CVTESS

Pocket Guide Bradley Fighting Vehicles

I-MILES COMBAT VEHICLE TACTICAL ENGAGEMENT SIMULATION SYSTEM (CVTESS), BRADLEY FIGHTING VEHICLES

DISTRIBUTION C: DISTRIBUTION AUTHORIZED TO U.S. GOVERNMENT AGENCIES AND THEIR CONTRACTORS ONLY (TECHNICAL DATA THAT ADVANCE TECHNOLOGY OR DESCRIBE NEW TECHNOLOGY IN AN AREA OF POTENTIALLY SIGNIFICANT MILITARY APPLICATION). OTHER REQUESTS FOR THIS DOCUMENT SHALL BE REFERRED TO PEO STRI PM LTS.
WARNING- THIS DOCUMENT CONTAINS TECHNICAL DATA WHOSE EXPORT IS RESTRICTED BY THE ARMS EXPORT CONTROL ACT (TITLE 22, U.S.C., SEC 2751, ET SEQ. VIOLATIONS OF THSES EXPORT LAWS ARE SUBJECT TO SEVERE CRIMINAL PENALTIES. DISSEMINATE IN ACCORDANCE WITH PROVISIONS OF DOD DIRECTIVE 5230.25.

 Draft 1:01

INTENTIONALLY BLANK PAGE

1 General

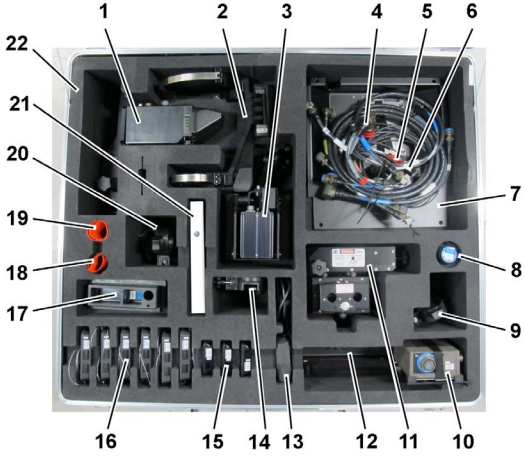
1.1 Preparation before installation

NOTE

The 25 mm gun must be boresighted prior to alignment of CVTESS. Confirm boresight status (see TM 9-2350-252-10-2 or TM 9-2350-284-10-2).

1. Position the vehicle on level ground.
2. Place the turret in the 12 o'clock position.
3. Main gun barrel horizontal (zero elevation).
4. TOW launcher in stowed position.
5. Turn off turret power and vehicle power.
6. Remove the commander's periscope and guard from between the commander's and gunner's hatches. Reinstall bolts. Store the commander's periscope and guard in a secure place inside the vehicle.
7. Check that the CVTESS installation kit is complete in the storage box.

This is a complete kit for the Bradley, both analog and digital:



#	Part Number	Name	Qty.
1	8851 360-101	TIM ASSEMBLY BRADLEY	1
2	8845 023-702	WEAPON KIT BRADLEY	1
3	8851 364-101	AUDIO UNIT ASSEMBLY	1

#	Part Number	Name	Qty.
4	8847 146-721	CABLE W1 VIM-TIM BFV/ ABRAMS	1
	8847 132-721	CABLE W3 POWER BFV ANALOG	1
	8847 132-722	CABLE W4 POWER BFV DIGITAL	1
	8847 140-721	CABLE W5 INTERFACE 1 BFV ANALOG	1
	8847 140-722	CABLE W6 INTERFACE 1 BFV DIGITAL	1
	8847 141-721	CABLE W7 AU/DIFCUE/ ATWESS BFV	1
	8847 146-722	CABLE W8 CAN TDIP J7 BFV DIGITAL	1
5	6853 500-571	CABLE TIES	-
6	6853 492-506	VELCRO	-
7	8854 245-171	BRACKET VIM-ANALOG	1
8	8839 108-212	SHORTING PLUG, 25 MM GUN (BLUE)	1
9	8854 245-111	BRACKET WDU-L/F	1
10	8851 081-201	VIM	1
11	8851 363-101	ATWESS ASSEMBLY BRADLEY	1
12	8854 245-181	BRACKET VIM DIGITAL	1
13	8851 083-101	CM	1
14	8854 245-301	BRACKET WDU FRONT	1

#	Part Number	Name	Qty.
15	8851 366-101	CKM ASSEMBLY	3
16	8851 365-101	WDU ASSEMBLY	6
17	8839 105-301	GROMMET BRADLEY	1
18	8839 479-004	LIGHT COVER, AP AMMO LOW	1
19	8839 479-005	LIGHT COVER, HE AMMO LOW	1
20	8854 245-121	BRACKET WDU R/F	1
21	8875 802-215	OP MANUAL CVTESS BRADLEY	1
22	8854 245-191	STORAGE CASE CVTESS BRADLEY	1

NOTE

Cables are rolled up and stored on top of the Bracket VIM analog.

NOTE

The VIM is stored in the box on either the Bracket VIM analog or the Bracket VIM digital, depending on where it was used last. If it is on the wrong bracket it needs to be moved to the appropriate bracket.

1.2 Installation Safety Instructions

WARNING

Vehicle master power switch and turret power switch must be in OFF position before installing or removing system components. Failure to follow this warning may cause turret or 25 mm gun movement, resulting in injury or death to personnel.

WARNING

Turret traverse lock must be engaged before installing or removing components/cables.

