigger and listen for "KILL" indication. Make sure torso harness used for test has a battery installed and has been tested for proper operation.

If no indication, go to Troubleshooting, page 3-5.

Ask Controller to reset torso harness.



Test Subtask 2-D: Coax Machine Gun Transmitter Test.

Make sure coax machine gun is loaded with blank ammunition.

Turn GUN SELECT switch on tank to COAX.

Hold a man worn torso harness (1) in front of main gun transmitter (2) and fire coax machine gun. Listen for a "KILL" or "NEAR MISS" indication.

If no indication, go to Troubleshooting, page 3-5.

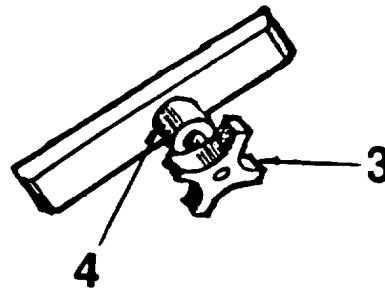
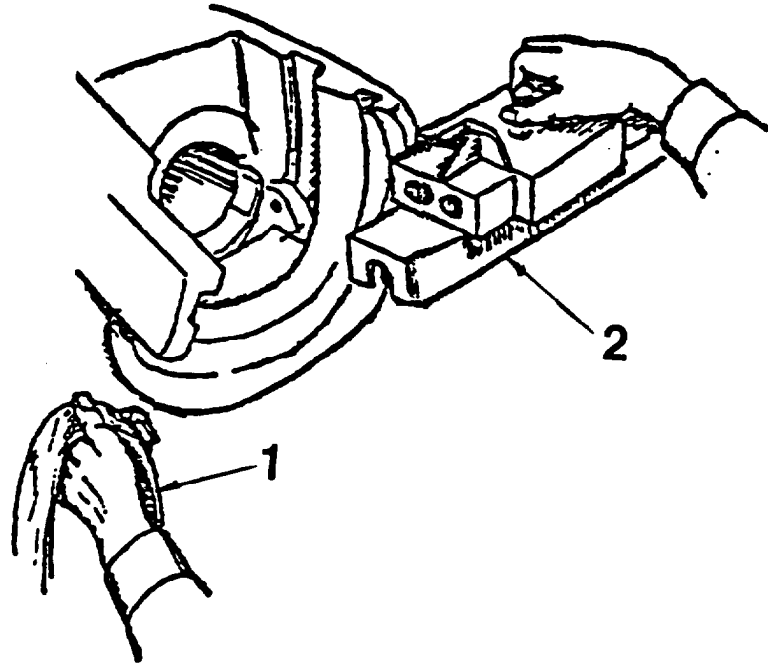
Ask controller to reset torso harness.

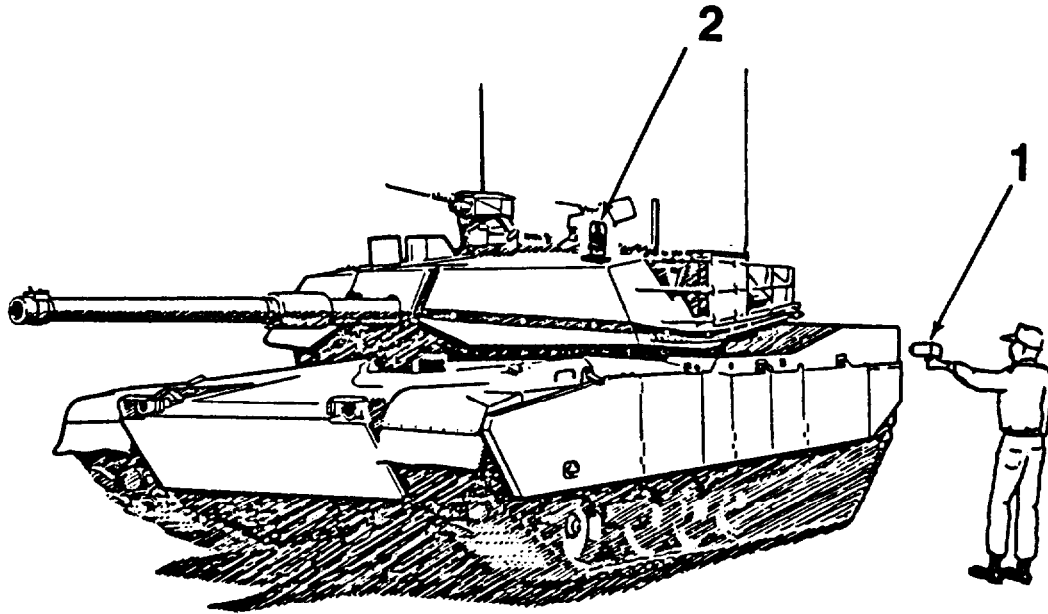
Turn GUN SELECT switch to TRIGGER SAFE position.

Place main gun transmitter in breech of main gun and **SECURELY TIGHTEN KNOB (3) AND JAM NUT (4) ON RETAINER ASSEMBLY.** (SEE Inside Task 9.)

CAUTION

Failure to secure retainer assembly will severely limit laser transmitter's accuracy.



Test Subtask 2-E: Belt Test.

Make sure MASTER VEHICLE POWER and UTILITY POWER switches are ON.

Check that all cable connections to detector belt segments are tight. Ask a crewmate to check that CVKI cable connections to control console and utility connector are also tight.

Ask controller to test your belt segments by setting his controller gun (1) on "NEAR MISS," and firing at each detector from a distance of 3 to 10 feet.

Each time he fires the CVKI light (2) should flash.

If the CVKI fails to flash for some or all of the detectors, go to Troubleshooting, page 3-6.

NOTE

It is OK for one detector on each belt segment to be bad.

ALIGNMENT TASKS - INDEX

	Page
1. Align MI Main Gun (105 mm)/Coax MG Laser Transmitter	2-68
1.1. Align MI AI Main Gun (120 mm)/Coax MG Laser Transmitter	2-74
2. Align M2 Machine Gun	2-74.4

Perform either task 1 or task 1.1 and task 2 in the order given.

Align Task 1: Align MI Main Gun (105 mm)/Coax MG Laser Transmitter. The MILES main gun/coax MG laser transmitter is aligned by completing the following subtasks:

Align Subtask 1-A: Prepare for manual input

Align Subtask 1-B: Manual data input

NOTE

Proper alignment is critical to operation of MILES system for MI main gun and coax machine gun. Read all instructions for Align Task 1 before proceeding. Then carefully perform each step in the order given. Prior to aligning main gun and coax machine gun laser transmitter, be sure to check and adjust “normal mode drift” out of system

Align Subtask 1-A: Preparation for Manual Input

NOTE

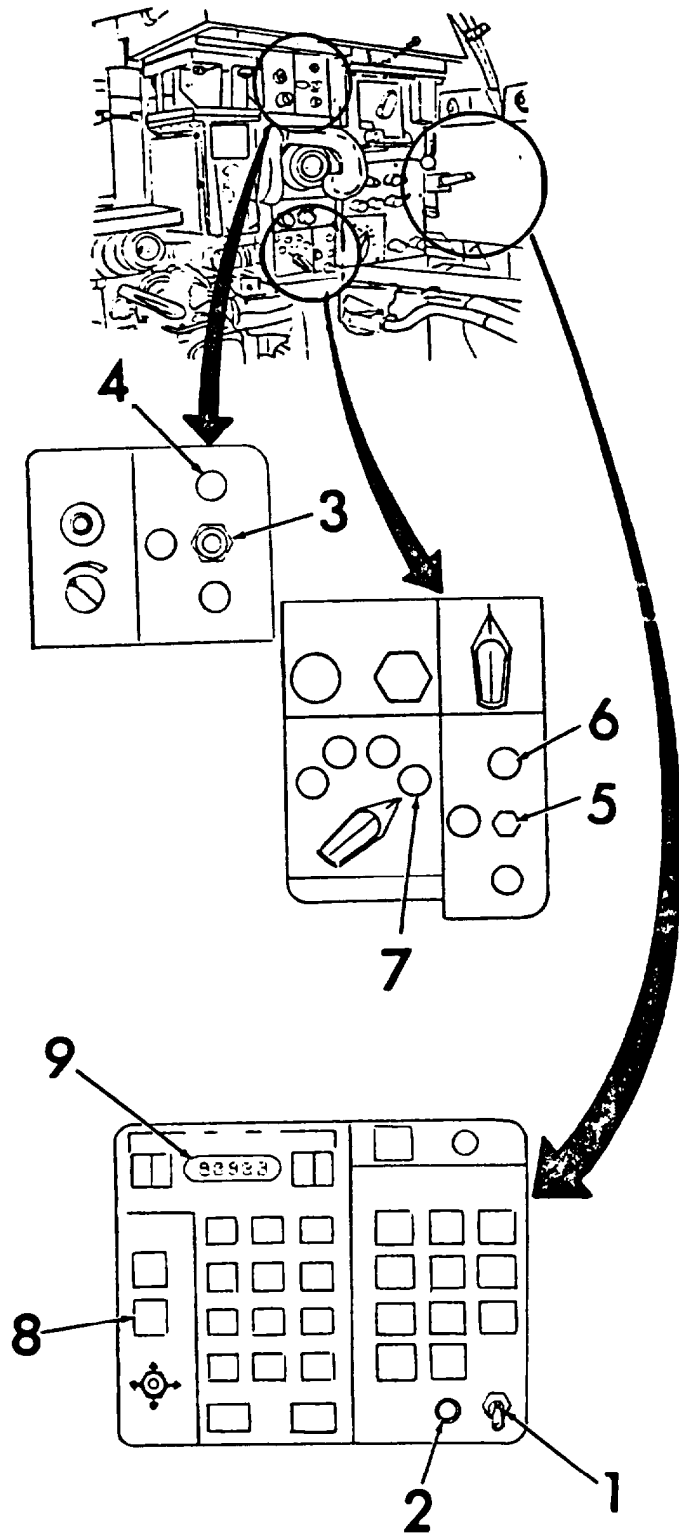
Determine exact range of the boresight target prior to starting this task. -The recommended boresight range is 1200 meters.

- Make sure TURRET POWER is ON.

1. Open COMPUTER CONTROL PANEL (CCP) door and set POWER switch (1) to ON.
2. Make sure PWR indicator lamp (2) comes on.
3. Set FIRE CONTROL MODE switch (3) on gunner's primary sight (GPS) upper panel to EMERGENCY.
4. Check that EMERGENCY indicator lamp (4) comes on.
5. Set GUN SELECT switch (5) to MAIN.
6. Make sure MAIN indicator lamp (6) comes on.
7. Set AMMUNITION SELECT (7) to SABOT.
8. Press BORESIGHT key (6).
9. Record numbers that appear in display window (9).

NOTE

It is very important that the numbers displayed are recorded and retained. They must be reentered into the computer following the training exercise.



