

Stryker Mobile Gun System (MGS) Advanced Gunnery Training System (AGTS)

Contract: W900KK-17-C-0009
CDRL: B001

Prime Item Development Specification

Document: 74D-STMGS-B001
Rev.: K

18 July 2018

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CHANGE HISTORY

DATE	REV	PAGES	DESCRIPTION
07/15/05	-	All	Initial Release
01/16/07	A	All	This WD 0007-4 update brings PIDS Draft Rev – generated at the end of Phase One design period up to the Production Stryker MGS program start baseline. General “housekeeping changes” were made such as providing missing non-government reference documents. This revision updates some TBDs in the PIDS based on the LRIP data collection and IDAGTS design. A current TBD list will be provided to PEOSTI, separately. The Unity periscope FOVs were updated from the LRIP data collection. Additional IDAGTS common requirements were added for Wall Breaching & Bunker Busting and Canister functionality. Room Clearing requirements were added as part of the W.D. item functionality. Also, IDAGTS common clarifications and corrections identified during the IDAGTS design and GAT were incorporated in this update (such as ammo loads, target ranges, and deleting the CPV MAST control).
06/06/08	B	Various	Define Stryker MGS AGTS Production requirements. Incorporate Customer comments on Rev. A (Mar '07) and draft Rev. B (Dec '08). Updates from data collection trip (Apr '07), reticle updates (Jan '08), SME review & models updates (Feb '08), and TBD resolution (Mar '08). Add changes from the Stryker Exercise Working Group Two Minutes: Correct CM2 model name to TSCV in Table 3.7.2.7.1-1; Ammo load by database added to 3.7.3.3.9; in sections 3.7.3.2.3.1.6 & 3.7.3.3.8 reflect proper coax allocation per vehicle; and update Basic Platoon Exercise situation per scenario to 10 in 3.7.3.3.2.1.7. Rev. B sets the Stryker MGS Production AGTS baseline.
06/05/09	C	Various	This revision incorporates Customer comments on Rev. B (Aug '08); updates from functional & requirement certification reviews; crew exercise and section/platoon exercise reviews; system integration, dryrun, and GAT PPRs; and general spec maintenance updates. This revision also incorporates SCSL version 2.3 updates and ammo transfer changes.

DATE	REV	PAGES	DESCRIPTION
08/03/10	D	Various	Updates for Stryker MGS AGTS Lot 2 production including replacing EPX-50 with SAGE IG, replacing DI Guy with lifeform / human models, incorporate SAGE models, update special models and max number of moving entities, and miscellaneous spec. maintenance updates & corrections.
10/01/10	E	155 - 160	Replace references to DI Guy with Insurgent
04/30/13	F	Various	Incorporated updates for Stryker MGS Lot 3 production including adding integrated mobile trailer, Free Movement with PVD in Crew Mode, adding SAGE P3I from AGTU and PAAR in relocatable shelter.
07/30/14	G	Various	Incorporated updates for Stryker MGS AGTS Lot 3 Concurrency production including modifications to the ELRF functionality, manual elevation handle, CDU screen color, auxiliary sight boresight knobs, and coax charging handle tension and new TASP.
11/09/17	H	Various	Incorporated updates for Stryker Gunner Manual upgrade to TC 3.21-31 including modifications to Basic Gunnery Updates, Global Updates, Special Purpose Exercise Development, SI/O-Built GTLF Exercise Functionality, Conversion of CTP to iCTP, Target Timing Updates, Target Kill Standard Updates, Legacy Database New Exercise Development, Ammunition Allocation Updates and Trainer Usage Data Upgrade.
1/18/18	J	8, 135, 140-141, 145-147, 149, 176-177, 179, 200, 204-206, 213-215, 217-219, 224, II-2 thru II-10, II-12 thru II-15, II-17 thru II-27	Incorporated updates from DryRun PPR 50DPP00016627, GAT PPR 50DPP00016654 and customer comments.
7/18/18	K	149, II-4, II-9	Incorporated updates from SAT PPR 16886 and GAT PPRs 16635 and 16779.

