CVTESS
Pocket Guide Abrams

I-MILES COMBAT VEHICLE TACTICAL ENGAGEMENT SIMULATION SYSTEM (CVTESS), ABRAMS

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1 General

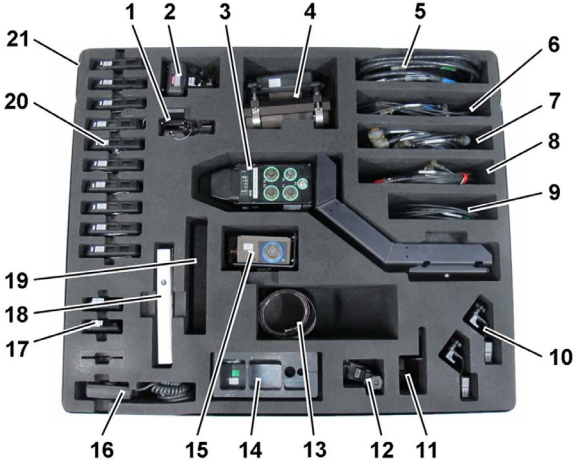
1.1 Preparation before installation

NOTE

The 120 mm gun must be boresighted prior to alignment of CVTESS. Confirm boresight status (see TM 9-2350-388-10-1 or TM 9-2350-264-10-1).

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. Turn off master power and turret power.
5. Remove the loader's periscope from the hatch. Store the loader's periscope in a secure place inside the tank.
6. Check that the CVTESS installation kit is complete in the storage box.

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



#	Part Number	Name	Qty.
1	8845 023-610	WEAPON KIT M240 D	1
2	8845 023-603	WEAPON KIT M2 Div	1
3	8851 361-101	TIM ASSEMBLY ABRAMS	1
4	8845 023-701	WEAPON KIT ABRAMS	1

#	Part Number	Name	Qty.
5	8847 146-721	CABLE W1 VIM-TIM BFV/ ABRAMS	-
6	8847 132-725	CABLE W11 POWER ABRAMS	-
7	8847 140-725	CABLE W12 INTERFACE 1 ABRAMS ANALOG	1
8	8847 140-726	CABLE W13 INTERF. 1 ABRAMS DIGITAL	1
9	8847 141-725	CABLE W14 MGSS/DIFCUE	1
10	8854 245-011	BRACKET WDU REAR	1
11	8854 245-311	BRACKET WDU FRONT	1
12	8839 115-501	TURRET POSITION SENSOR	1
13	6853 492-506	VELCRO	1
14	8839 105-201	GROMMET M1/M1A1	1
15	8851 362-101	VIM ASEMBLY ABRAMS	3
16	8851 083-101	CM	6
17	8851 366-101	CKM ASSEMBLY	1
18	8875 802-214	OP MANUAL CVTESS ABRAMS	1
19	6853 500-571	CABLE TIES	1
20	8851 365-101	WDU ASSEMBLY	1
21	8854 245-091	STORAGE CASE CVTESS ABRAMS	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.

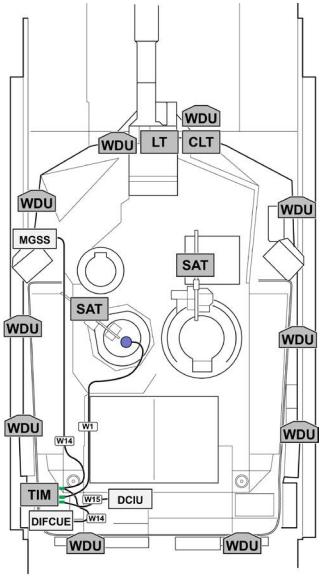
WARNING

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 Abrams (digital and analog).