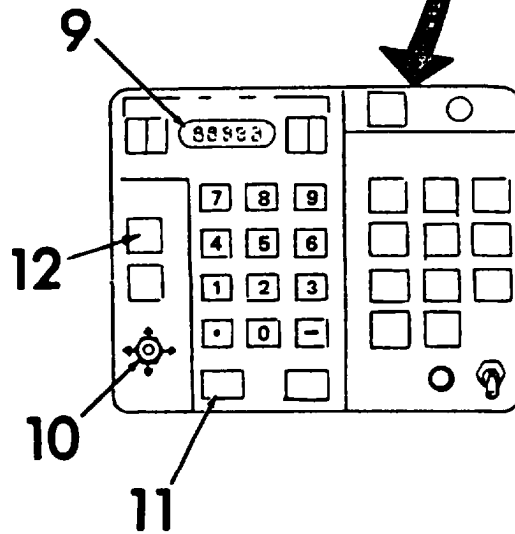
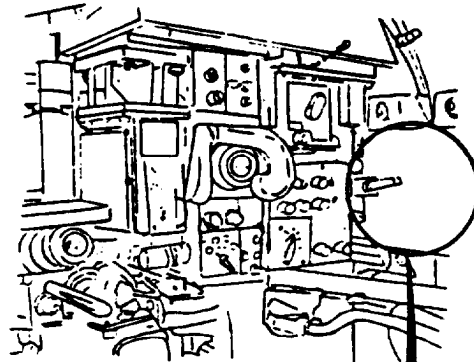
Align Subtask 1-A: Preparation for Manual Input (Cont)

10. Enter 0.0 in the display window (9) by moving TOGGLE switch (10) up (U), down (D), left (L), or right (R).
11. When numbers in display window (9) read 0.0, press ENTER key (11).
12. Press ZERO key (12) and record numbers that appear in display window (9).

NOTE

It is very important that the numbers displayed are recorded and retained. They must be reentered into the computer following the training exercise.

13. Enter 0.0 in display window (9) by moving TOGGLE switch (10) up (U), down (D) left (L), or right (R).
14. When numbers in display window (9) read 0.0, press ENTER key (11).



Subtask 1-B: Manual Data Input.

CAUTION

Data entered manually into an Auto Input function (LEAD, CANT, CROSSWIND, RANGE) can not be recalled. Key button must remain lit indicating the computer is not receiving automatic data.

15. Press LEAD button (13).
 16. Enter 0.0 in display window (9) by using number keys (14).
 17. Press ENTER key (11).
-

NOTE

LEAD button (13) must remain lit. DO NOT PRESS LEAD BUTTON after step 17 is performed.

18. Press CANT button (15).
 19. Enter 0.0 in display window (9) by using number keys (14).
 20. Press ENTER key (11).
-

NOTE

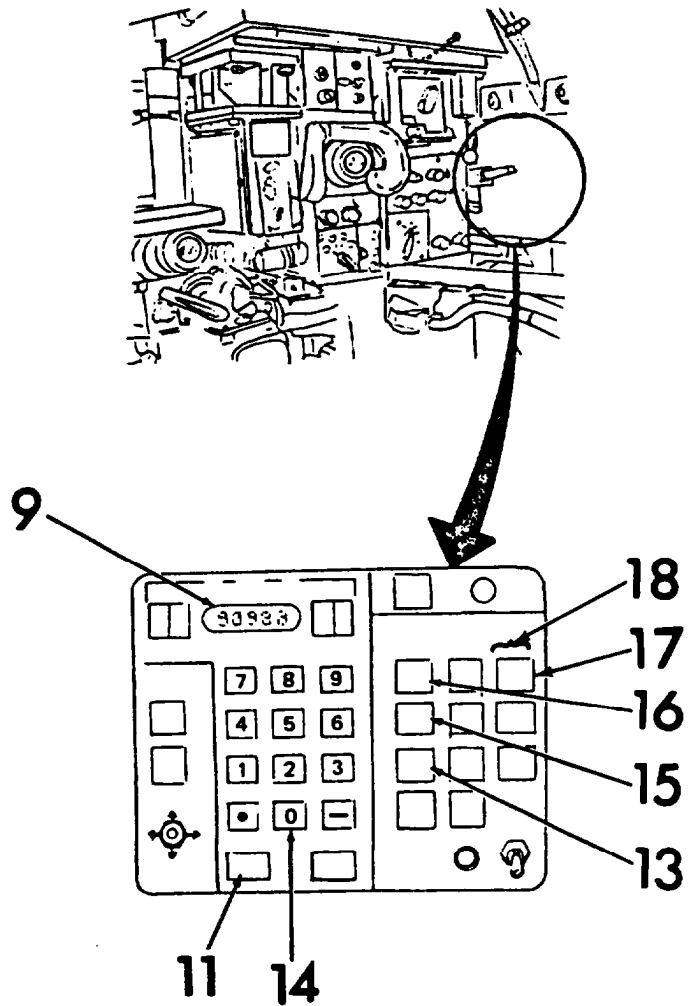
CANT button (15) must remain lit. DO NOT PRESS CANT BUTTON after step 20 is performed.

21. Press CROSSWIND button (16).
 22. Enter 0.0 in display window (9) by using number keys (14).
 23. Press ENTER key (11).
-

NOTE

CROSSWIND button (16) must remain lit. DO NOT PRESS CROSSWIND BUTTON after step 23 is performed.

24. Press AMMO SUBDES key (17) located behind protective cover (16) and verify that number in display window (9) is 0. If not, record numbers. Enter 0 by pressing number keys (14) then press ENTER key (11). Close protective cover



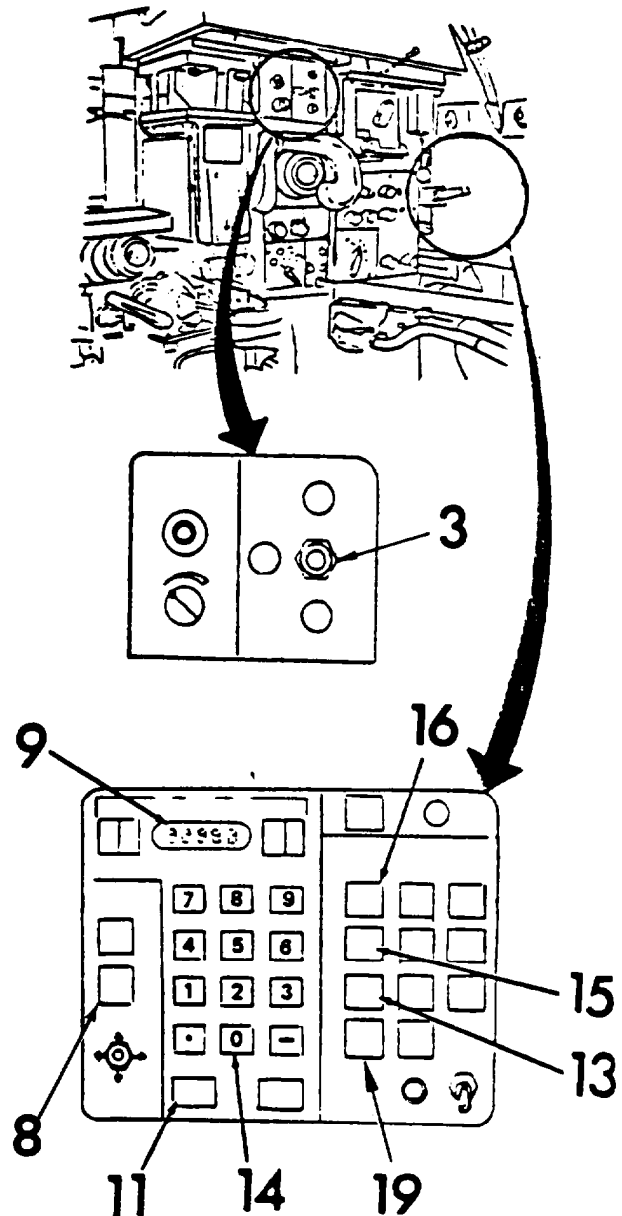
Align Subtask 1-B: Manual Data Input (Cont).

25. Press RANGE button (19).
26. Enter range of boresight target using number keys (14).
27. When the numbers in display window (9) indicate boresight range, press ENTER key (11).

NOTE

RANGE button (19) must remain lit. DO NOT PRESS RANGE BUTTON after step 27 is performed.

28. Press and release gunner's or commander's palm switches one time.
29. Set FIRE CONTROL MODE switch (3) to manual.
30. Manually align MILES transmitter scope to selected boresight target using manual turret and elevation crank handles. Recommended boresight range is 1200 meters.
31. Verify that LEAD (13), CANT (15) CROSSWIND (16), and RANGE (19) keys are lit. If not, repeat steps
 - 15, 16, and 17 if LEAD key is not lit.
 - 18, 19, and 20 if CANT key is not lit.
 - 21, 22, and 23 if CROSSWIND key is not lit.
 - 25, 26, and 27 if RANGE key is not lit.
32. Press BORESIGHT key (6).



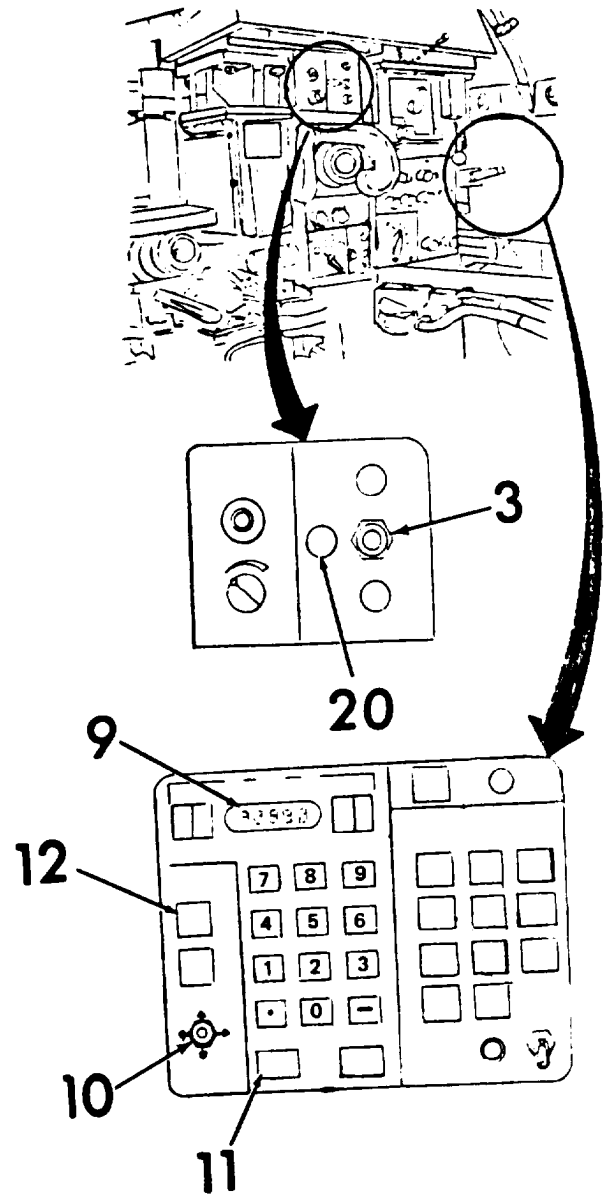
Align Subtask 1-B: Manual Data Input (Cont).

33. While looking through the Gunner's Primary Sight (GPS), move TOGGLE switch (10) up (U), down (D), left (L), or right (R) to place reticle on boresight target.
34. When reticle is aligned on boresight target, press ENTER key (11).
35. Press ZERO key (12).
36. While looking through the Gunner's Primary Sight (GPS), move TOGGLE switch (10) up (U), down (D), left (L), or right (R) to place reticle on boresight target.
37. When reticle is aligned on boresight target, press ENTER key (11).

NOTE

If is very important that the numbers displayed are recorded and retained. They must be reentered into the computer following the training exercise.

