Combat Vehicle System (CVS)
MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES) XXI
COMBAT VEHICLE SYSTEM (CVS)
Kit for
ABRAMS SERIES TANKS

Operator Training Course
Objectives

- Learn what MILES XXI CVS equipment is and how it works.
- Identify equipment required to perform installation on the vehicles.
- Perform equipment inspection/check-out to ensure operability.
- Learn and perform the installation and removal of MILES equipment.
- At the end of this course you will be able to install and operate the MILES XXI CVS kit for the Abrams Series vehicles.
Warnings

- **WARNING** Indicate that death or severe personal injury may result if proper precautions are not taken.

- **CAUTION** Indicate property damage may result if proper precautions are not taken.

- **NOTE** Indicates an item of special interest.
Laser Safety

Do not look at the LASER emitter at close range (less than 10 meters). Increasing the distance between the eye and the LASER reduces the risk of injury.

Do not look directly at the LASER beam or the LASER emitter through optics such as binoculars, telescopes, or periscopes at ranges of less than 75 meters.
Weapon Warnings

**WARNING**

You can be killed, burned, or injured when using MILES XXI related pyrotechnic devices. Observe all safety precautions when using these devices.

Never load MILES XXI equipped weapons with live ammunition.
Schedule

- Classroom Instruction, 2 hrs.
- Hands on Training, 6 hrs.
Purpose Of Equipment

- Simulates the effects of direct fire weapons as they would affect the vehicle and crew.
- LASER Transmitters fire LASER beams to simulate firing live ammunition.
- Vehicle Control Unit (VCU) determines result of incoming fire on the vehicle.
- The MILES XXI equipped weapons have the same range, effect, and operational capabilities as real vehicle weapons.
Introduction

The MILES XXI CVS is made up of:

- Component Assemblies
  - Vehicle Detection System (VDS)
    - Detector belts
  - Cabling
    - Power cables
    - System BUS cables
  - LASER Transmitters
  - Weapon Effects Simulators
Additional Items Required for Abrams CVS Operation

- Controller Device (CD)
MILES XXI
CVS Components

- Vehicle Control Unit (VCU)
- VCU Mounting Bracket
- Vehicle Display Assembly (VDA)
- Radio Interface Assembly (RIA)
- Fire Control Interface (FCI)
- Main Gun Laser Transmitter (MGLT)
- Vehicle Detection System (VDS)
- Hull To Turret Transmitter (HUTT)
Vehicle Control Unit (VCU)

- CVKI flashes to indicate effect on vehicle of incoming fire.
- Contains rechargeable battery which is charged while vehicle is running.
- RF antenna
- GPS antenna
- Fuse
VCU Mounting Bracket

- Common to all Abrams tanks.
- Used to mount the VCU to the bustle rack of the tank.
Vehicle Display Assembly (VDA)

- The VDA provides a 2-row 16-character backlit display, two menu/submenu scroll pushbuttons and one menu/submenu select push-button.
- Using the UP/DOWN scroll buttons allows the operator to scroll through the main menus and sub-menus.
- Use the SELECT push-button to enter each of the main menus and in some cases, sub-menus.
- Displays up to 500 recorded events (increments of 99).
The VDA is mounted near the ammo door.
VDA Status Display

<table>
<thead>
<tr>
<th>TIME - HHMMSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>YYYYY XXXXXXX</td>
</tr>
</tbody>
</table>

HHMMSS = Hour/Minutes/Seconds

XXXXXX = IS ALIVE!

IS DEAD!

FPK (*Firepower Kill*)

MOBK (*Mobility Kill*)

COMK (*Commo Kill*)

YYYYY = YYYYY=PID (*Player Identification*)
VDA Menus

WPNTYPE MAIN GUN
LDR M1A2

PRESS SELECT FOR
EVENT STATUS

RELOAD NONE
NO RNDS LOADED

SELECT
AUX MENU

AMMO TYPE NONE
REM RNDS 0000
Player ID (PID)

- First Character identifies the ammo type.
- The next 4 digits are the unique number assigned to identify players and vehicles participating in an exercise.
- Even numbers represent BLUFOR and odd numbers represent OPFOR.
- Number can be changed from BLUFOR to OPFOR and “vice versa”.
- Player ID’s are assigned by the Controller Device (CD) and the VDA.
Radio Interface Assembly (RIA)

- Common to all Abrams vehicles.
- Allows crew members to hear current vehicle status.
- Injects voice cues into the vehicle intercom system.
RIA Audio Messages

- Audio indicators are voice messages heard through the vehicle intercom. These messages describe direct or indirect fire that affects the status of the vehicle.
RIA Audio – Cont’d

VOICE MESSAGES:
- Near Miss
- Hit
- Resurrect
- Commo KILL
- Firepower KILL
- Mobility KILL
- Vehicle KILL
- Reset
- Audio Check
The RIA is located to the left of the Loader below the Master Control Station (MCS).
Kill Types