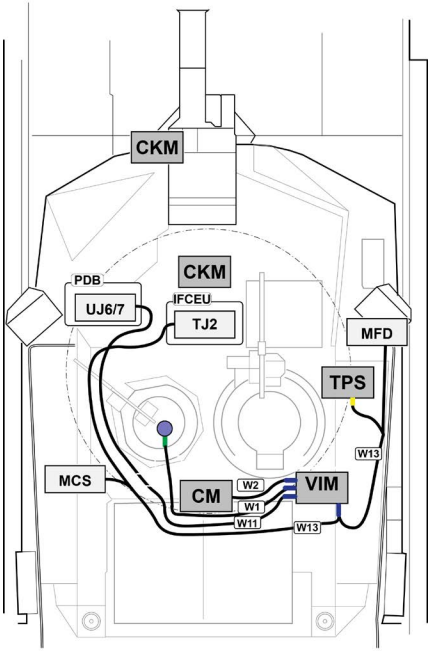


2.2 Internal installation

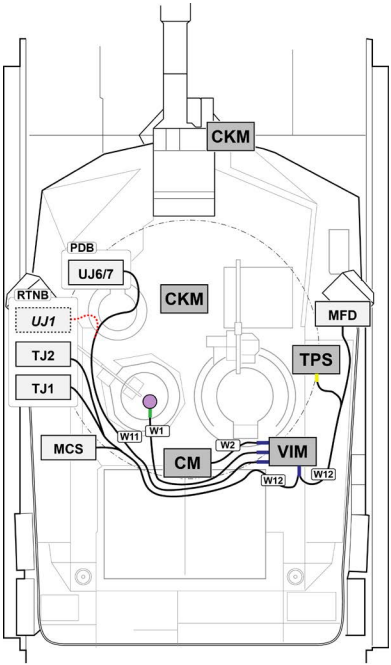
The following procedure applies to both variants of the Abrams (digital and analog). The connection points for vehicle power, using cable W11 is assumed to be the Power Distribution Box (PDB) in both cases. Some analog tanks do not have PDB, in which case the power cable is connected to the Utility Jack on the RTNB instead.

Also the interface cable is different between the analog and the digital. The digital uses cable W13, the analog uses cable W12.

The figure below illustrates positions of components and cable routing for the digital Abrams.



The figure below illustrates positions of components and cable routing for the analog Abrams.



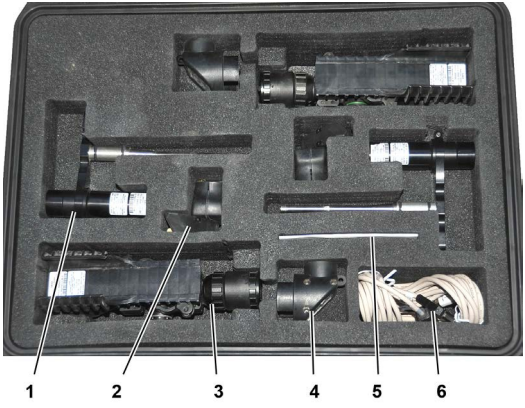
3 Alignment

3.1 Weapon Kit Alignment

There are three weapon kits to align on the Abrams:

- Weapon kit Abrams (120 mm and coax)
- Weapon kit M2 (CROWS or SCWS)
- Weapon kit M240 (loader's M240)

The weapon kits are aligned before the exercise, using the Alignment Device Abrams.



1	Fixed alignment scope (2 ea)	4	Right-angle prism (2 ea)
2	Small Arms Alignment Device (SAAD) (2 ea)	5	Installation DVD Win-Excon
3	Alignment kit (2 ea)	6	IrDA transceiver with USB cable

Aligning the weapon kit Abrams is a two-stage procedure. First the weapon kit bracket is aligned coarsely, making the Canister Laser Transmitter (CLT) aligned to the tank sights for when firing canister rounds. Then the Laser Transmitter (LT) is fine-aligned separately to get precision when firing all other 120 mm ammunitions and coax.

NOTE

Weapons need to be boresighted before aligning the weapon kits.

3.1.1 Weapon Kit Abrams Alignment

1. Boresight the main gun following normal procedures.

NOTE

Once sights are aligned with the barrel, do not change the sight or perform boresight again. The LT and CLT 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.