38. Close Computer Control Panel door.
39. Align GUNNER AUXILIARY SIGHT (GAS) and M105D sight with boresight target.
40. Set FIRE CONTROL MODE switch (3) on Gunner's Primary Sight (GPS) upper panel to NORMAL. Verify that NORMAL indicator lamp (20) goes on.
 - Boresight procedures are now complete. To check boresight use power control handles to move GPS off target and then back on target. Keeping the power control handles depressed, verify that the MILES transmitter scope, GPS, and M105D sight are all centered on the same point.



Align Task 1.1: Align MI AI Main Gun (120mm)/Coax MG Laser Transmitter. The MILES main gun/coax MG laser transmitter is aligned by completing the following subtasks:

Align Subtask 1.1 -A: Preparation for Manual Input

Align Subtask 1.1-B: Manual Data Input

NOTE

Proper alignment is critical to operation of MILES system for MI AI main gun and coax machine gun. Read all instructions for Align Task 1.1 before proceeding. Then carefully perform each step in the order given. Prior to aligning main gun and coax machine gun laser transmitter, be sure to check and adjust “normal mode drift” out of system.

Align Subtask 1.1-A: Preparation for Manual Input.

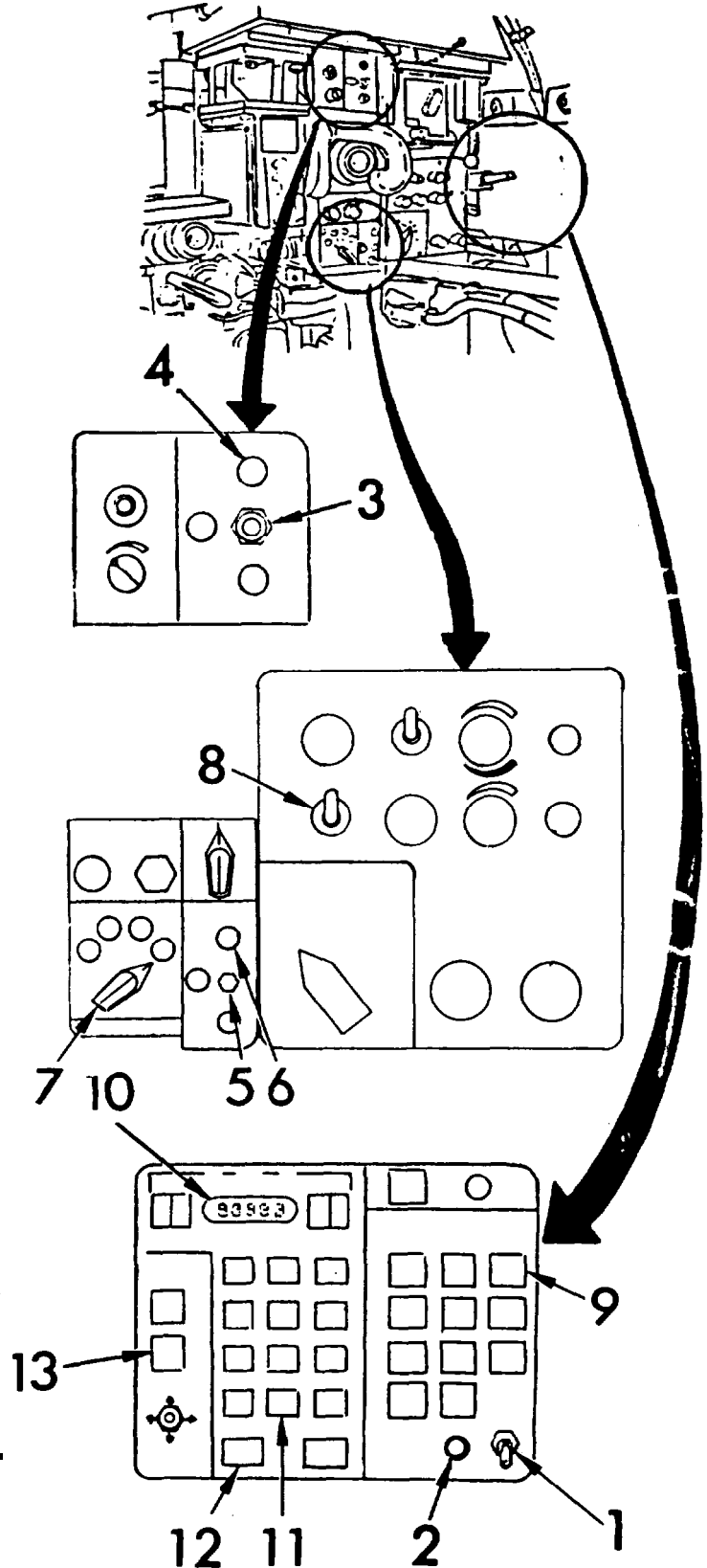
NOTE

Determine exact range of the boresight target prior to starting this task. The recommended boresight range is 1200 meters.

- Make sure vehicle power is on.
1. Open COMPUTER CONTROL PANEL (CCP) door and set POWER switch (1) to ON.
 2. Make sure PWR indicator lamp (2) on loader's control panel comes on.
 3. Set fire CONTROL MODE switch (3) on gunner's primary sight (GPS) upper panel to EMERGENCY.
 4. Check that EMERGENCY indicator lamp (4) comes on.
 5. Set GUN SELECT switch (5) to MAIN.
 6. Make SURE main indicator lamp (6) comes on.
 7. Set AMMUNITION SELECT switch (7) to SABOT.
 8. Set THERMAL MODE switch (6) to STBY.
 9. Press AMMO SUBDES key (9).
 10. Enter 59 in the display window (10), using manual input keys (11).
 11. Press ENTER key (12).
 12. Press BORESIGHT key (13).
 13. Record numbers that appear in display window (10).

NOTE

It is very important that the numbers displayed are recorded and retained. They must be reentered into the computer following the training exercise.

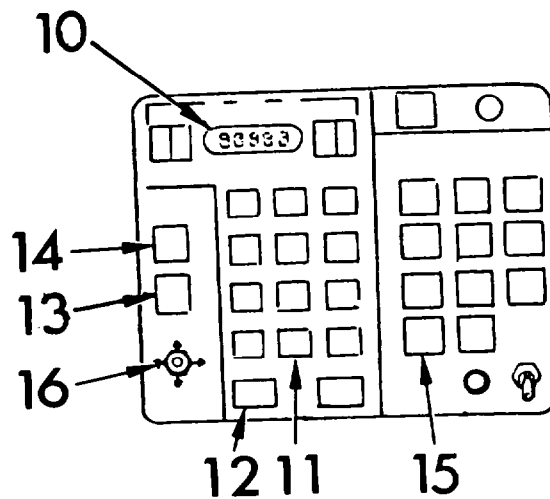
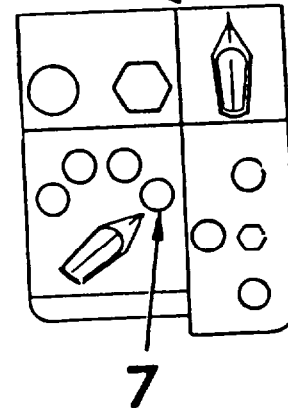
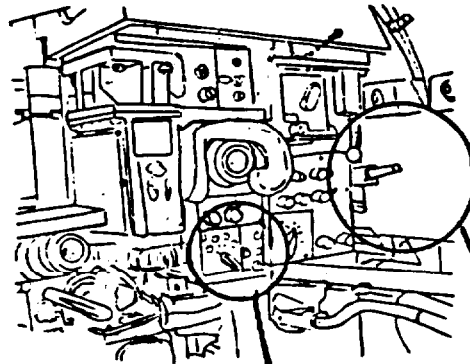


Align Subtask 1.1-A: Preparation for Manual Input (Cont).

14. Enter 0.0, 0.0 in the display window (10), using manual input keys (11).
15. Press ENTER key (12).
16. Press ZERO key (14).
17. Enter 0.0, 0.0 in the display window (10), using manual input keys (11).
18. Press ENTER key (12).

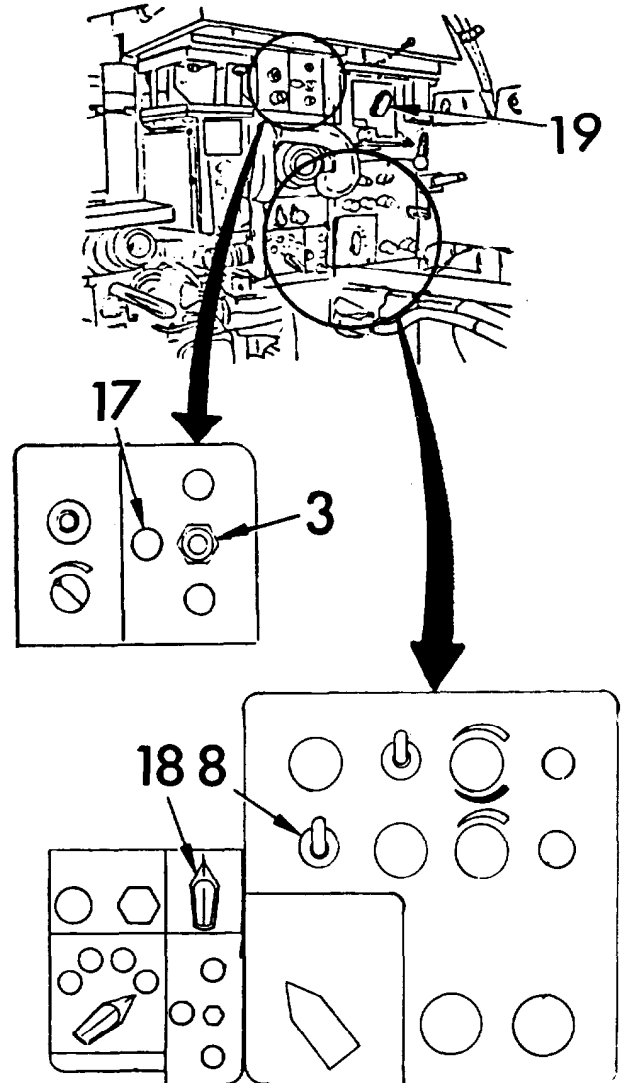
Align Subtask 1.1-B: Manual Data Input.

19. Set AMMUNITION SELECT switch (7) to HEAT.
20. Press ZERO key (14).
21. Enter 0.0, 0.0 in the display window (10), using manual input keys (11).
22. Press ENTER key (12).
23. Set AMMUNITION SELECT switch (7) to SABOT.
24. Press RANGE key (15).
25. Enter range of boresight target in the display window (10), using manual input keys (11).
26. Press ENTER key (12).
27. Press RANGE key (15), returning system to automatic input.
28. Press and release gunner's or commander's palm switch one time.
29. Manually align MILES transmitter scope to selected boresight target using manual turret and elevation crank handles. Recommended boresight range is 1200 meters.
30. Press BORESIGHT key (13).
31. While looking through the Gunner's Primary Sight (GPS), move TOGGLE switch (16) up (U), down (D), left (L), or right (R) to place reticle on boresight target.