- Kill
- Firepower Kill
  - Disables all Vehicle Weapons.
- Mobility Kill
  - Combination of a FPK and a MOBK will assess a Catastrophic Kill.
  - During a MOBK, if after 20 seconds the vehicle moves more than 100 meters the system will initiate a Cheat Kill.
- Communications Kill
- Cheat Kill
Vehicle Detection System (Belts)

- Equipped with IR photo detectors.
- VDS consists of four belts, one on each side of the turret.
LASER TRANSMITTERS

- Main Gun LASER Transmitter (MGLT)
MGLT

- Simulates various types of main gun and coaxial machine gun firing.
- Aligns the transmitter with the vehicle main gun to replicate direct fire.
- Alignment procedures are conducted IAW with the operators manual.
MGLT Mounting

- The MGLT mounts on top of the coax flash hider.
FCI interfaces with the vehicles fire control system.
The FCI is mounted near the ammo door above the VDA.

**FCI Cable Assembly specific to M1A1** – to interface the FCI to the vehicle fire control system through TJ1 and TJ2 on the TNB.

**FCI Cable Assembly specific to M1A2** - to interface the FCI to the vehicle fire control system through TJ3 on the FCEU.
HUTT

- **HUTT** - Determines which way the turret is pointing by transmitting a signal to the VDS.

- Contains an On/Off toggle switch.

- Contains a Low battery light.

- Powered by a 9 volt battery.
Weapon Effects

- Main Gun Signature Simulator (MGSS)
- Direct/Indirect Fire Cue (DIFCUE)
MGSS

- The MGSS is used on the Abrams vehicles, to simulate the firing of the main gun during force-on-force training exercises.
- The Firing Unit (FU) can hold up to 30 pyrotechnic cartridges, simulating the flash, smoke and bang created when the main gun is fired.
- Immediately following the flash and bang is an outpouring of white smoke. This provides a realistic enactment of the actual main gun firing effects.
- During MGSS operation, maintenance, or when personnel are in close proximity, extreme caution should be used. Personal safe distance is five meters.
DIFCUE

- An electro-mechanical device installed on the vehicle, simulating direct and indirect incoming fire during force-on-force training exercises.
- DIFCUE can be loaded with up to 60 pyrotechnic cartridges and simulates flash, smoke and noise of direct and indirect incoming fire.
- Refer to the DIFCUE operators manual for installation and operation.
DIFCUE Trigger Cable Assembly

- DIFCUE Trigger Cable Assembly – Connects the VCU to the DIFCUE.

- DIFCUE not included in CVS kit. Used in the Combat Training Centers (CTC).
Cabling Components

- System Bus Cables
- System Cables
- Terminators
- Vehicle Power Interface Cables
- M240 Coax Microphone Trigger Assembly
System BUS Cables

- Carry data between the VCU and various components.
- The system interconnects in a daisy chain fashion.
- System BUS cables are interchangeable, however placement is crucial due to the cable lengths.
The Abrams kit contains specially designed cable assemblies for the following components:

- VCU Adapter Assembly Cable
- MGLT Adapter Cable
- Coax Microphone Cable
VCU Signal Cable

- Interfaces to the RS 232, DIFCUE and MGSS.
Vehicle Power/Interface Cable

- Connections and routing are unique to the vehicle.
- Refer to the interconnect diagrams.
Power Connection M1A1

- The power connection is located at the Turret Networks Box (TNB) UJ1.
Power Connection M1A2

- The power is connected from J4 on the VCU to UJ1 on RSM 4 in the Commander’s position.
The power is connected to the auxiliary power connector, located under the commander’s intercom box.
M240 Coax Microphone Trigger Assembly

- Transforms blank ammunition being fired to an electronic signal to the MGLT.
- The MIC clamps to the BFA.
Terminators

- Provides termination to the system BUS.
- Two terminators are used in MILES XXI kit.
- One connects to the last detector belt in the series.
- The other is connected to the RIA.
Transit Case

- Transports and stores MILES XXI equipment.
Questions

- Questions on the M1 Series Vehicle Kit?
Controller Device Description

- CD is a portable, handheld unit.
- Used for configuration and control of MILES XXI equipment.
- Interfaces with:
  - Individual operators
  - MILES XXI devices
- Inputs and receives data.
- Selects system parameters.
- Collects data for the AAR.
Controller Device Inspection

- Perform PMCS per TM 9-6920-3659-10, Ch 5.
- Check the following items:
  - Housing (1)
  - 8 Buttons (2)
  - LCD Display (3)
  - RS-232 Connector (4)
  - Battery (5)
  - Trigger Switch (6)
CD Usage

- CD is used by Observer/Controllers (OCs).
- CD is used to alter, monitor, or control a given training exercise.
- CD operates in four primary modes:
  - LASER IR Transmission Mode (0-500 meter range)
  - LASER IR Detection Mode (0-20 meter range)
  - RF Mode (must acquire domain)
  - Direct Link (RS-232 cable)