Weapon Kit Abrams Alignment - Continued

2. Set all ammo subdes to:
    - Abrams digital: enter MILES on the Gunner's Control and Display Panel (GCDP)
    - Abrams analog: enter 59 on the Computer Control Panel (CCP)

NOTE

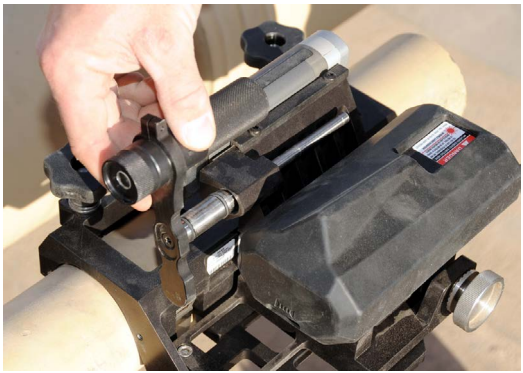
On the analog tank, subdes 59 may not be accepted for the CAN ammo. Use CAN subdes if 59 is not accepted.

3. Lay the main gun at a clearly defined target, or an alignment board if available, at approximately 1200 m.

NOTE

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

4. Remove the rubber cover from the LT.
5. Install the fixed alignment scope on the weapon kit.

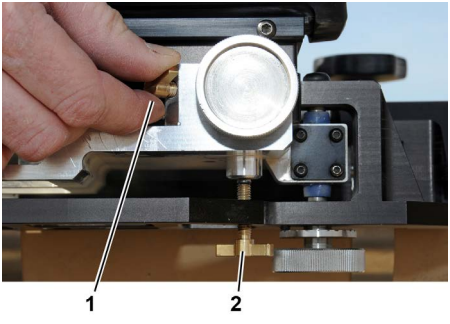


NOTE

Make sure the fixed alignment scope is pushed in as far as possible.

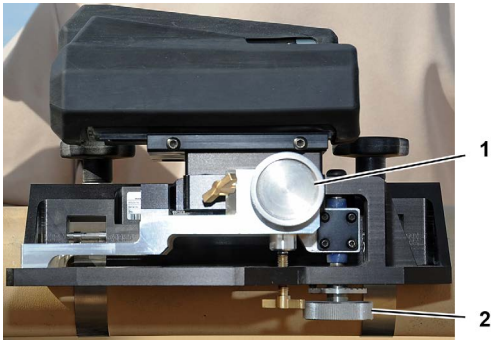
6. Install the right-angle prism on the fixed alignment scope.

7. Loosen the two locking screws on the bracket.



1	Locking screw for horizontal adjustment	2	Locking screw for vertical adjustment

8. Look into the right-angle prism and locate the same aiming point the 120 mm gun sight is set on.
9. Adjust the weapon kit alignment using the two adjustment screws on the bracket



1	horizontal adjustment	2	vertical adjustment

10. Tighten the locking screws on the bracket.
11. Position the alignment kit to the LT.

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

13. Move the right-angle prism from the fixed alignment scope to the alignment kit.

14. Look into the right-angle prism and locate the same aiming point the 120 mm gun sight is set on.

Adjust the alignment scope using the adjustment knobs on the alignment scope so the crosshair is on the 120 mm gun sight aiming point.

NOTE

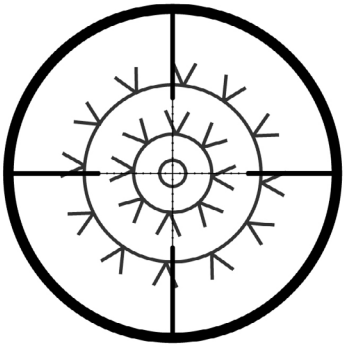
Do not touch the alignment scope after adjusting to aiming point.

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

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)

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

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



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.

19. Remove the SAAD from the LT.
20. Remove the right-angle prism.
21. Remove the alignment kit using both hands to pull it forward.

22. Remove the fixed alignment scope.
23. Install the rubber cover on the LT.

Start from the back of the LT, fit the cover over the antenna and then slide the rubber cover over the front of the LT.

3.1.2 Weapon Kit Abrams Alignment

Safety Conditions

WARNING

Make sure the weapon is unloaded. Beware, the barrel can be hot from previous firing.

NOTE

Alignment should always be carried out after attaching the SAT or when alignment is in doubt.

1. Remove the rubber cover from the SAT.
2. Set the M2 sight to the appropriate weapon system type setting (see note below) and ensure that this is not changed after alignment. The sight must not be changed throughout the training period.