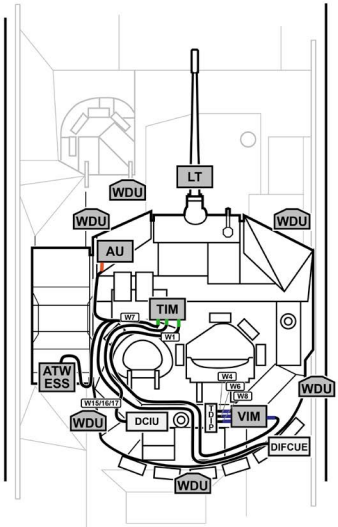
WARNING

Be careful when moving and standing on the vehicle. Do not trip over the simulator equipment and cables.

2 Installation

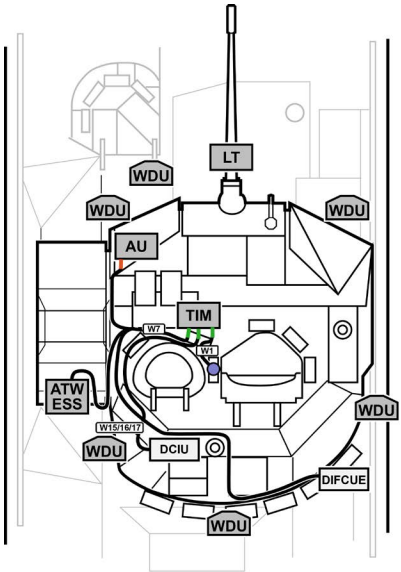
2.1 External installation

The figure below illustrates positions of components and cable routing on the Bradley (digital).



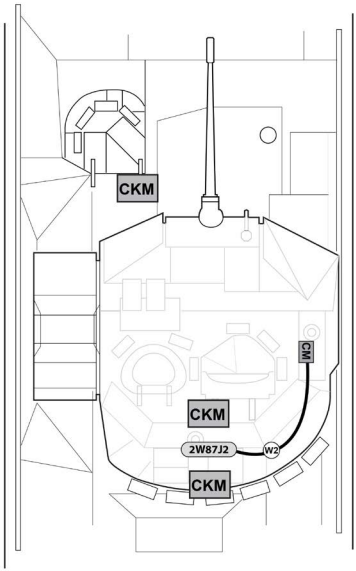
2.1 External installation- Continued

The figure below illustrates positions of components and cable routing on the Bradley (analog).



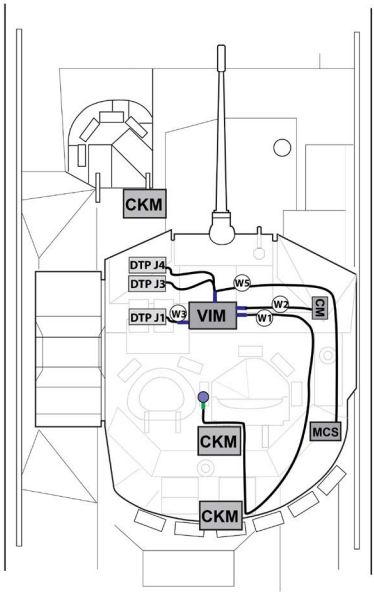
2.2 Internal installation

The figure below illustrates positions of components and cable routing on the Bradley (digital) .



2.2 Internal installation- Continued

The figure below illustrates positions of components and cable routing on the Bradley (analog) .

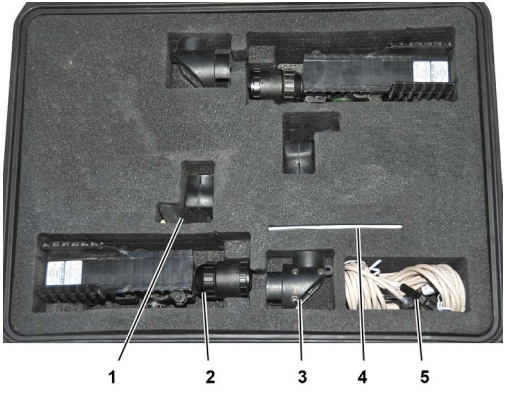


3 Alignment

3.1 Weapon Kit Alignment

There are one weapon kit on the Bradley:
Weapon kit Bradley (25 mm, coax and TOW)

The weapon kit is aligned before the exercise, using the Alignment Device Bradley.



1	Small Arms Alignment Device (SAAD) (2 ea)	4	Installation DVD Win-Excon
2	Alignment kit (2 ea)	5	IrDA transceiver with USB cable
3	Right-angle prism (2 ea)		

3.2 LT Alignment

1. Boresight the 25 mm gun following normal procedures.

NOTE

Once sights are aligned with the barrel, do not change the sight or perform boresight again. The LT will be aligned to the sight, not the barrel, so it is vital that the sight retains its setting throughout the exercise.
If boresight is performed again, then the weapon kit must be realigned.

2. Select AP on the weapons control box.
3. Vehicle specific settings:
    - Bradley digital: Set environmental settings (Powder, Air, air pressure and Cross wind to default values.
    - Bradley analog: Set manual range to 0 m.
4. Using the ISU, lay the 25 mm gun at a clearly defined target, or an alignment board if available, at approximately 1200 m.

3.2 LT Alignment - Continued

NOTE

If using a board, lay the gun at center mass.

5. Remove the rubber cover from the LT.

6. Position the alignment kit on the LT.

3.2 LT Alignment - Continued

7. Push the alignment kit onto the LT until it is just past the alignment screws on the LT (yellow arrows on label visible).

8. Install the right-angle prism on the alignment kit.
9. Look into the right-angle prism and locate the same aiming point the 25 mm gun sight is set on.

3.2 LT Alignment - Continued

Adjust the alignment scope using the adjustment knobs on the alignment scope so the crosshair is on the 25 mm gun sight aiming point.