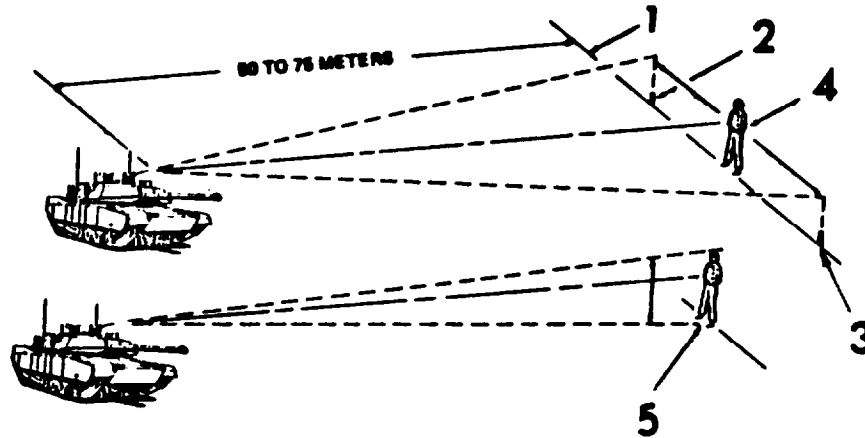


Align Subtask 1.1-B: Manual Data Input (Cont).

32. When reticle is aligned on boresight target, press ENTER key (12).
33. Close Computer Control Panel door.
34. Align GUNNER AUXILIARY SIGHT (GAS) to aiming point, using boresight cross on reticle.
35. Set FIRE CONTROL MODE switch (3) on Gunner's Primary Sight (GPS) upper panel to NORMAL. Verify that NORMAL indicator lamp (17) goes on.
36. Set THERMAL MODE switch (8) to ON.
37. Set FLTR/CLEAR/SHTR switch (18) to SHTR.
38. Open GPS thermal door.
39. Set THERMAL MAGNIFICATION LEVEL switch (19) to 10X.
40. Align thermal sight reticle to the GPS aiming point.
41. Set THERMAL MODE switch (8) to STBY.
 - Boresight procedures are now complete. To check boresight use power control handles to move GPS off target and then back on target. Keeping the power control handles depressed, verify that the MILES transmitter scope and GPS are centered on the same point.



Align Task 2: Align M2 Machine Gun.



M2 machine gun transmitter must be aligned in the dry fire mode using the dry fire trigger cable. Ask controller for a cable and, if necessary, instructions for installing and using it.

NOTE

Perform this task for the M2 machine gun. No alignment of coax machine gun is necessary.

To align machine gun transmitters you will need a soldier with a helmet and torso harness on.

1. Send the soldier out about 50 to 75 meters from the tank (1). He should have a green controller key in his receptacle. Key should be in Controller position. This allows the MWLD to be continuously fired upon and will only give a "NEAR MISS" indication.
2. Connect dry fire trigger cable assembly. Ask controller to set system for dry fire operation.
3. Insert orange Weapon Key in transmitter receptacle and turn to WEAPON ON.
4. Fire at the soldier while scanning side-to-side and up and down. When soldier's buzzer sounds a "NEAR MISS," lock machine gun in that position.
5. While continuing to be "fired" upon, the soldier now moves to his right to the point where his buzzer stops (2). He marks this point on the ground.
6. While continuing to be "fired" upon, the soldier now moves to his left to the point where his buzzer stops (3). He then marks this point on the ground.
7. The soldier then estimates the center between the two marks and stands there (4).
8. Gunner now adjusts his sights on soldier

Align Task 2: Align M2 Machine Gun (Cont).

9. The gunner, continuing to fire, moves his aim point up and down noticing where the buzzer stops. He estimates the center and boresights the crosshairs to that point (5).
10. The gunner should practice reaiming and firing a few times to insure his weapon is properly aligned.

OPERATIONAL TASKS - INDEX

	Page
1. Place Hoffman Device into Ready Fire Operation	2-75
2. Fire Main Gun or Coax Machine Gun	2-79
3. Observe Your Target	2-80
4. Recognizing Enemy Fire	2-81
5. Reset After a "KILL"	2-82
6. Turn Off and Reset MWLD Alarm	2-83

Perform tasks in order given.

Operational Task 1: Place Hoffman Device into Ready Fire Operation. Operating the Hoffman simulator device requires four subtasks:

- Operational Subtask 1-A. Preparation for Firing
- Operational Subtask 1-B. Firing
- Operational Subtask 1-C. Reloading
- Operational Subtask 1-D. Unloading

Perform subtasks in order given.

NOTE

For detailed procedures on operating the Hoffman simulator device, see TM Simulator, Tank Gun Fire Device 17-61.

WARNING

Always observe the following safety precautions when operating the Hoffman device.

Operational Task 1: Place Hoffman Device into Ready Fire Operation (Cont).

1. BEFORE LOADING, RELOADING OR UNLOADING - REMOVE THE KEY.

The device shall only be loaded, reloaded or unloaded in the LOADING POSITION. THE GREEN SIGNAL LIGHT MUST SHINE.

2. When loading, reloading, or unloading, do NOT stand IN FRONT of the device.
3. When the device is loaded, the protection cover must NOT be drawn over the firing drums.
4. Readiness for firing shall not be established until the commander has given the order to do so. "Readiness for firing" is as follows:

- SWITCH ON THE IGNITION LOCKOUT
- RED SIGNAL LIGHT MUST SHINE

Report, "READY TO FIRE."

5. SETTING TO SAFETY occurs by switching off the security lockout switch and removing the key. Gun loader to report, "DEVICE SET AT SAFE."

6. Should stoppages occur, further firing and reloading are permitted. The following points must, however, be observed:

- Subsequent and still loaded pyro charges must first be fired off.
- Do NOT make preparations for reloading until a security interval of 15 minutes has elapsed.
- When reloading, LEAVE THE NON-IGNITED DUDS IN THE FIRING DRUMS. Cut the non-ignited dud(s) out of circuit by pulling out plug of the ignition leads belonging to the dud(s) and by placing a short-circuit cap over the plug.
- Pull tight the ignition leads and plug with short-circuit cap and secure them again on the ignition leads retainer.
- Reload the device.
- After completion of the training practice, pyro experts shall be called in to unload and destroy the ignition dud(s).
- Safety distances when firing:
50 METERS IN FRONT
25 METERS ON EACH SIDE
- Firing within a RADIUS OF 150 METERS FROM BUILDINGS IS FORBIDDEN.

Operational Subtask 1 -A: Preparation for Firing

1. Press yellow contact button and adjust automatic firing-device to the LOADING POSITION. Green signal light must be on.
2. When loading, do NOT stand in front of firing-device. Load either from side or from behind. Make sure LOCKOUT SWITCH is off and the key is removed.
3. Preparing the pyro charges for loading:
 - Remove adhesive tape
 - Remove cover
 - Pull ignition leads and plug taut
4. Insert pyro charges into the firing drums down to the base.
5. Draw ignition leads over rim of the drum to the rear. Pull taut. Wrap them firmly around the retainer in such a way that plug can be inserted in the corresponding socket after removal of short-circuit cap. Short-circuit caps are to be kept for a possible unloading.
6. READINESS FOR FIRING (to be carried out on orders of tank commander).
 - Insert key into lockout safety switch, press down, and turn to left.
 - Switch clicks into position, Red signal light shines.
 - Readiness for Firing is established.
 - The gun-loader reports, READY TO FIRE.
7. SETTING TO SAFETY

On the command SET TO SAFETY, the gun-loader removes key from the lockout safety switch by turning it to the right. The RED SIGNAL LIGHT must EXTINGUISH. The device is now safeguarded against inadvertent firing.
8. When the firing drums are loaded, the **protection cover must not be drawn over the device**. Weather conditions have no adverse effect on the functioning of the pyro charges.

Operational Subtask 1 -B: Firing.

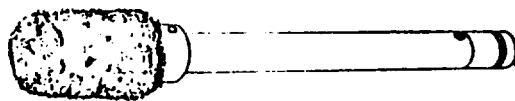
9. On the command of tank commander, the automatic firing device is to be made ready for firing. When order to fire is given by tank commander, "pyro charges are individually fired off by tank cannon firing mechanism.

Operational Subtask 1-C: Reloading

10. For safety reasons, the following procedure is to be followed on reloading:
- Switch off LOCKOUT SAFETY SWITCH and remove key.
 - Press yellow contact button and bring the device into the loading position. Green signal light must shine.
 - Remove the remains of ignition leads and also plug belonging to fired-off pyro charges.

NOTE

Cleaning tool and scraper hook are supplied with the HoffmanDevice.

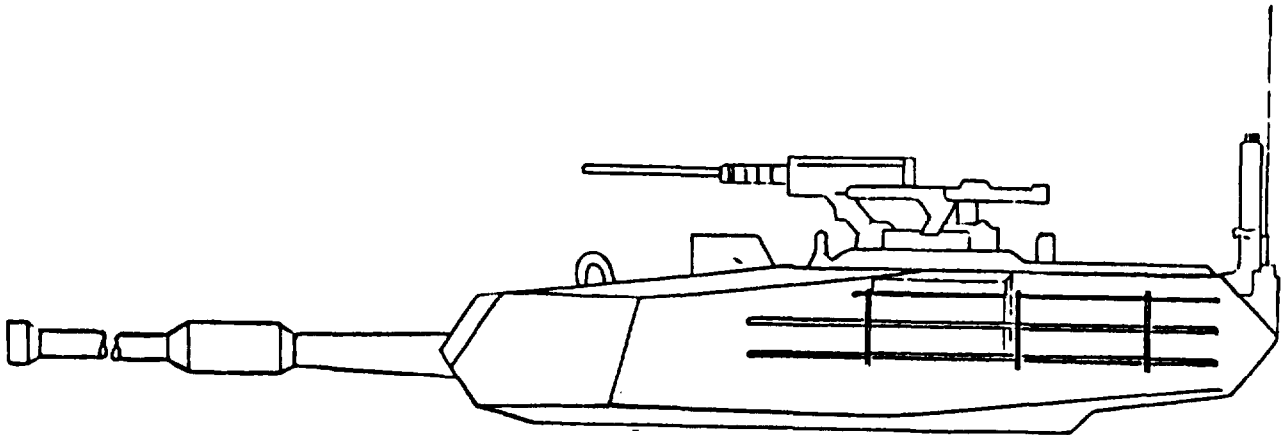


-
- With the aid of cleaning tool, brush out all residue left in firing drums, removing coarser residue with scraper hook.
 - Reload pyro charges.
11. Reloading is to be carried out in the same way regardless of whether Hoffman device is partially reloaded or fully reloaded.

Operational Subtask 1-D: Unloading

12. The following procedure is to be observed when unloading Hoffman device:
- Switch off ignition lockout of automatic firing device. Remove key.
 - Unscrew power supply coupling on automatic firing device. Disconnect plug.
 - Withdraw the plugs of the pyro ignition leads from sockets. Attach short-circuit caps to plugs and unwrap the ignition leads from the retainers.
 - Withdraw from the firing drums the pyro charges attached to ignition leads.
 - Place protective caps on pyro charges and pack charges away.

Operational Task 2: Fire Main Gun or Coax MG.



1. Both main gun and coax machine gun are fired using normal procedures.
2. When firing main gun, you must **wait five seconds between rounds** before you can fire again. This delay simulates loading time. When the NOT READY light is ON the MILES laser will not fire.
3. The coax transmitter operates when blanks are fired. The transmitter will not operate when blank ammunition is gone.

NOTE

Make sure Task 1 alignment procedures have been completed before attempting to fire.

4. If you wish to see how many rounds are left in your weapons:

Set control console switch (1) to weapon of interest (main gun or coax). Do not set switch to MISSILE - your tank does not fire missiles.