NOTE

For CROWS, select MILES mode.
For SCWS, use the boresight reticle for the aiming point.
Do not compensate for distance. This will be the aim point for engaging targets.

3. Aim the M2 gun at a target. Lock the gun in that position.
4. Position the alignment scope on the SAT.

5. Push the alignment scope onto the SAT until the adjustment screws show. Use both hands.

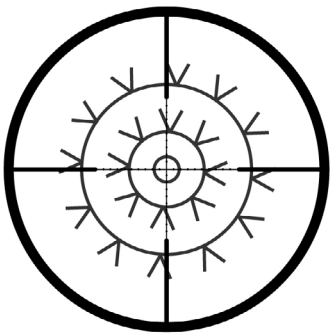
6. Install the angled prism on the alignment scope.

7. Look into the alignment scope and adjust scope to the same point on the target that the M2 sight is aimed.

8. Attach the SAAD to the front end of the SAT. One side of the SAAD is marked “This side towards barrel”.

9. Rotate the optics of the SAAD into the line of sight of the alignment scope.

10. Look into the alignment scope. Adjust the reticle pattern to the alignment scope crosshair by turning the two adjustment screws on top of the SAT.



NOTE

The SAAD will also 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, find shade.

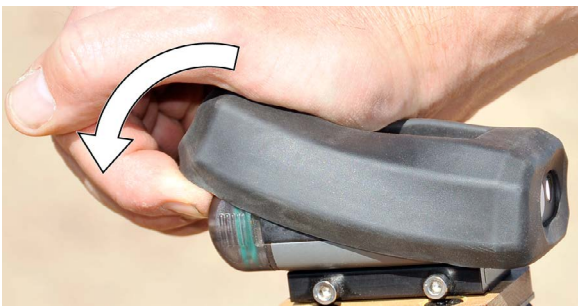
NOTE

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.

11. Remove the SAAD from the SAT.
12. Remove the right-angle prism.

13. Remove the alignment kit using both hands to pull it forward.

14. Install the rubber cover on the SAT.



3.1.3 Weapon Kit M240 Alignment

Safety conditions

WARNING

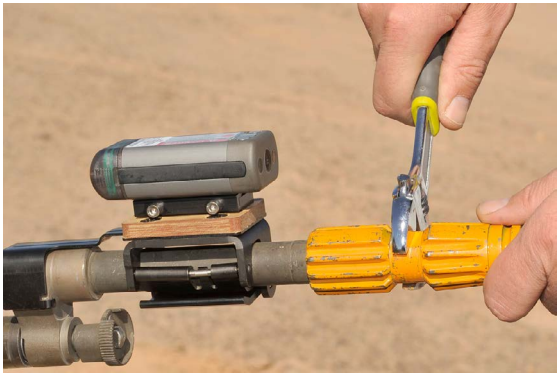
Make sure the weapon is uloaded. Beware the barrel can be hot from previous firing.

NOTE

Alignment should always be carried out after attaching the SAT or when alignment is in doubt.

1. Remove the rubber cover from the SAT.

2. Remove the Blank-Firing Attachment (BFA).



3. Insert the fixed alignment scope into the barrel.

4. Turn fixed alignment scope out of line of sight.

5. Attach the SAAD to the front end of the SAT. One side of the SAAD is marked “This side towards barrel”.

6. Check that a green LED on the SAT turns on, indicating that the SAT is ready to be aligned.

NOTE

Attaching the SAAD activates the SAT and turns on the reticle. The SAT will stay active for 30 seconds after removing the SAAD.

7. Remove the SAAD.
8. Rotate the alignment scope into the line of sight of the SAAD.

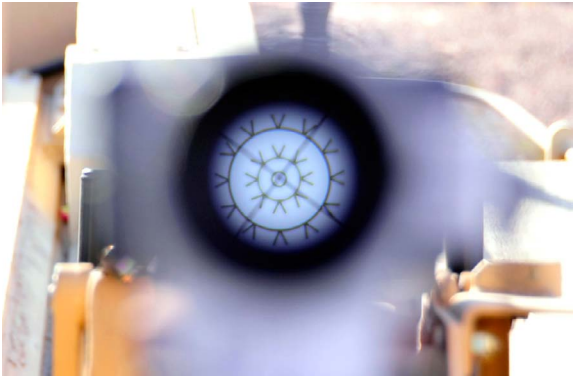
9. Look into the alignment scope. Adjust the reticle pattern to the alignment scope crosshair by turning the two adjustment screws on top of the SAT.