10. Attach the SAAD to the front end of the LT.

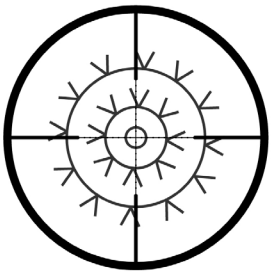
3.2 LT Alignment - Continued

One side of the SAAD is marked “This side towards barrel”. Make sure this side is facing to right side in the firing direction (towards the bracket attachment rails on the LT).

11. Rotate the SAAD optics in front of the alignment scope, into line of sight.

3.2 LT Alignment - Continued

12. Look through the right-angle prism. You will see a reticle projected on the alignment scope's crosshair.
13. Adjust the reticle pattern to the alignment scope's crosshair. Use the attached screwdriver to turn the two adjustment screws on the LT.



3.2 LT Alignment - Continued

NOTE

The SAAD will turn off after 3 minutes as a battery saving feature. Remove the SAAD. After 5 seconds, install the SAAD again. The SAAD will also turn off if something is malfunctioning.

NOTE

It can be difficult to see the reticle pattern in direct sunlight. If so, use e.g. your hand to shade the SAAD.

NOTE

If the end positions are reached with the alignment screws, check the sights and the installation of the LT. If the problem is not solved, contact an O/C or support maintainer.

Do not use excessive force on screws.

14. Remove the SAAD from the LT.
15. Remove the right-angle prism.
16. Remove the alignment kit using both hands to pull it forward.

3.2 LT Alignment - Continued

17. Install the rubber cover on the LT.

Starting at the back of the LT, fit the cover over the antenna and then slide the rubber cover over the front of the LT.

4 Associating Wireless Units to the TIM

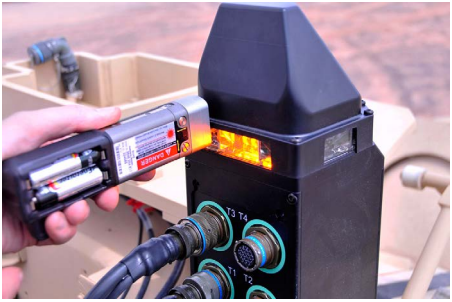
All wireless units in the CVTESS kit need to be associated to the TIM. Initial associations are done at the factory before shipping. As long as the kit stays intact, the TIM will detect and connect to the units that it was associated to, so normally re-association is not required.

The wireless units store the ID's of the TIM they are associated to in their memory, and will connect to the TIM once they are powered-up and within radio range.

If a wireless unit has to be replaced in the CVTESS kit, it needs to be associated to the TIM the first time it is used. If the TIM is replaced in the CVTESS kit, all wireless units need to be associated to the new TIM.

Association is done by holding the unit to the IR window on the left rear of the TIM.

The CVTESS must be fully installed and powered up in order to perform associations. Successful association is indicated by one orange blink from the TIM. If the TIM is already associated to e.g. an LT when trying to associate another LT, the TIM will blink orange three times.



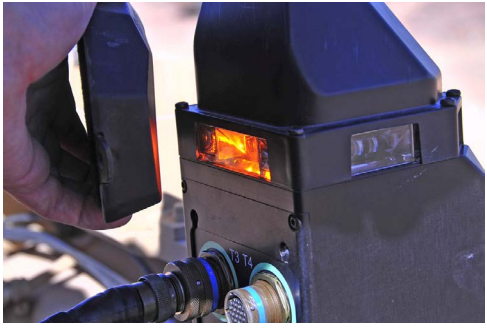
4.1 WDU association

1. Install two AA batteries in the WDU.
2. Push and release the button on the front of the WDU.

This will put the unit in association mode for approximately 20 seconds.

3. Hold the WDU window to the IR window on the TIM to establish IR communicaton.

4.1 WDU association - Continued



4. When the TIM blinks once the association is complete.

4.2 LT association

1. Remove the rubber cover from the LT.
2. Remove the LT bracket, with LT installed, from the 25 mm gun barrel.
3. Install batteries in the LT to pair. If the unit already has batteries, take them out and put them back in.
4. Hold the LT close to the TIM to establish IR communication.

5. When the TIM blinks once the pairing is complete.
6. Install the LT bracket on the 25mm gun barrel, see Weapon Kit Alignment.
7. Install the rubber cover on the LT.

4.3 CKM association

1. Install two AA batteries in the CKM. If the unit already has batteries, take them out and put them back in to put the CKM in association mode.
2. Hold the CKM to the IR window on the TIM to establish IR communication.

The IR sensor is located on the front of the CKM.

4.3 CKM association - Continued

3. When the TIM blinks once the association is complete.

5 Operation

5.1 Open menu functions

The table below describes the open parts of the CM menu tree.

Main menu	Sub menus		Text on CM
SI			SIMULATION
	AM		AMMUNITION
		MW	UPLOAD MAIN AMMO
		CO	UPLOAD COAX AMMO
		MI	UPLOAD MISSILE
	VS		VEHICLE STATUS
	LO		EVENT LOG
	ET		ENABLE TDTD
	PD		POWER DOWN
SU			SETUP
	BL		BACKLIGHT
	CO		CONTRAST ADJUST
	SL		SOUND LEVEL ADJUST
	TA		TURRET POSITION
TE			TEST
	EL		ERROR LIST
	CW		CONNECTED WDU'S
	CL		CONNECTED LASER UNITS
	CC		CONNECTED CKM'S
	IV		INPUT VEHICLE
	OV		OUTPUT VEHICLE

5.2 Firing the simulator

Firing the simulator requires the crew to perform all of its normal weapons procedures, target engagement rules, hand operations/grips and normal firing actions. The simulator laser unit will fire if all conditions for fire are filled.

1. Follow normal procedures for firing.
    - Bradley digital: engage target using normal procedures.
    - Bradley analog: the 25 mm sight must be used when engaging target, range must be set to 0. Use high magnification. Do not use LRF.
2. Fire the weapon.