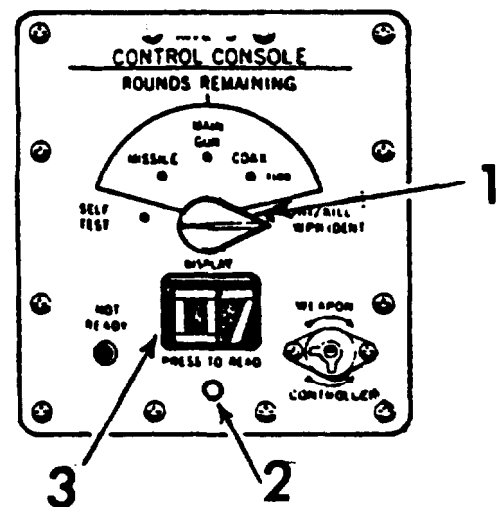
Press and hold PRESS TO READ button (2).

Read display (3) for rounds remaining.

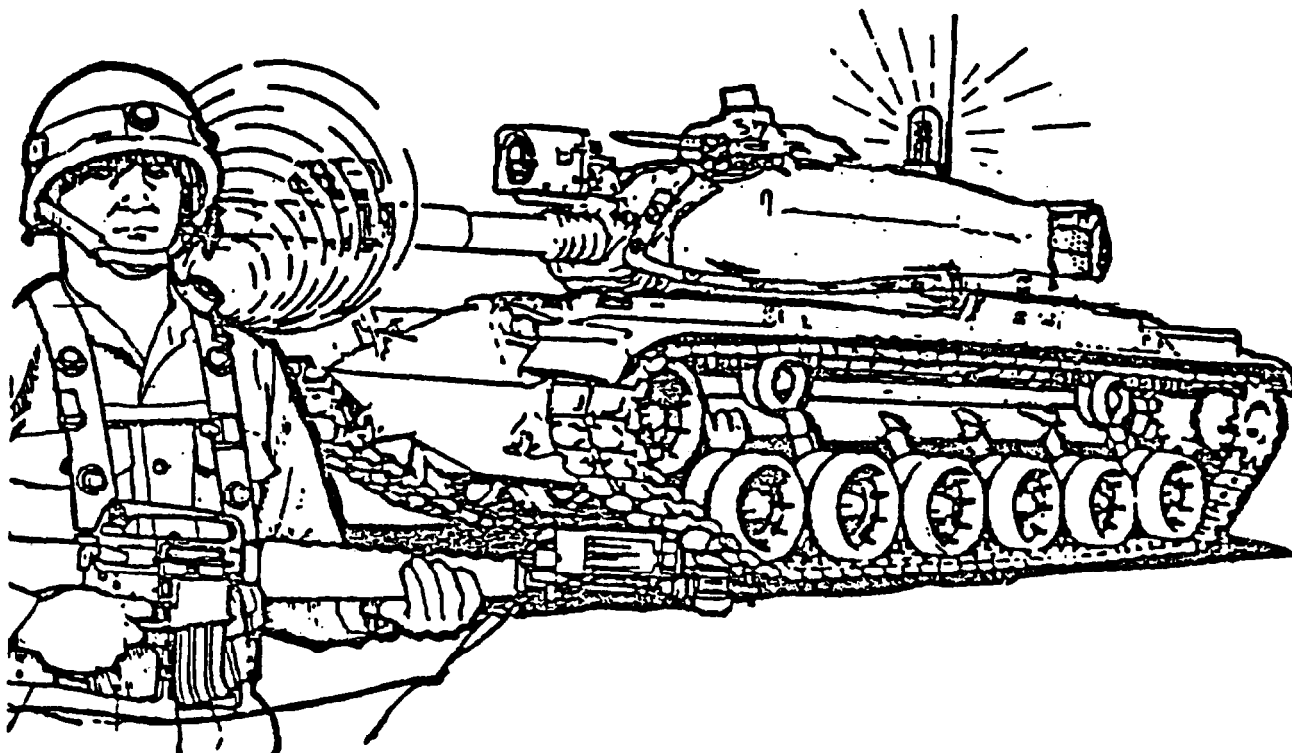
If display shows 00, you have no rounds left.

The number of coax rounds remaining is 100 times the number displayed.

Rounds count will not decrease when firing coax machine gun in blank fire mode.



Operational Task 3: Observe Your Target.



The effect of your MILES-equipped weapon fire can be evaluated by observing your target during training exercise.

If detectors are “HIT” by laser fire, alarms on vehicle CVKIs will flash and personnel MWLDs will sound. Usually, you will not be close enough to hear the alarms.

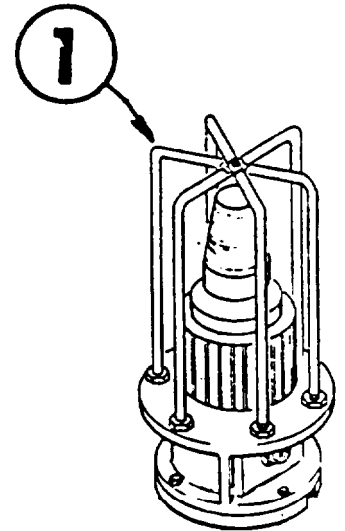
If a vehicle is “HIT” but not “KILLED” CVKI light flashes four to six times.

If a vehicle is “NEAR MISSED,” CVKI light flashes one to three times.

If you “KILL” personnel, soldiers remove yellow keys from laser transmitters and insert in their MWLDs to turn off buzzers.

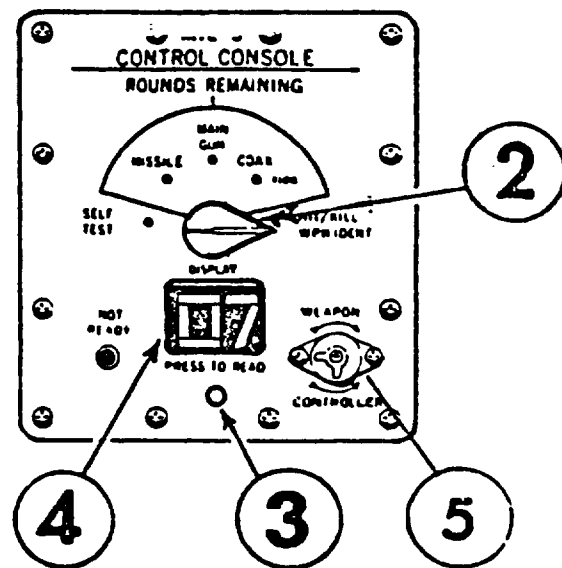
Operational Task 4: Recognizing Enemy Fire.

1. If you are "HIT" by laser fire, CVKI light (1) will flash. You will also hear tones on the intercom unit. A brief alarm (one to three CVKI flashes and a intercom beeps) means a "NEAR MISS." Repeated 4 to 6 intercom tones and 4 to 6 CVKI flashes mean a "HIT." Continuous CVKI flashing and INTERCOM TONE indicates a "KILL."
2. To determine what kind of weapon has fired on you, turn the switch (2) on the control console to HIT/KILL position.
3. Press display button (3).
4. The display (4) will show a number. Use the chart below to match number on display with type of weapon firing on you.



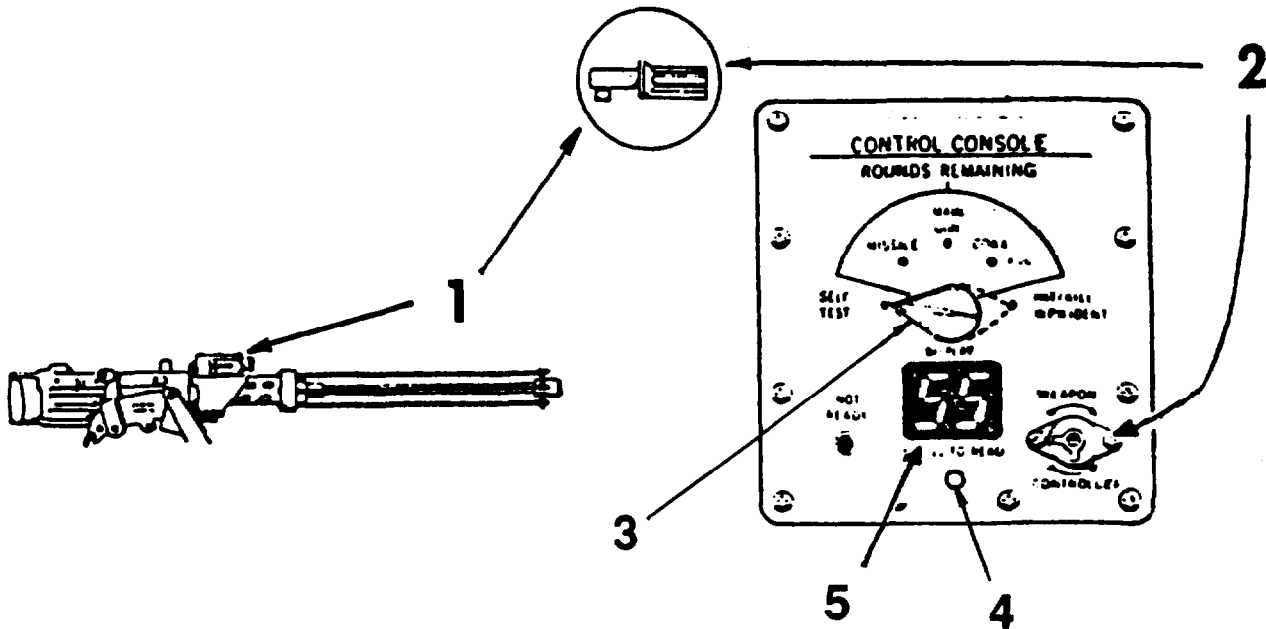
<u>Display Number</u>	<u>Weapon</u>
-----------------------	---------------

00	Controller Gun
07	TOW or Shillelagh
08	DRAGON
12	105 mm
13	152 mm
14	2.75 inch Rocket
15	VIPER
16	120 mm
99	Self-kill



5. "SELF-KILL" results when orange weapon key is put in the control console receptacle (5) and turned to WEAPON position. A code of 99 will show on the LCA display, the CVKI light will flash continuously, and the NOT READY light will light. When the orange weapon key is removed, a continuous tone will be heard in the intercom. You must then call the controller to reset your system.

Operational Task 5: Reset After a "KILL".



If your tank is "KILLED," the main gun and coax machine gun transmitters are automatically turned off.

To silence your intercom alarm after a "KILL" remove the orange weapon key from the M2 machine gun transmitter (1) and insert in the control console. The transmitter will no longer fire. Remove yellow key from M240 machine gun transmitter and insert into your torso harness.

Insert the orange key (2) in the control console receptacle and turn off the intercom alarm. IF YOU REMOVE KEY FROM RECEPTACLE, THE ALARM WILL BEGIN AGAIN. The CVKI light continues to flash. It can be turned off only by the controller.

To reset: Remove orange weapon key. Alarm will sound. Ask the controller to turn off your intercom alarm and CVKI light. This resets control console.