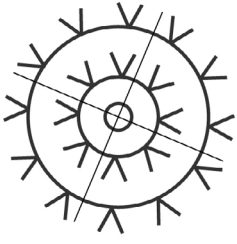
Keep the fixed alignment scope pushed in during alignment.

NOTE

To reactivate the SAT for another 30 seconds, attach and remove the SAAD again.

Correctly aligned SAT.





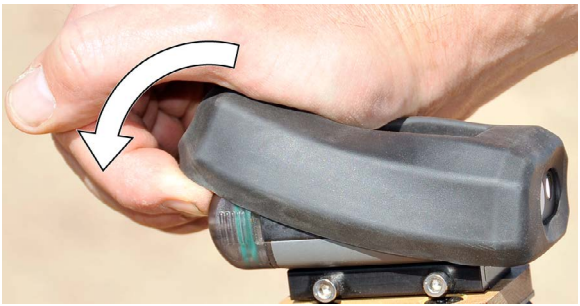
NOTE

It can be difficult to see the reticle pattern in direct sunlight. If so, find shade.

NOTE

If the end positions are reached with the alignment screws, check the installation of the SAT. If the problem is not solved, contact an O/C or support maintainer.
Do not use excessive force.

10. Remove the alignment scope by pulling it straight out.
11. Install the rubber cover on the SAT.



12. Install the BFA on the barrel.

3.1.4 TA - Turret Position

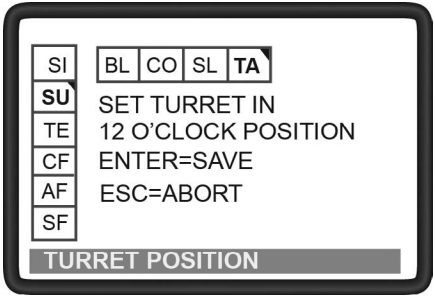
1. The turret position function is used to align CVTESS to the 12 o'clock position of the turret on the Abrams.

NOTE

This function is only applicable on the Abrams. All other applications will respond with a popup.

NOT APPLICABLE
PRESS ENTER
TO PROCEED

2. Select TA and press ENTER.



3. Turn the turret to 12 o'clock position.
4. Press ENTER to save the turret position.
5. Press ESC to abort and return to the previous menu.

4 Associating Wireless Units to the TIM

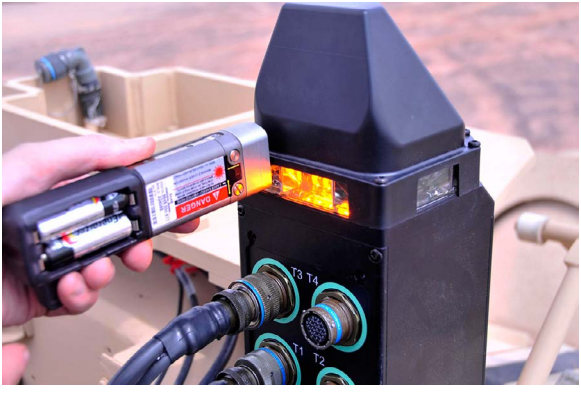
All wireless units in the CVTESS kit need to be associated to the TIM. Initial associations are done at the factory before shipping. As long as the kit stays intact, the TIM will detect and connect to the units that it was associated to, so normally re-association is not required.

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 communication.

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

4.2 LT association

1. Remove the LT/CLT assembly from the coaxial machine gun flash suppressor, if installed.
2. Remove the rubber cover from the LT.
3. Install two AA batteries in the LT associate. If the unit already has batteries, take them out and put them back in to put the LT in association mode.
4. Hold the LT front to the IR window on the TIM to establish IR communication.