WARNING

All enabled firing signature systems, Audio Unit (AU) or Anti-Tank Weapons Effect Signature Simulator (ATWESS), will go off when firing the weapon. Make sure no personnel is in the danger zone before firing.

5.2 Firing the simulator - Continued

WARNING

The frontal LED in the TIM will produce a high energy flash of light for each round when firing. Do not look straight into the light at close range.

NOTE

The simulator can be fired when power supply is off (running on TIM backup battery). In this case make sure the CM is on before firing. Push any button on the CM to wake it up from power saving mode.

5.3 Firing the simulated TOW

1. Simulated TOW can be fired either with ATWESS pyro device enabled or disabled (ON/OFF):
   - 1.1 If ATWESS is enabled (pyro ON) it has to be loaded with cartridges before firing, see section Loading the ATWESS.
   - 1.2 If ATWESS is disabled (pyro OFF) missiles must be loaded using the CM, see section Crew Ammunition Handling.
2. Select TOW on the fire control system.
3. Aim TOW at target.
   - 3.1 Digital Bradley: aim using normal vehicle procedures.
   - 3.2 Analog Bradley: the 25 mm sight must be used when aiming TOW, range must be set to 0. Use high magnification. Do not use LRF.

5.3 Firing the simulator TOW - Continued

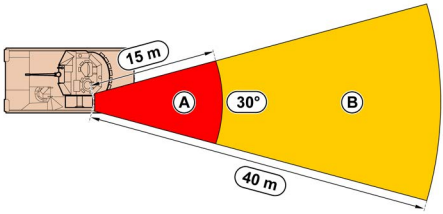
NOTE

The 25 mm gun sight must be used on the analog Bradley because it has no MILES compensation for gun elevation. The laser transmitter simulating the TOW is installed on the 25 mm barrel, so it needs to point straight at the target.

4. Fire the TOW using normal vehicle firing procedures. ATWESS cartridge will fire if pyro is enabled.

WARNING

Ensure that there are no personnel in the danger zone before firing.



5. Track your target for 17 seconds, or until target hit/near miss indication is received.

5.3.1 Loading the ATWESS

Safety conditions:

WARNING

Handle ATWESS cartridges with the same care you use with any live ammunition.

WARNING

Always wear protective gloves when handling ATWESS cartridges.

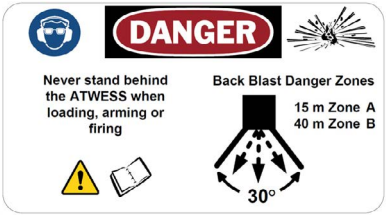
WARNING

Ensure that the safety area is free from personnel, flammable material or other objects that could be damaged by the flame, heat and splinter.

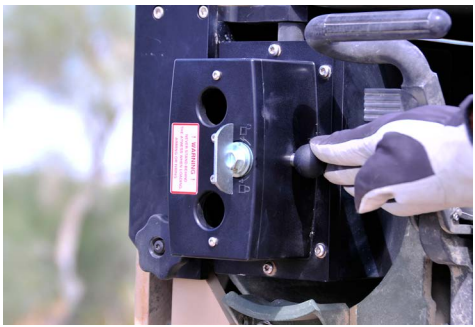
NOTE

Always load the ATWESS with the TOW launcher erected in loading position. This will make training more realistic and provide a safer position for the loader.

5.3.1 Loading the ATWESS - Continued

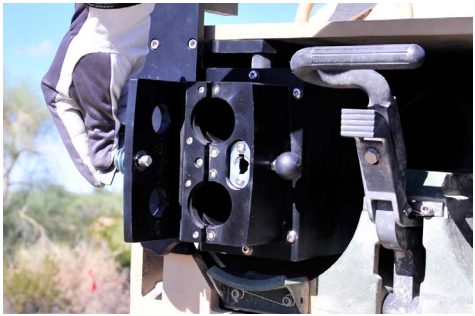


1. Make sure the safe/arm lever is pushed in completely.



2. Turn the locking handle and open the breech door.

5.3.1 Loading the ATWESS - Continued

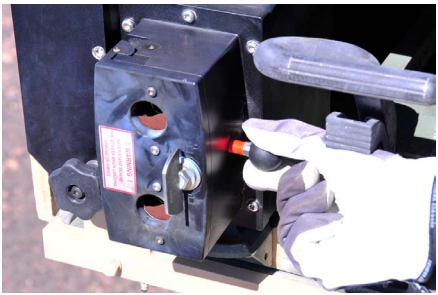


3. Visually check to see that the cartridge chambers are completely empty.
4. Load two cartridges.

5.3.1 Loading the ATWESS - Continued

5. Close and lock the breech door.

6. Pull out the safe/arm lever.



7. The ATWESS is now loaded and mechanically armed.

5.3.2 Reloading the ATWESS

Safety conditions:

WARNING

Handle ATWESS cartridges with the same care you use with any live ammunition.

WARNING

Always wear protective gloves when handling ATWESS cartridges.

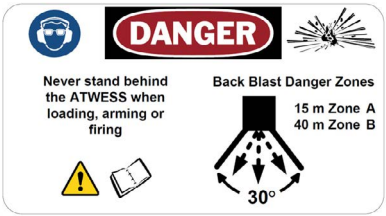
WARNING

Ensure that the safety area is free from personnel, flammable material or other objects that could be damaged by the flame, heat and splinter.

NOTE

Always load the ATWESS with the TOW launcher erected in loading position. This will make training more realistic and provide a safer position for the loader.