NOTE

The CD can be used to “Kill” and “Resurrect” all current MILES systems. The full capabilities of the CD are used solely to interact and configure MILES XXI systems.
Power Up The System

- Turn on vehicle Master power.
- Turn on the VCU power switch (CVKI will start blinking, indicating the vehicle is dead).
- Reset System from a Kill status (CVKI will stop blinking).
- Conduct a CD Acquire.
- Select System Config.
Confirm Vehicle Configuration

- Check the VDA display to confirm the vehicle is configured correctly.
- The vehicle type will show one of the following for all Abrams variants:
  
  - “M1A1”  Blank Fire (Normal)
  - “M1A1df”  Dry Fire
Configure Vehicle Using the VDA

Using the VDA:

- Select the “SELECT AUX MENU” main menu.
- Scroll to the “SELECT ADMIN FUNCTIONS” sub-menu and press “SELECT”.
- Scroll to the “SELECT FOR VEHICLE CONFIG” sub-menu and press “SELECT”.
- Scroll to select the appropriate vehicle from the display.
- Shoot any detector belt with a CD, using the RESET command.
- An “INITIALIZED” voice cue will be heard through the vehicle intercom system, to confirm configuration.
Configure Vehicle Using the CD

Using the CD:

- Perform CD Acquire.
- Select the CVS menu.
- Select “CVS SET VEHICLE CONFIG”.
- Choose the correct vehicle from the sub-menu.
- Aim the CD at the VDS and pull the trigger.
- Confirm selection by viewing the VDA display window.
Labels are placed on the electronics module by CLS personnel, to indicate vehicle placement.

The number denotes direction on the vehicle and the actual direction is also indicated.
- 1 = Front
- 2 = Right (Side)
- 3 = Rear
- 4 = Left (Side)

The additional spaces are used in lieu of reconfiguring the detector belts (indicating such), for an alternate mounting location.
Initialize System, Set Detector Belts Using the VDA

- Locate the “SELECT AUX MENU” main menu.
- Scroll to the “SELECT ADMIN FUNCTIONS” sub-menu.
- Scroll to the “SELECT FOR BELT CONFIG” sub-menu.
- Select the appropriate detector belt to be initialized.
- Shoot any detector belt using the RESET command, using any generation MILES CD within 30 seconds.
- The CVKI will flash the appropriate number of times and the VDA will beep the same number of times.
- Confirm initialization by checking the SYSTEM CONFIG display.
Initialize System, Set Detector Belts Using the CD

- Select CVS menu; then pull trigger on CD.
- Select BELT1, vehicle front, and fire CD at the belt.
- Select BELT2, fire CD and continue clockwise around the vehicle.
  - Do the remaining 2 belts.
- Once again fire at each belt using the appropriate belt command and ensure the VCU flashes accordingly for each belt, (BELT1 VCU flashes one time, BELT2 VCU flashes two times, etc.).
Select System Config Menu

- Confirms component presence (+).
- Identifies missing components (-).
- BIT will confirm missing components.
Set Vehicle PID Using the VDA

Using the VDA:

– Select the “SELECT AUX MENU” main menu.
– Scroll to the “SELECT ADMIN FUNCTIONS” sub-menu and press “SELECT”.
– Scroll to the “SELECT TO CHOOSE VEHICLE PID” sub-menu and press “SELECT”.
– Use the UP/DOWN push-buttons to enter the PID number and press the SELECT push-button after each number is entered.
– Shoot any detector belt with a CD, using the RESET command.
– The VDA will beep twice and the display will change accordingly.
Set Vehicle PID Using the CD

Using the CD:

– Perform CD Acquire.

– Select the CD PID menu.

– Select “PID SELECT”.

– Use the UP/DOWN push-buttons to select the correct number, press the SEL push-button after each number is selected.

– After the last number is selected, the following menu will appear “PID SEND”.

– Aim the CD at the VDS and pull the trigger.

– Confirm PID selection by viewing the VDA display window.
Requirements Prior to Aligning MGLT

- Ensure tank is parked on level ground.
- Ensure MILES XXI equipment is properly installed and configured for your model tank.
- Procedures for boresighting and zeroing all weapons on the vehicle IAW the -10 are completed.
MGLT Alignment Procedures

- Loader looks through the MGLT 12X scope.
- Unlock the elevation and azimuth knobs.
- Using the elevation and azimuth knobs move the MGLT to vehicle aiming point.
- Lock down the elevation and azimuth knobs.
- Confirm alignment by manually moving gun off target and relay back using the “G” pattern and fire at a MILES target.
- Refer THERMAL and GAS sights.
Power Down the System

➤ Turn off VCU power and vehicle Master power.

➤ Clear all weapons and simulators of blank ammunition and cartridges.

NOTE
Remove all MILES XXI equipment in reverse order of installation, prior to washing vehicles. Equipment should be dry and free of dirt and oil prior to storage in transit case.
Summary

- Placing into operation the CVS equipment.
- Installation and removal of the CVS equipment.
Vehicle Installation

"Hands on Training"