5. When the TIM blinks once the association is complete.
6. Install the rubber cover on the LT.
7. Install the LT./CLT assembly on the coaxial machine gun flash suppressor.

4.3 CLT association

1. Remove the LT/CLT assembly from the coaxial machine gun flash suppressor, if installed.
2. Remove the rubber cover from the CLT.
3. Remove the battery cover from the CLT.
4. Install two AA batteries in the CLT associate. If the unit already has batteries, take them out and put them back in to put the CLT in association mode.
5. Hold the CLT rear to the IR window on the TIM to establish IR communication.

6. When the TIM blinks once the association is complete.
7. Install the battery cover on the CLT.
8. Install the rubber cover on the CLT.
9. Install the LT/CLT assembly on the coaxial machine gun flash suppressor.

4.4 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.

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	LOAD MAIN AMMO
		CO	COAX AMMO
	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 Crew ammunition handling

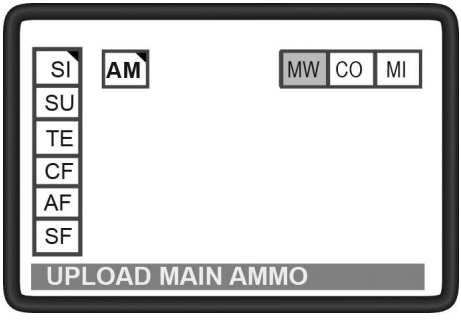
The simulator is preloaded with simulated ammunition. Ammunition type and loaded quantities are setup by an O/C before the exercise. Type and quantity that are available for the crew reflects what is actually realistic to carry in the turret in a combat situation.

The main gun has to be reloaded manually after each firing, just as when firing live ammo, but using the CM. To reflect actual loading time, as well as unloading time if a previous round has to be removed, there is a countdown before the simulator can be fired.

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

The weapon stations laser units on the turret require blanks to fire.

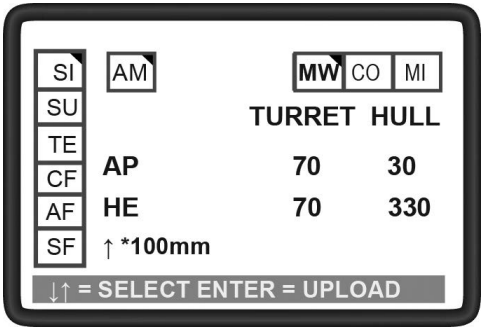
Loading procedures are available in the Ammunition (AM) menu on the CM.



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

5.2.1 MW – Load Main Ammo

1. The Load main ammo (MW) is used to load simulated ammunition to the 120 mm gun.
2. Select MW and press ENTER.
3. Open the ammo door as during normal loading (only applicable on the analog variant).
4. Select ammunition and press ENTER to load ammunition



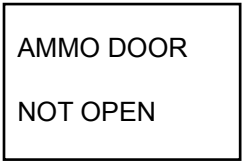
A preset load time starts to count down to simulate the actual loading of a round.

An arrow before the ammunition type indicates that it is being loaded.

NOTE

If a round, e.g. Sabot, is already loaded, and HEAT is required, there will be an unloading time simulating the unloading of the Sabot, and then a loading time for loading the HEAT.

If the ammo door is not open, a popup will remind the loader to open the ammo door.



5. Press ESC to return to the previous menu.

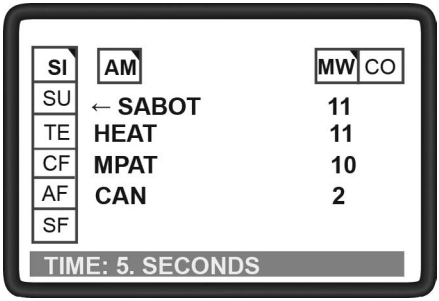
NOTE

Pressing ESC during ongoing loading stops the process and no round is loaded.

5.2.2 Changing ammunition (unload round)

When changing ammunition from e.g. Sabot to HEAT on the CM, the simulator is setup with a delay to compensate for the time it takes to stow the round that is being unloaded.