5.3.2 Reloading the ATWESS - Continued



1. Make sure the safe/arm lever is pushed in completely.

2. Turn the locking handle and open the breech door.
3. Remove the expended cartridges.

5.3.2 Reloading the ATWESS - Continued

4. Visually check to see that the cartridge chambers are completely empty.
5. Load two cartridges.

6. Close and lock the breech door.
7. Pull out the safe/arm lever.

5.4 Crew ammunition handling

The simulator is preloaded with simulated ammunition. Ammunition type and loaded quantities are setup by an O/C before the exercise. Type and quantity that are available for the crew reflects what is actually realistic to carry in the turret and in the hull in a combat situation.

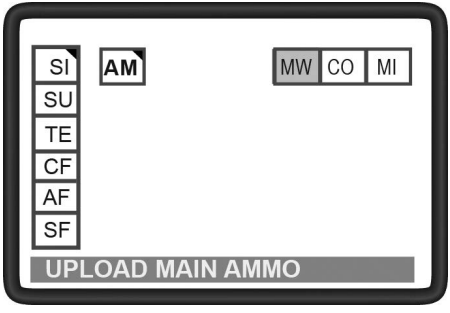
The main gun has to be reloaded manually when running out of ammo, just as when firing live ammo, but using the CM. To reflect actual uploading time, there is a countdown before the simulator can be fired.

The TOW can be fired either with ATWESS enabled or disabled. When ATWESS is enabled, the reloading is carried out by reloading the ATWESS cartridges. In this case the available number of missiles is restricted to the number of ATWESS cartridges onboard. If the ATWESS is disabled there will be a loading timer when using the CM to reload. The amount of available missiles is preset in the CM.

The coax machine gun is normally preloaded with the amount of one full box available for firing and another full ready box available for upload.

5.4 Crew ammunition handling - Continued

Upload procedures are available in the Ammunition (AM) menu on the CM.



The following procedures describe crew ammunition handling for main gun, TOW missile and coax.

5.4.1 MW – Upload Main Ammo

1. The Upload main ammo (MW) is used to upload simulated ammunition to the 25 mm gun.

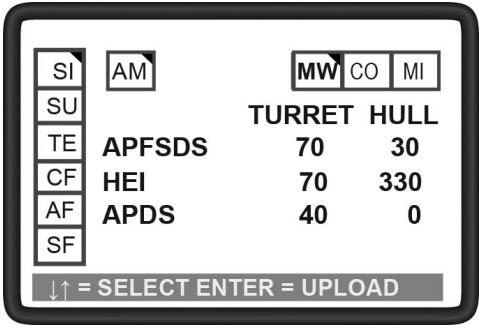
5.4.1 MW - Upload Main Ammo - Continued

NOTE

To enable upload of ammunition, the turret needs to be in the correct loading position:

- To upload AP ammunition, rotate turret to 4350 ± 270 mils.
- To upload HE ammunition, rotate turret to 2150 ± 270 mils.

2. Select MW and press enter.
3. Select ammunition and press ENTER to upload ammunition.



5.4.1 MW - Upload Main Ammo - Continued

A preset upload time starts to count down. During the upload sequence a full ready box (turret) or remaining ammunition in hull is transferred.

4. Press ESC to return to the previous menu.

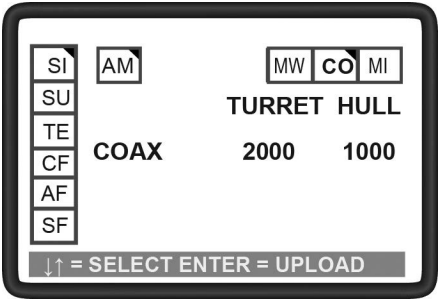
NOTE

Pressing ESC during ongoing ammunition upload stops the process and ammunition is not transferred.

5.4.2 CO – Upload Coax Ammo

1. The Upload coax ammo (CO) is used to upload simulated ammunition to the coax gun.
2. Select CO and press enter.
3. Select ammunition and press ENTER to upload ammunition.

5.4.2 CO – Upload Coax Ammo - Continued



A preset upload time starts to count down. During the upload sequence a full ready box (turret) or remaining ammunition in hull is transferred.

4. Press ESC to return to the previous menu.

NOTE

Pressing ESC during ongoing ammunition upload stops the process and ammunition is not transferred.

5.4.3 MI – Upload Missle (ATWESS Disabled)

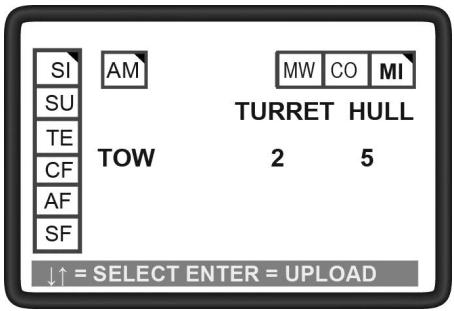
1. The Upload Missile (MI) is used to upload simulated missiles to the TOW launcher when training with ATWESS disabled.

NOTE

To enable upload of missile, the turret needs to be in the correct loading position:

- Rotate turret to 5900 ± 270 mils.

2. Select MI and press enter.
3. Select ammunition and press ENTER to upload ammunition.



5.4.3 MI – Upload Missle (ATWESS Disabled) - Continued

A preset upload time starts to count down. During the upload sequence one missile is transferred from the hull to the launcher.

4. Press ESC to return to the previous menu.

NOTE

Pressing ESC during ongoing ammunition upload stops the process and ammunition is not transferred.

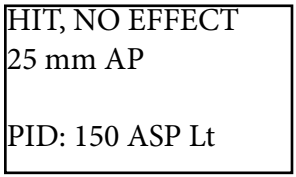
5.5 Target result presentation

NOTE

During a force-on-force exercise, vehicle commander must check the CM for correct tactical action if a hit indication is announced on the vehicle intercom.