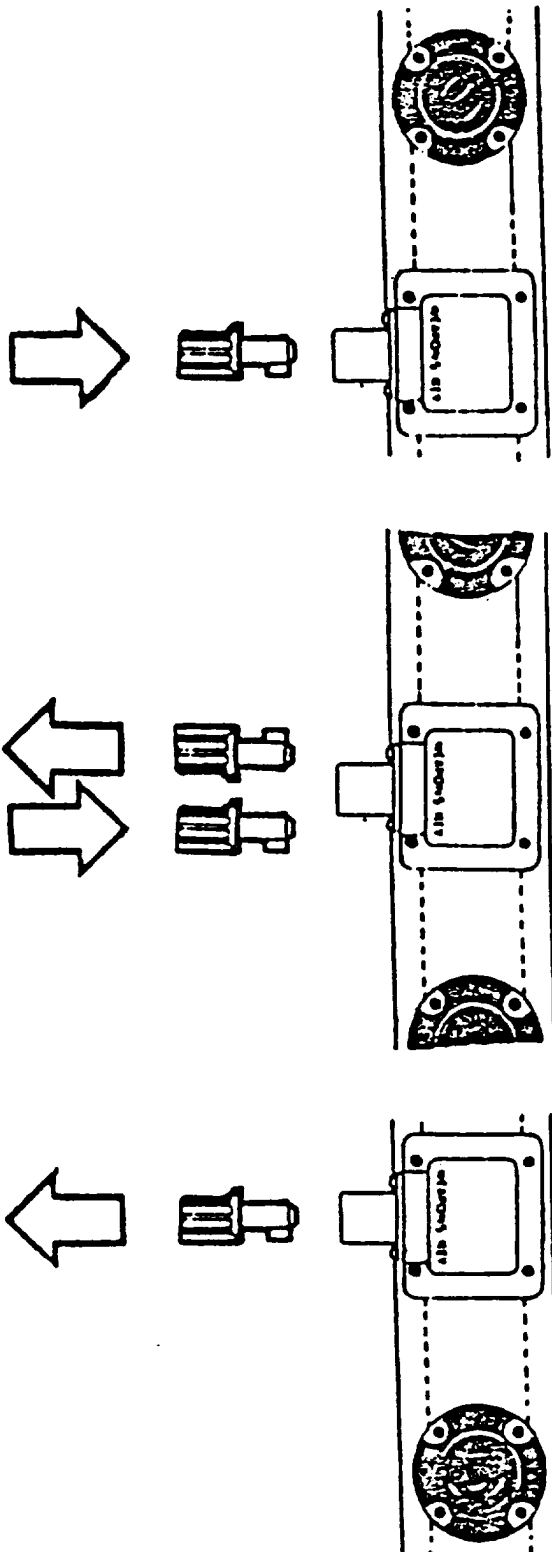
Turn control console switch (3) to MAIN GUN. Press the display button (4). Display (5) should show 55. If no 55, turn to Troubleshooting, page 3-4.

Put your orange key back in the M2 transmitter and turn it to WEAPON ON.

Put your yellow key back in the M240 transmitter and turn it to WEAPON ON.

The controller will determine when to reset your system.

Operational Task 6: Turn Off and Reset MWLD Alarm,



NOTE

One yellow weapon key is provided with M240 machine gun. Two additional keys are provided with the vehicle's complement of equipment.

The two additional keys are used by the first two crew members who are "KILLED." If the third crew member is "KILLED" he must use the yellow key from the M240 machine gun.

To turn off alarm:

Insert yellow weapon key in receptacle- on torso harness. Turn off alarm.

To reset alarm, you must call the controller.

Remove yellow weapon key from receptacle (alarm will sound).

Ask controller to put green controller key in and turn off alarm.

Ask controller to remove green key. Alarm is reset.

Postoperational and Storage Tasks - Index Remove, inspect, service and return all MILES equipment following completion of training exercise.

	<u>Page</u>
1. Return Fire Control Computer to Automatic Status	2-84
2. MWLD Postoperational Tasks	2-85
3. M240 MG Postoperational Tasks	2-85
4. M2 MG Postoperational Tasks	2-85
5. Inside Postoperational Tasks	2-86
6. Outside Postoperational Tasks	2-86
7. Transit Case Packing Tasks	2-87
8. Return Equipment	2-88

NOTE

If you need additional information on completing a post-operational task, turn to referenced section. Postoperational task will be reverse of referenced section.

Postoperational and Storage Task 1: Return Fire Control Computer to Automatic Status. (Except where indicated, task applies **only to M1 tank, not M1A1 tank**).

Enter into computer original BORESIGHT numbers recorded during step 9, Align subtask 1-A (M1 tank), or step 13, Align Subtask 1.1-A (M1A1 tank).

Enter original ZERO numbers recorded during step 12, Align subtask 1-A, into computer.

Enter original AMMO SUBDES numbers recorded during step 35, Align subtask 1-B, into computer.

Verify that LEAD, CANT, CROSSWIND and RANGE keys are NOT lit. This indicates that Fire Control computer has been returned to automatic mode.

Realign GUNNER AUXILIARY SIGHT (GAS) and M105D sight.

NOTE

For assistance in returning computer to auxiliary mode consult TM 9-2359-255-10, Operator's Manual: M1 Tank.

Postoperational and Storage Task 2: MWLD Postoperational Tasks

Remove MWLD Harnesses. See MWLD Tasks 5 and 6.

Remove batteries from MWLD harnesses and close battery doors. See MWLD Task 4.

Inspect and service the MWLD. See MWLD Tasks 2 and 3.

Postoperational and Storage Task 3: M240 MG Postoperational Tasks.

Remove M240 transmitter. See M240 MG Task 4.

Remove the battery from the M240 transmitter and close battery compartment door. See M240 MG Task 3.

Inspect and service M240 MG transmitter. See M240 MG Task 2.

Remove, inspect, and service M240 MG blank firing attachment. See TM 9-1005-313-10

Postoperational and Storage Task 4: M2 MG Postoperational Tasks,

Remove M2 transmitter. See M2 MG Task 4.

Remove the battery from M2 transmitter and close battery compartment door. See M2 MG Task 3.

Inspect and service M2 MG transmitter. See M2 MG Task 2.

Remove, inspect, and service M2 MG blank firing attachment. See TM 9-1005-314-12&P.

Postoperational and Storage Task 5: Inside Postoperational Tasks.

Remove and inspect MILES inside cables. See Inside Tasks 12 and 13.

Remove battery box. Remove batteries from battery box and inspect battery box. See Inside Tasks 4 and 5.

Remove and inspect control console. See Inside Tasks 2 and 3.

NOTE

Reinstall original M1 Abrams Tank bolts, nuts and lock washers in tank support plate.

Remove and inspect main gun/coax MG transmitter. See Inside Task 8 and 9.

Remove and inspect coax microphone assembly. See Inside Tasks 6 and 7.

Postoperational and Storage Task 6: Outside Postoperational Tasks.

Remove and inspect CVKI cable assembly. See Outside Tasks 11 and 12.

Remove and inspect Hoff man 10-pole cable assembly. See Outside Task 15.

Remove and inspect CVKI. See Outside Task 9.

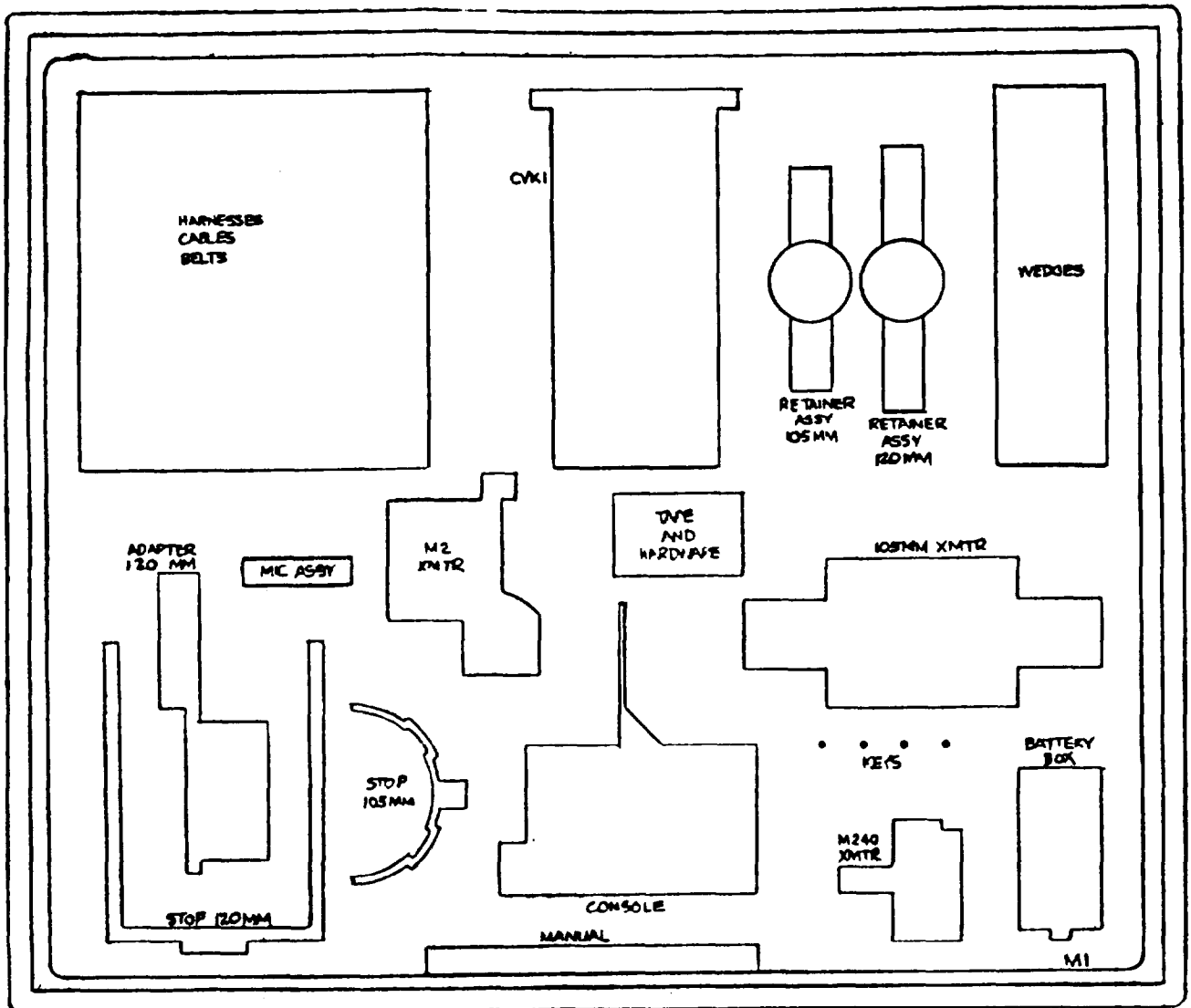
Remove and inspect detector belt segments and wedge mounting blocks. Leave fastener tape on the vehicle. See Outside Tasks 5, 6, 7, and 8.

Remove, inspect, and service Hoffman device simulator body with mount. See Outside Task 13.

NOTE

Reinstall periscope window in loader's hatch.
Reinstall Hoffman device 10-pole socket dust cap.

Postoperational and Storage Task 7: Transit Case Packing Instructions.



Replace all MILES equipment in M1 transit case. Make sure each piece is in proper space. Use transit case orientation plate on case lid as a guide.

Close and latch the case.

Postoperational and Storage Task 8: Return Equipment.

Return all equipment to your NCOIC.

Include: All MILES equipment.