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1 SCOPE

1.1 IDENTIFICATION

[9771]

This specification establishes the minimum functional requirements for the Stryker MGS Advanced Gunnery Training System (AGTS) in the Permanent and Mobile configurations.

[9772]

The term "Platoon" is used in this Stryker MGS AGTS Prime Item Development Specification to denote an echelon (consisting of three vehicles) consistent with US standard military terminology. It should be noted that "Section" in the context of the Stryker MGS specification consists of two Stryker MGS simulated vehicles. In Crew mode of operation, each individual trainer shall provide the Stryker MGS AGTS crew training defined herein.

[10334]

The following list provides a cross-reference between the terrain database names used in this AGTS Specification versus an alternate naming convention.

<u>AGTS Specification</u>	<u>Alternate Naming Convention</u>
Euro 1 - 4	Woodland 1 - 4
Korea	Woodland 5
Des 1 - 4	Desert 1 - 4
29 Palms	Desert 5
Arab MOUT	Urban 1
USMC MOUT	Urban 2

2 APPLICABLE DOCUMENTS

2.1 GOVERNMENT DOCUMENTS

2.1.1 SPECIFICATIONS, STANDARDS, AND HANDBOOKS

[9317]

The following specifications, standards, and handbooks form a part of this specification to the extent specified herein. This AGTS design and development is done under the guidance of these documents.

[9773]

Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS), and supplement thereto, in effect on 1 May 1993.

[9774]

SPECIFICATION

MILITARY

MIL-HDBK-1012/1	Electronic Facilities Engineering
MIL-HDBK-46855	Human Engineering Program Process and Procedures
Notice 1	
MIL-HDBK-454B	General Guidelines for Electronic Equipment
MIL-T-23991E	Training Devices, Military; General Specification for

STANDARDS

FEDERAL

FED-STD-595C	Colors Used in Government Procurement
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MILITARY

MIL-STD-130N	Identification Marking of U.S. Military Property
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MIL-STD-781A	Reliability Testing for Engineering Development, Qualification and Production
MIL-STD-882D	System Safety
MIL-STD-1472F	Human Engineering Design Criteria for Military Systems, Equipment, and
Notice 1	Facilities.
MIL-STD-1474D	Noise Levels for Army Material.
Notice 1	
MIL-STD-1686C	Electrostatic Discharge Control Program for Protection of Electrical and
	Electronic Parts, Assemblies, and Equipment
ISO/IEC/ANSI 8652	Ada Standard

DOD STANDARDS

IEEE 12207.0, Software Development and Documentation
IEEE/EIA 12207.1, &
IEEE/EIA 12207.2

2.1.2 OTHER GOVERNMENT DOCUMENTS, DEVIATIONS AND PUBLICATIONS

[9775]

The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those in effect on 1 May 1993.

ARMY

	System Requirements Document for Stryker MGS AGTS
	Common Gunnery Architecture (CGA) Image Generator & Real Time Software
	Subsystem Requirements
TC 3-20.31 (March 2015)	Training and Qualification, Crew
FM 3-20.151	The Mobile Gun System Platoon, November 2005
TM 9-2355-321-10	Mobile Gun System (MGS) Operator's Manual, STRYKER

2.2 NON-GOVERNMENT DOCUMENTS

[84]

The following documents form a part of this specification to the extent specified herein. This AGTS design and development is done under the guidance of these documents. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS in effect on 1 May 1993. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents in effect on 1 May 1993.

Company	Specification, Marker
Standard 16331-R17485	
Company	Requirements for Electronic Equipment
Standard 16331-R17521	
NFPA 10	Standard for Portable Fire Extinguishers 2010.
NFPA 70	National Electrical Code 2008.
NFPA 75	Standard for the Protection of Electronic Computer/ Data
	Processing Equipment 2009.
ISO-9001	Quality Systems
IEEE 200	Reference Designations for Electrical and Electronic Parts and
	Equipment
Subpart J	Federal Communications Commission Rules, Part 15
29 CFR 1910	Occupational Safety and Health Standards