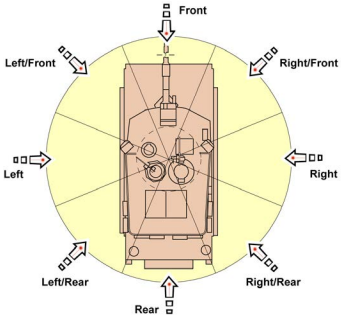
The effect of the incoming round on the vehicle will be announced on the intercom to alert the crew that they are under fire from another simulator.

If the target simulator detects incoming fire, a popup will be displayed on the CM. It will show the player ID of the firing simulator, and the aspect of the incoming fire.



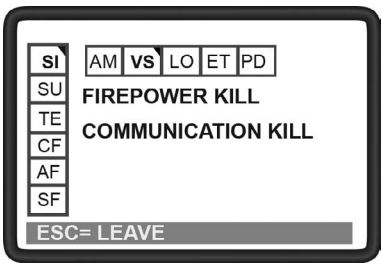
5.5 Target result presentation - Continued

Ft	Front
FtRt	Front right
Rt	Right
RrRt	Rear right
Rr	Rear
RrLt	Reat left
Lt	Left
FtLt	Front left



NOTE

The indicated direction of an incoming round is in relation to the turret.
The vehicle status can always be verified by selecting VS (Vehicle Status) in the SI (Simulation) menu on the CM.



5.6 Tamper Indications

CVTESS senses, indicates and stores attempts to tamper with the system during Force-on-Force exercise. A popup appears on the CM when a tamper has occurred. Examples of what is classified as tampering are:

- Switching off CVTESS
- Disconnecting cables
- Removing batteries in WDUs or CKMs

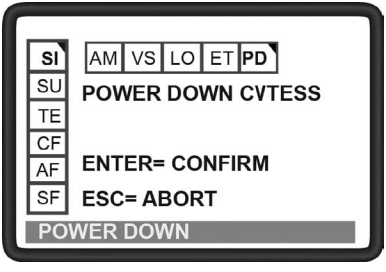
Tampering will render the vehicle a tampering kill, which will be communicated over the intercom and by constant flashing from the TIM. A tampering kill can only be reset by an O/C using a UCD.

NOTE

Tampering can be unintentional, e.g. if a cable gets accidentally cut off during exercise.

5.7 After Exercise

1. Check the Error List (TE, EL) on the CM.
2. Take a note of any errors and report to maintenance personnel when turning in the equipment.
3. Turn off CVTESS:
   3.1 Select Power Down (SI, PD) on the CM.
   3.2 Press ENTER to power down



   3.3 Put VIM power switch in OFF position.
4. When the training event is completed, remove CVTESS per removal instructions.

6 Troubleshooting

6.1 General

When the equipment is not operating properly it is often possible to determine the source of the problem through observation. Corrective actions on equipment exposed to outdoor conditions can often be performed on location. Corrective actions that require that electronic units must be opened should preferably be performed indoors.

This troubleshooting guide aims to present a practical and systematic approach to the identification of possible failures, and to suggest corrective actions, according to the following methodology:

- Symptom: the way the operator becomes aware of an error.
- Cause: one or more possible errors that can create the symptom.
- Corrective action: one or more actions that can solve the error. If there are multiple actions, perform the first action. If the problem is not solved continue with the next action.

6.2 Built-in Test

Connected units run a Built-In Test (BIT) automatically and repeatedly when the system is powered. If a malfunction is found, a message will appear as a popup on the Control Module (CM). The message will call out the malfunctioning unit, or cable, making it easier to identify problems which may develop when operating or maintaining CVTESS.

6.3 Wired Units

Symptoms	Causes	Corrective action
No power in simulator.	No main power.	Check that vehicle power (master power and turret power) is on.
		Check that the power cable is properly connected
		Make sure that the vehicle power connector has power (measure voltage, or connect something else to verify that the connector has power).
	Power cable broken.	Check cable and connector.
		Replace power cable.
	VIM broken.	Replace VIM.
	TIM broken.	Replace TIM.
No power in simulator running on backup battery.	Running too long on backup battery (battery low).	Turn on master power and turret power and recharge backup battery.
	Battery broken.	Replace TIM.
	Battery charger in TIM broken.	Replace TIM.

6.3 Wired Units - Continued

Symptoms	Causes	Corrective action
CM reports low battery in TIM.	Not connected to power.	Check and/or connect power cable.
	Vehicle power off.	Check that vehicle power (master power and turret power) is on.
	Not or dead battery in TIM.	Disconnect the power cable from the vehicle. If CVTESS shuts off instantly (the TIM battery is either missing or dead. Replace TIM.
Power in simulator (will react to UCD) but no power in CM (blank display).	CM not connected.	Connect CM.
	Cable W2 or connector broken.	Check cable and connector.
		Replace CM.
	Simulator software malfunction	Restart CVTESS by turning the VIM off and on again.
	CM broken.	Replace CM.
No sound cues in intercom.	MCS in vehicle not switched on.	Switch MCS on.
	Volume set too low.	Turn up the volume.
	Cable Radio MCS not connected or broken.	Check cable and connector.
		Check connection, both at VIM and at MCS.
		Replace the cable.

6.4 Wireless Units

Troubleshooting CKM

Symptoms	Causes	Corrective action
No connection with one CKM.	No power in CKM.	Check that the CKM has fresh batteries.
	CKM not associated with simulator.	Check that the CKM is in the list of associated CKM. Use the CM menu TE and CC.
		Re-associate the CKM to the TIM.
	Wrong CKM associated with TIM.	Deselect any unused CKM from the list of CKMs using the CM menu CF and DU.
		Associate the CKM to the TIM.
	CKM out of radio range from the CM.	Make sure the CM is inside the turret.
	CKM malfunction.	Check the LED inside the battery compartment. A red burst of red blinks every 3 seconds indicates a BIT error.
		Restart the CKM by removing batteries and putting them back in again.
		Replace the CKM.