- Hoffman device system

- Blank fire adapters and blank ammunition trays

- Unused blank ammunition

- Unused Hoffman device cartridges

- Special tools

**CHAPTER 3
MAINTENANCE INSTRUCTIONS**

SECTION I. LUBRICATION INSTRUCTIONS

MILES equipment for the M1 Abrams Tank requires no operator lubrication.

SECTION II. TROUBLESHOOTING

Table 3-1 lists the common malfunctions which you may find during the operation or maintenance of the MILES simulator system for the M1 Abrams Tank or its components. You should perform the tests/inspections and corrective actions in the order listed.

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Table 3-1. Troubleshooting

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
--------------------	---------------------------	--------------------------

M2 MACHINE GUN

1. FIRING LIGHT ON M2 LASER TRANSMITTER DOES NOT OPERATE

Step 1. Check battery.

Wait 10 seconds, replace battery and retest.

Step 2. If still no light.

Report on DA Form 2404 and replace transmitter.

M240 MACHINE GUN

2. FIRING LIGHT ON M240 MG LASER TRANSMITTER DOES NOT OPERATE

Step 1. Check battery.

Wait 10 seconds, replace battery and retest.

Step 2. If still no light.

Report on DA Form 2404 and replace transmitter.

MWLD EQUIPMENT

3. NO ALARM ON MWLD TORSO HARNESS UPON INSERTING BATTERY

Step 1. Remove battery.

Wait 10 seconds, reinsert battery and retest.

Step 2. If still no alarm.

Replace battery and retest.

Step 3. If still no alarm.

Report on DA form 2404 and replace torso harness.

Table 3-1. Troubleshooting - Continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
MWLD EQUIPMENT - Continued		
4. NO ALARM ON MWLD TORSO HARNESS WHEN TESTED	Step 1. Remove battery.	Wait 10 seconds, reinsert battery and retest.
	Step 2. If still no alarm.	Replace battery and retest.
	Step 3. If still no alarm.	Report on DA Form 2404 and replace torso harness.
5. NO ALARM ON MWLD HELMET HARNESS WHEN TESTED	Step 1. Check that bottom of harness overhangs entire rim of helmet.	Retest.
	Step 2. If still no alarm.	Remove and reinsert battery and retest.
	Step 3. If still no alarm.	Place helmet on another soldier with operating torso harness and retest.
	Step 4. If still no alarm.	Replace battery and retest.
	Step 5. If still no alarm.	Report on DA Form 2404 and replace helmet harness.

Table 3-1. Troubleshooting - Continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
MILES CONTROL CONSOLE		
6. CONTROL CONSOLE DISPLAY SHOWS A NUMBER <u>OTHER THAN 00</u> OR IS BLANK DURING TESTING		<p>Step 1. Disconnect and reconnect cable connectors labeled control console or battery.</p> <p>Recheck for 00 by pressing control console display button.</p> <p>Step 2. If display is still blank.</p> <p>Ask controller to check out equipment using vehicle test set.</p>
7. CONTROL CONSOLE DISPLAY DOES NOT SHOW THE <u>NUMBER 88</u> DURING TESTING		<p>Step 1. Turn console switch to HIT/KILL and back to SELF TEST.</p> <p>Check display.</p> <p>Step 2. If display still does not show 88.</p> <p>Ask controller to check out equipment using vehicle test system.</p>
8. CONTROL CONSOLE DISPLAY DOES NOT SHOW THE <u>NUMBER 55</u> DURING TESTING		<p>Step 1. Ask controller to check out equipment using vehicle test set.</p>
9. CONTROL CONSOLE DISPLAY DOES NOT SHOW THE <u>NUMBER 54 (FOR M1) OR 50 (FOR M1A1) DURING TESTING</u>		<p>Step 1. Check all MILES trigger cable connections.</p> <p>Tighten any loose connections.</p> <p>Step 2. Fire the main gun.</p> <p>Check for number 54 or 50 on display.</p> <p>Step 3. If display still does not show 54 or 50.</p> <p>Ask controller to check out equipment using vehicle test set.</p>

Table 3-1. Troubleshooting - Continued

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
MILES VEHICLE EQUIPMENT		
10. NO "KILL" INDICATION WHEN MAIN GUN FIRED AT MWLD TORSO HARNESS DURING TESTING	Step 1. Check all MILES breech cable connections.	Tighten any loose connections.
	Step 2. Fire the main gun when a detector on a man worn torso harness is held in front of the transmitter inside the turret.	Check for "KILL" indication.
	Step 3. If still no "KILL" indication.	Ask controller to check out the system using vehicle test set.
11. NO HIT INDICATION WHEN COAX MACHINE GUN FIRED AT A TARGET DURING TEST	Step 1. Check coax microphone cable connections.	Tighten any loose connections.
	Step 2. Fire coax machine gun at a target.	Check for hit indication.
	Step 3. If still no indication.	Ask controller to check out the equipment using vehicle test set.
12. NO INTERCOM TONE	Step 1. Check vehicle intercom.	Turn to ON.
	Step 2. Check vehicle intercom cable connections at intercom terminals.	Tighten any loose connections.
	Step 3. If still no tone.	Ask controller to check out the equipment using vehicle test set.

Table 3-1. Troubleshooting . Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

MILES VEHICLE EQUIPMENT - Continued

13. NO CVKI FLASH

Step 1. Check CVKI cable connection.

Tighten any loose connections.

Step 2. Check MILES connections at turret networks box.

Tighten any loose connections.

Step 3. Check utility power switch.

Turn switch to ON.

Step 4. If still no flash.

Ask controller to check out the equipment using vehicle test set.

14. FAULTY DETECTOR BELT SEGMENTS

Step 1. Check cable connections at the detector belt segments.

Tighten any loose connections.

Step 2. If detector belt segments are still faulty.

Ask controller to check out the equipment.

APPENDIX A

REFERENCES

A-1. SCOPE

This appendix lists all forms, field manuals and technical manuals referenced in this manual.

A-2. FORMS

SF 368	Quality Deficiency Report
DA Form 2028-2	Recommended Changes to DA Publications
DA Form 2062	Hand Receipt
DA Form 2402	Exchange Tag
D A Form 2404	Equipment Inspection and Maintenance Work Sheet

A-3. FIELD MANUALS

FM 21-11	Field Manual: First Aid for Soldiers
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A-4. TECHNICAL MANUALS

TM 9-1005-213-10	Operator's Manual: M2 Machine Gun
TM 9-1005-313-10	Operator's Manual: M240 Machine Gun
TM 9-2350-255-10	Operator's Manual: M1 Tank
TM 9-2350-264-10	Operator's Manual: M1A1 Tank
TM 38-750	The Army Maintenance Management System
TM 9-1005-314-12&P	Operator's and Organizational Maintenance Manual: Blank Firing Attachment (BFA) M19 for Cal .50 M2 Machine Gun

A-5. MISCELLANEOUS PUBLICATIONS

AR 310-2	Identification and Distribution of DA Publications
Hoffman-Werke, 1 April 1979	Operator's and Maintenance Manual: Cannon, Fire Simulator
SB 11-6	Dry Battery Supply Data
DA PAM 738-750	The Army Maintenance Management System (TAMMS)

APPENDIX B

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

SECTION I. INTRODUCTION

B-1. SCOPE

This appendix lists components of end item and basic issue items for the MILES M1 Abrams Tank System to help you inventory items required for safe and efficient operation.

B-2. GENERAL

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the MILES M1 Abrams Tank System in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the MILES M1 Abrams Tank System during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE\MTOE authorization of the end item.

B-3. EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Item Number (Illus Number). This column indicates the number within the illustration where the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

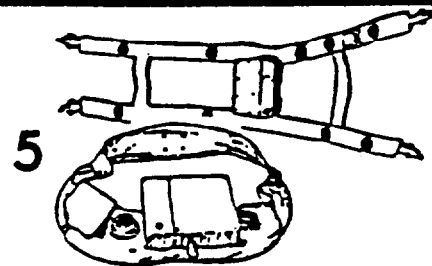
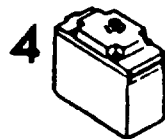
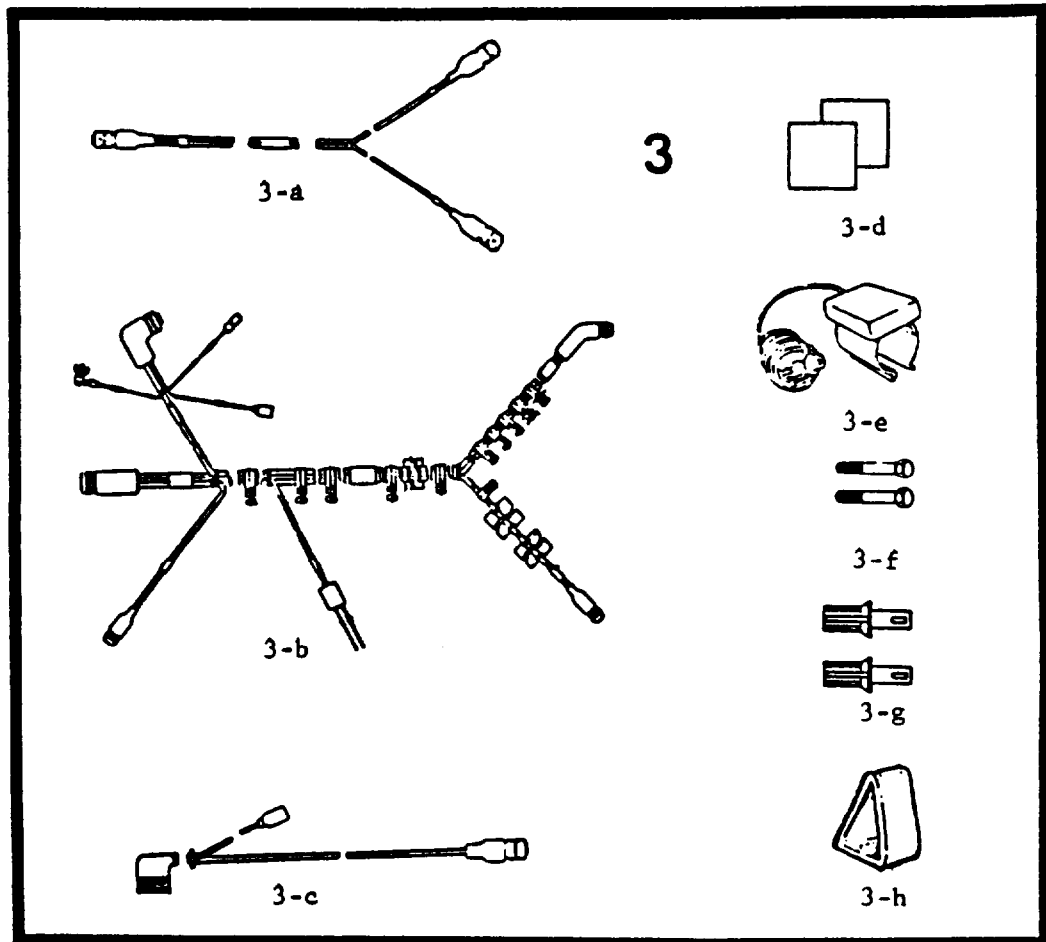
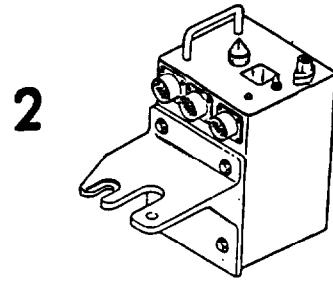
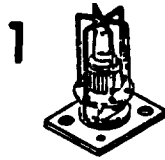
e. Column (5) - Quantity required (Qty rqr) Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. COMPONENTS OF END ITEM

ILLustration Number	National Stock Number	Description FSCM & Part Number	U/M	Qty r q r
1	•	Adapter Assembly, Combat Vehicle Kill Indicator (19200) 11836215	ea.	1
2	•	Adapter Assembly, Console Simulator System, Laser: (19200) 11836229	ea.	1
3	1265-01-075-4893	Adapter Set, Simulator System, Laser: For M1 Tank (19200) 11836204	ea.	1
Line Item/Part Number 11836204 consists of the following components:				
3-A		Cable Assembly, Breech M1 (19200) 11836207	ea	1
3-B	•	Cable Assembly, Kill Indicator M1, (19200) 11836206	ea	1
3-C	•	Cable Assembly, Trigger M1 (19200) 11836208	ea	1
3-D	.	Fastener Tape, Crew Helmet (19200) 11749717	ea	-
3-E	1265-01-079-8475	Microphone Assembly (19200) 11749403	ea.	1
3-F		Screw Cap, Hex Head .375 x 16 x 1.25 (96906) MS90725-62	ea	4
3-G	1265-01-076-1993	Weapon Key, Man, Vehicle, Controller (19200) 11749094	ea.	3
3-H	1265-01-080-7390	Wedge Assembly, Detector Belt - CVLD (19200) 11749329	ea	11
4		Battery Box Assembly (19200) 11749790	ea.	1
5	1265-01-075-4893	Detector Assembly, Simulator System, Laser: Man Worn (19200) 11748808	ea.	3

Not available on publication date.