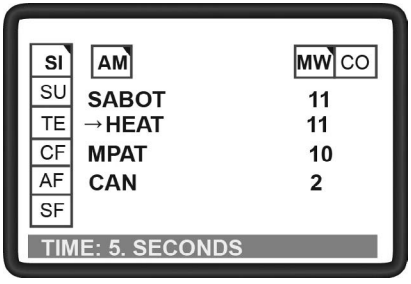
A preset stow time starts to count down to simulate the actual unloading of a round. An arrow before the ammunition type indicates that it is being stowed.



NOTE

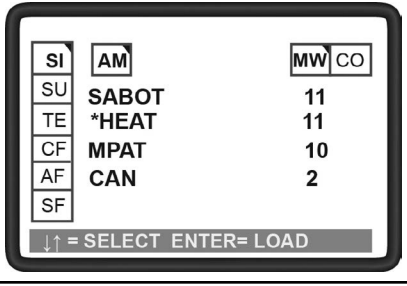
On the analog tank the ammo door must be opened both when stowing and then again when loading.

When stowing is complete, loading of the selected ammunition will start. The preset loading time starts to count down to simulate the actual loading of a round. An arrow before the ammunition type indicates that it is being loaded.



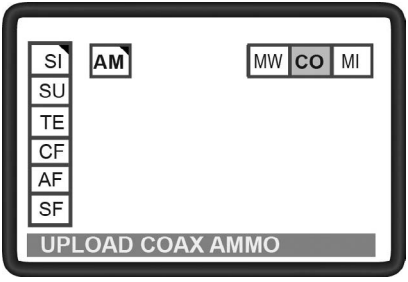
After the countdown an asterisk in front of the ammunition type indicates the loaded ammunition.

To unload and stow a round, without loading another round, select the loaded ammunition and press ENTER. Stow time will count down. After the countdown the simulator is empty and ready to be reloaded.



5.2.3 CO – Load Coax Ammo

1. The Load 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 load ammunition.



A preset load time starts to count down. During the load sequence a full ready box is transferred.

4. Press ESC to return to the previous menu.

NOTE

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

6 Firing

6.1 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.
   - Abrams digital: engage target using normal procedures.
   - Abrams analog: index 200 m manual range when firing canister ammunition if subdes 59 could not be entered into the CCP for canister ammunition. For other ammunition, aim using normal procedures.
2. Fire the weapon.

WARNING

The Main Gun Signature Simulator (MGSS), will go off when firing the weapon. Ensure that there are no personnel in the danger zone before firing.

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.

7 Troubleshooting

7.1 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.

7.1 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.
	No 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.

7.2 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.
	Wrong WDU associated with TIM.	Deselect any unused WDU from the list of WDUs using the CM menu CF and DU.
		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.

Troubleshooting WDU- Continued

Symptoms	Causes	Corrective action
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.

7.3 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.

7.4 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.

7.5 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.

8 Removal Instructions

8.1 Safety Instructions Installation and Removal

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

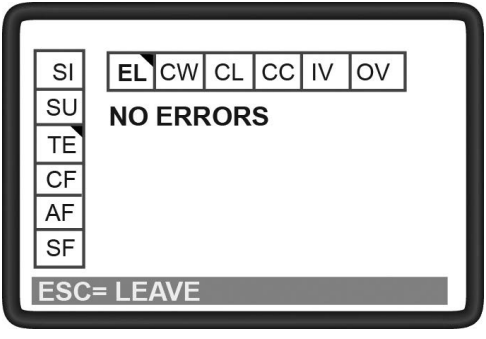
Be careful when moving and standing on the vehicle. Do not trip over the simulator equipment and cables.

8.2 Safety Instructions Installation and 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.

8.3 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.

8.3 Removal of Equipment - Continued

3. Remove all simulator components.
   - VIM
   - TPS
   - CKM
   - CM
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 loader's periscope.
2. Disconnect all cables from the simulator components, and vehicle connection points.

8.3 Removal of Equipment - Continued

3. Remove all simulator components.
    - TIM
    - WDUs (10 ea), including brackets
    - CKM (driver's compartment)
    - Weapon kit Abrams
    - Weapon kit M2
    - Weapon kit M240
4. Remove and roll up all 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 (laser transmitters, 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.

8.3 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.

9 Cleaning

9.1 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.