Troubleshooting CKM - Continued

Symptoms	Causes	Corrective action
No connection with any CKM.	No power in CKMs.	Check that the CKM have-fresh batteries.
	CKMs not associated with simulator.	Check that the CKMs are in the list of associated CKMs. Use the CM menu TE and CC.
		Re-associate the CKMs to the TIM.
	Wrong set of CKMs associated with TIM.	Deselect all CKMs from the list of CKMs using the CM menu CF and DU.
		Associate the CKMs.
	Malfunction in CM.	Disconnect and reconnect CM to TIM.
		Restart CVTESS by turning the VIM off and on again.
	WLN antenna in CM broken.	Replace the CM.

Troubleshooting WDU

Symptoms	Causes	Corrective action
No connection with one WDU.	No power in WDU.	Check that the WDU has fresh batteries.
	WDU not associated with simulator.	Check that the WDU is in the list of associated WDU. Use the CM menu TE and CW.
		Re-associate the WDU to the TIM.
	WDU malfunction.	Restart the WDU by removing batteries and putting them back in again.
		Replace the WDU. Verify correct position on vehicle.
No connection with any WDU.	No power in WDUs	Check that the WDUs have fresh batteries.
	WDU is not associated with simulator.	Check that the WDUs are in the list of associated WDUs. Use the CM menu. TE and CW.
		Re-associate the WDUs to the TIM.
	Wrong set of WDUs associated with TIM.	Deselect all WDUs from the list of WDUs using the CM menu CF and DU.
		Associate the WDUs
	Malfunction in TIM.	Restart CVTESS by turning the VIM off and on again.
	WDN antenna in TIM broken.	Replace the TIM.

Troubleshooting laser unit

Symptoms	Causes	Corrective action
No connection with one laser unit.	No power in laser unit.	Check that the laser unit has fresh batteries.
	Laser unit not associated with simulator.	Check that the laser unit is in the list of associated WDU. Use the CM menu TE and CL.
		Re-associate the laser unit to the TIM. **NOTE** The laser unit will have to be realigned.
	Wrong laser unit associated wiht TIM.	Deselect any unused laser units from the list of laser units using the CM menu CF and DU.
		Associate the WDU to the TIM. **NOTE** The laser unit will have to be realigned.
	Laser unit malfunction.	Restart the laser unit by removing batteries and putting them back in again.
		Replace the laser unit. **NOTE** The laser unit will have to be realigned.

Troubleshooting laser unit - Continued

Symptoms	Causes	Corrective action
No connection with any laser unit.	No power in laser unit.	Check that the laser units have fresh batteries.
	Laser units not associated with simulator.	Check that the laser units are in the list of associated laser units. Use the CM menu TE and CL.
		Re-associate the laser units to the TIM. **NOTE** The laser unit will have to be realigned.
	Malfunction in TIM.	Restart CVTESS by turning the VIM off and on again.
	WDN antenna in TIM broken	Replace the TIM.

6.5 Firing and target system events

SAT Troubleshooting

Symptoms	Causes	Corrective action
Cannot fire main weapon.	Incorrect firing procedures.	Follow the correct firing procedures (e.g. hatches closed, weapon armed).
	No ammunition.	Load ammunition to main weapon using the CM.
	Vehicle is killed.	Reset using a UCD.
	No main gun trigger signal from vehicle.	Perform Main gun trigger test in the CM, TE (Test) and IV (Input Vehicle) and verify Main gun trigger signal from vehicle
		If no signal: Check vehicle.
Cannot fire coax.	Incorrect firing procedures.	Follow the correct firing procedures (e.g. hatches closed, weapon armed).
	No ammunition.	Load ammunition using the CM.
	Vehicle is killed.	Reset using a UCD.
	No Coax gun trigger signal from vehicle.	Perform Coax gun trigger test in the CM, TE (Test) and IV (Input Vehicle) and verify Coax gun trigger signal from vehicle.
		If no signal: check vehicle firing system.

SAT Troubleshooting - Continued

Symptoms	Causes	Corrective action
Cannot fire weapon stations (Abrams)	Incorrect firing procedures.	Follow the correct firing procedures
	Weapon jammed or out of blanks.	Check weapon.
		Reload blanks.
	Vehicle is killed.	Reset using a UCD.
No effect on target in FoF.	Laser aperture dirty.	Clean laser aperture.
	Target's WDU dirty.	Clean WDU window.
	Gunner is using wrong target range or LRF.	Check sight settings.
	Incorrect alignment.	Align laser.
Simulator does not detect hit.	The WDUs are dirty.	Clean WDU window.
	Low or no battery in WDU.	Check battery in WDU, either by pushing the button and looking at the LEDs, or using the CM.
	Same player ID in both firing and target simulator.	Sheck PID on CM, change if necessary.
	WDU broken.	Replace WDU.

6.6 Laser Units

6.6.1 LT and SATs

Laser Troubleshooting

Symptoms	Causes	Corrective action
No reticle light during alignment. No effect on target in FoF.	SAAD attached more than 3 minutes.	1. Remove the SAAD. 2. Wait 5 seconds. 3. Reinstall the SAAD.
	SAAD wet or dirty.	• Clean the optics of hte SAAD and SAT. • Replace the SAAD.
	Low battery in SAT.	• Replace the SAT battery. • Replace the SAAD.
	Direct sunlight into the SAAD.	Cup your hand over the SAAD to shade it.
The SAT does not simulate (no flashing LED during firing).	SAT error.	**Perform BIT/Attach the SAAD on the SAT.** **BIT OK (Green LED/illuminated reticle):** 1. Clean the SAT front window with a dry cloth. 2. Still no simulation, replace the SAT. **BIT NOT OK (No LED/no reticle):** 1. Replace the SAT battery. 2. Still no simulation, replace the SAT. 3. Perform a new BIT test, BIT NOT OK- replace the SAT.