COMPONENTS OF END ITEM (CONT)



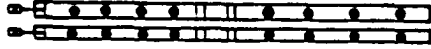
SECTION II. COMPONENTS OF END ITEM (CONT)

Illustration Number	National Stock Number	Description FSCM & Part Number	U/M	Qty rqr
6	1265-01-076-6522	Detector Belt Assembly Segment Number 3 - CVLD (19200) 11749300	ea.	2
7	*	Detector Belt Assembly Segment Number 6 - CVLD (19200) 11836200	ea.	1
8	1265-01-081-5608	Installation Kit (19200) 11836199	ea.	1
9		Transit Case Assembly, (19200) 11836230	ea.	1
10		Transmitter Assembly, Simulator System, Laser: For M2 Machine Gun (19290) 11836209	ea.	1
11		Transmitter Assembly, Simulator System, Laser: For M240 Machine Gun (19200) 11836211	ea.	1
12	1265-01-077-3768	Transmitter Assembly, Simulator System, Laser: For 105 mm/Coax (19290) 11748805	ea.	1
		Line Item/Part Number 11748805 consists of the following components:		
12-A	1265-01-076-2011	Retainer Assembly (19200) 11749028	ea.	1
12-B	1265-01-010-2535	Stop Assembly, Extractor (19200) 11749022	ea.	1
12-C	1265-01-077-3768	Transmitter Assembly, 105 mm Gun (19200) 11749062	ea.	1

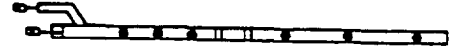
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COMPONENTS OF END ITEM (CONT)

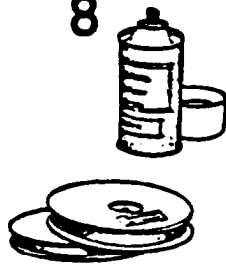
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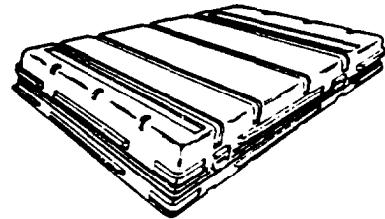
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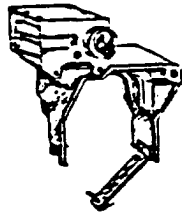
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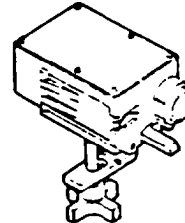
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10



11



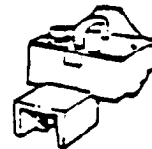
12



12-A



12-B



12-C

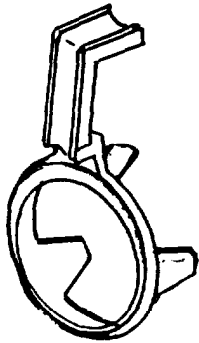
SECTION II. COMPONENTS OF END ITEM (CONT)

Illustration Number	National Stock Number	Description FSCM & Part Number	U/M	QTY rqr
13	•	Adapter Set.. 120 mm (19200) 9352810 Line Item/Part Number 9352801 consists of the following components:	ea.	1
13-A	•	Adapter, 120 mm (19200) 9352811	ea.	1
13-B	•	Stop, 120 mm (19200) 9352812	ea.	1
13-C	•	Retainer Assembly (19200) 9352816	ea.	1
13-D	•	Cable Assembly, 120 mm Interface (19200) 9352817	ea.	1

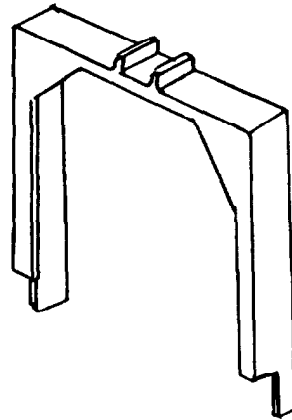
- Not available on publication date.

COMPONENTS OF END ITEM (CONT)

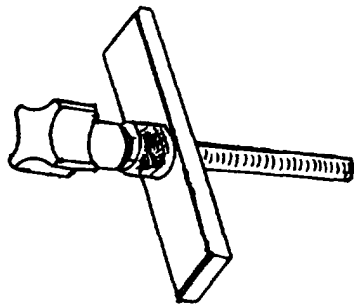
13



A



B



C



D

SECTION III. BASIC ISSUE ITEMS

1 ea. TM 9-1265-373-10-1 Operator's Manual f/ Simulator System,
Firing Laser: M82 f/ M1/M1A1 Abrams
Tank

APPENDIX C
ADDITIONAL AUTHORIZATION LIST

SECTION I. INTRODUCTION

C-1. SCOPE

This appendix lists additional items you are authorized for the support of the M1 Tank/MILES System.

C-2. GENERAL

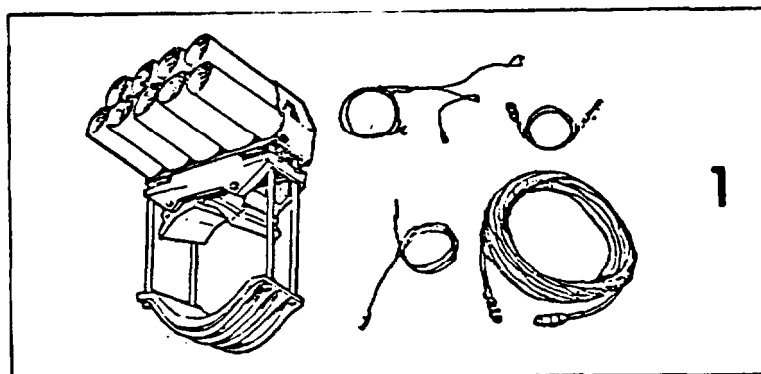
This list identifies items that do not have to accompany the M1 Tank/MILES System and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

C-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment.

SECTION II. ADDITIONAL AUTHORIZATION LIST

National Stock Number	Description FSCM & Part Number	U/M	Qty	Illustration
6910-01-067-1667	Simulator, Tank Gun Fire Device No. 17-61	ea.	1	1



APPENDIX D
EXPENDABLE SUPPLIES AND MATERIALS LIST

SECTION I. INTRODUCTION

D-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the M1 Tank/MILES System. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS

a. Column (1) - Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material.

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

c. Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Item Number	Level	National Stock Number	Description FSCM & Part Number	U/M
1	C	6135-00-050-3280	*Battery, 6 volt 80058-BA3090/U	ea.
2	C	6135-01-063-1978	*Battery, 9 volt 80058-BA3090/U	ea.
3	C	**	Fastener Tape 19200-11749428	roll
4	C	6640-00-240-5851	Paper, Lens 81349-NNN-P-40	pk.
5	C	7920-900-205-1711	Rag, wiping: cot DOD-R-30 J2, gr B	. . .
6	C	**	Tape Primer 19200-11749034	16 oz.

* Dry battery listed is used with the equipment. It will not be preshipped automatically but is to be requisitioned in quantities necessary for the particular organization in accordance with SB 11-6.

** Not available on publication date.

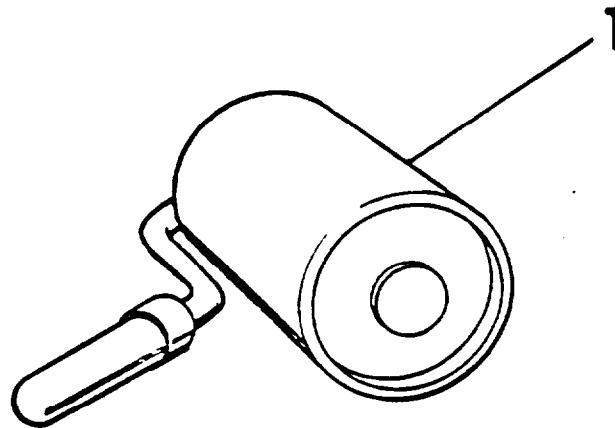
APPENDIX E
SPECIAL TOOLS AND TEST EQUIPMENT

This appendix lists special tools and test equipment which are used with the M1 Tank/MILES system.

Explanation of Columns

National stock numbers and descriptions are provided to help you identify and request the special tools and test equipment used with the M1 Tank/MILES system.

National Stock Number	Description FSCM & Part Number	Illustration
5120-00-243-9401	Hand Roller	1



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18	2		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Change drawing to read illustrations.

Add after the word spray "and allowing 5 minutes of drying time between coats."

Change: Washer, Flat $\frac{1}{4}$ " to read
Washer, Lock $\frac{1}{4}$ "

Reason: Correct nomenclature

Figure should be shown as flat washer

Figure should be shown as a lock washer

Reason: Figures should depict actual noun nomenclature.

TOW standard Kill Range Meters reads "25-3000", should be "65-3750"

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 (GRAM) .001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 grams = 2.2Lb
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
 1 Cu Meter = 1,000,000 CU Centimeters = 35.31 Cu Feet

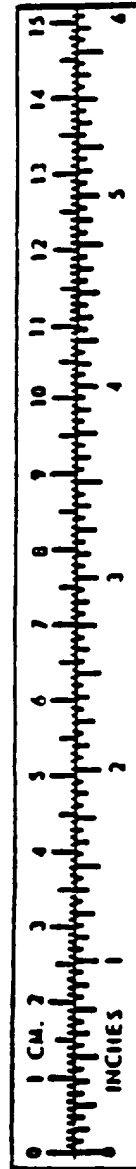
TEMPERATURE

5\9 (°F - 32) = °C
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32.2° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 9/5 Co = 32 = F°

APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches	Centimeters	2.540
Feet	Meters	0.305
Yard	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yard	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Liters	29.573
Pints	Liters	0.473
Quarts	Liter	0.946
Gallons	Liters	3.786
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yard	1.196
Square Kilometers	Square Miles	0.366
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilogram	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometer per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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