Laser Troubleshooting - Continued

Symptoms	Causes	Corrective action
Ten red LED flashes.	Low power.	Replace the SAT battery.
	SAT overheated.	Let the SAT cool down.
	SAT error.	Replace the SAT.
Ten flashes alternating red and green.	Warning low battery.	Replace the SAT battery.
	Warning SAT overheated.	Let the SAT cool down.
One red LED flash when a blank round is fired.	The associated personnel or vehicle system has a killed/ wounded or tampering status.	Reset associated personnel or vehicle system with UCD.
One green flash when a blank round is fired.	SAT is not aligned.	Align the SAT.
	SAT has no effect on the target.	• Clean the SAT front window with a dry cloth. • Replace the SAT.
Laser simulate and hit, but aiming is off.	Bad alignment.	Redo alignment.
	Bad boresight.	Redo boresight.
	Alignment kit is broken.	Replace alignment kit.

6.6.2 LED Indications on the Laser

LED indications	Corrective action
One green flash when a blank round is fired.	SAT is OK and simulating.
Ten flashes alternating red and green.	Warning of low battery or overheated SAT. The SAT will still simulate.
One red flash when a blank round is fired.	SAT is OK, but does not simulate. The associated personnel or vehicle system has a killed/wounded or tampering status.
Ten red flashes.	Error, the SAT does not simulate.

7 Removal Instructions

7.1 Removal Safety Instructions

WARNING

Vehicle master power switch and turret power switch must be in OFF position before installing or removing system components. Failure to follow this warning may cause turret or 25 mm gun movement, resulting in injury or death to personnel.

WARNING

Turret traverse lock must be engaged before installing or removing components/cables.

WARNING

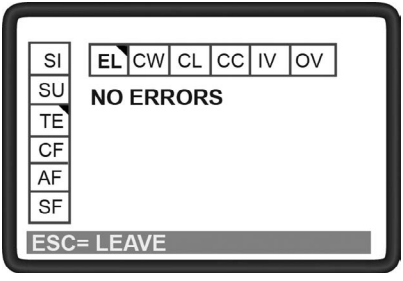
Be careful when moving and standing on the vehicle. Do not trip over the simulator equipment and cables.

7.2 Test the simulator before removal

Before removal of CVTESS, perform the following functional test while the equipment is still on the vehicle:

1. Start up the simulator.
2. Fire all weapons.
3. Check the Error List (EL) on the Control Module (CM).

There should be no errors.



4. Take a note of any detected errors and report to maintenance personnel when turning in the equipment.

7.3 Removal of Equipment

Removal of a component is generally performed in reverse order of installation. It is not required to remove the simulator equipment in any particular order. The order described in this section is a recommendation.

NOTE

Keep the vehicle kit intact when removing components. Do not mix components with other vehicle kits. The wireless components are associated with the TIM, and will remain associated next time CVTESS is powered up.

NOTE

Do not remove Velcro from the vehicle.

Start removal on the inside of the turret:

1. Turn off the power switch on the VIM.
2. Disconnect all cables from the simulator components, and vehicle connection points. Elevate or lower the gun as required for accessibility.

7.3 Removal of Equipment - Continued

3. Remove all simulator components.
   - CM
   - VIM (analog)
   - Shorting plug
   - Light covers, AP and HE ammo low
   - 3 CKMs (turret, friver and squad compartment)
4. Remove and roll up all cables.
5. Reinstall any removed vehicle parts, such as covers and dust covers.
6. Reconnect all disconnected vehicle cables.

Continue removal on the outside of the turret:

1. Remove the grommet, pull out cable W1 and reinstall periscope (analog).
2. Disconnect all cables from the simulator components, and vehicle connection points.

7.3 Removal of Equipment - Continued

3. Remove all simulator components.
    - TIM
    - VIM (digital)
    - 6 WDUs - including brackets
    - Weapon kit Bradley
4. Remove and roll up all cables.
5. Reinstall any removed vehicle parts, such as covers and dust covers.
6. Reconnect all disconnected vehicle cables.

Inspect, clean and pack the equipment in the storage box.

1. Clean components and cables as needed (see cleaning instructions).
2. Remove batteries from all wireless components (LT, WDUs and CKMs).
3. Visually inspect components and cables for damage as they are returned to the storage case. Flag and report any detected damage.

7.3 Removal of Equipment - Continued

4. Pack components and cables in the storage case according to the table of contents provided.

   Ensure equipment is dry and clean before packing.

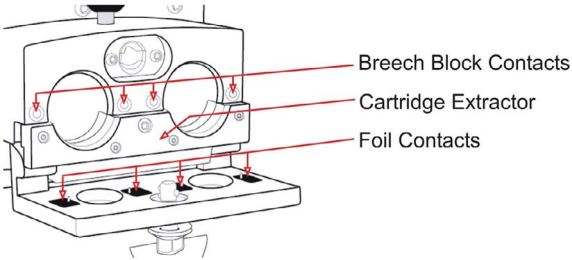
5. Ensure the kit is complete. Report any missing items.

7.4 Cleaning

1. Remove mud and dust with a nylon brush.
2. Clean all exterior parts with a wet sponge.
3. Clean all optical surfaces with lens cleaning paper. If necessary use detergent without citric acid e.g. windshield wiper fluid. Clean the glass smoothly with circular movements from the center to the edge.
4. Dry all equipment with a clean and dry cloth.

Cleaning ATWESS

1. Open the breech door on the ATWESS.
2. Apply gun oil on a clean cloth and wipe off powder residues and dirt in and around the cartridge chambers.



3. Clean foil contacts and breech block contacts.
4. Clean the cartridge extractor.