1020.10 of Public Law 90-602 The Radiation Control for Health and Safety Act
Title 10, Code of Federal Regulations Code of Federal Regulations
Regulations, Part 40
24D-A001-1, Initial Release Stryker Mobile Gun System Advanced Gunnery Training
System Integrated Product Team Technical Reports - Software
Engineering Data dated 05 July 2005

[10335]

Department of Transportation (DOT) Federal Motor Carrier Safety Regulations

[10209]

OSHA 1910.23 Guarding floor and wall openings and holes

[10210]

OSHA 1926.1052 Safety and Health Regulations for Construction, Stairways

2.3 ORDER OF PRECEDENCE

[108]

In the event of a conflict between the content of this specification and the referenced documents cited herein, the content of this specification shall take precedence.

[109]

Nothing in this specification, however, supersedes applicable laws and regulations, unless a specific exemption has been obtained.

[110]

This specification is also subservient to the overall system specification, when invoked as part of a weapon system acquisition.

3 REQUIREMENTS

3.1 TRAINING SYSTEM DESCRIPTION

[6085]

The Stryker MGS AGTS is a simulation system which provides crew gunnery training to commanders and gunners of the Stryker MGS vehicle in the permanent and mobile configurations. A two crew station trainer can be initialized as a section trainer by utilizing one Pre-Brief/After Action Review (PAAR) Station. A four crew station trainer can be initialized as a three or four member platoon trainer, also utilizing a PAAR. Driver participation shall be included during free movement operation, and a driver position shall be provided at the Instructor Operator Station. The Stryker MGS AGTS is used to train target acquisition, identification, and engagements with the guns using both the primary and auxiliary fire control system and sighting equipment against mobile and stationary threats, single and multiple target arrays, in a realistic battlefield environment during day, night, and reduced visibility conditions. The Stryker MGS AGTS configurations shall provide crew, section and platoon training, and contain the following:

- a. Crew stations that resemble the commander's and gunner's positions of the Stryker MGS vehicle.
- b. Instructor stations which initiate, monitor, control and provide feedback for each exercise, and provide driver participation in free movement and CGF exercises.

3.1.1 TRAINING SYSTEM MISSION

[9776]

The AGTS shall provide training devices for training individual crew members (commander only or gunner only), crews (commander and gunner with driver participation) in precision and degraded gunnery skills for the Stryker MGS.

[6087]

The training device shall be capable of being networked to provide training skills required for both section and platoon operations.

[8599]

The training shall address a wide variety of audiences, including unit personnel, and students at various enlisted and officer Armor and Infantry training courses.

[118]

The training shall include initial, qualification, and sustainment levels of training, according to the training site and needs of the audience. In many cases, training of multiple levels for multiple audiences occurs at a single site.

[6088]

The training system shall be capable of supporting training in permanent facilities and mobile configurations.

3.1.2 TRAINING TASKS

[9777]

The AGTS shall support the following types of training:

- a. Crew training (unit). (Individual Stryker MGS AGTS crew stations.)
- b. Section training. (Two linked Stryker MGS AGTS crew stations.)
- c. Platoon Training. (Three linked Stryker MGS AGTS crew stations)

[8601]

This training shall create and sustain soldiers with the appropriate proficiency in the skills and tasks identified in 3.1.2.1.1 and 3.1.2.1.2, as well as any additional skills, knowledge, attitudes, or tasks which may be required as determined by the gunnery and direct fire tasks identified in the appropriate soldier training publications, master task list and training plans.

[125]

Crews shall be trained to respond and adapt to the space constraints and control environment associated with the appropriate vehicle.

[9281]

The system shall provide commanders and gunners with training of gunnery skills necessary to detect, classify, and engage targets at ranges up to 3000 meters.

[127]

The students shall receive incremental training to develop and sustain psychomotor skills necessary to operate proficiently in a battlefield environment in the appropriate vehicle platform.

[128]

Training and evaluation of correct ammo selection based on target type, target presentation and range shall be provided.

[129]

Precision gunnery training shall be provided for the respective weapon systems.

3.1.2.1 INDIVIDUAL TRAINING TASKS

[9778]

Individual training will be provided to vehicle commanders and gunners in precision and degraded gunnery tasks in accordance with (IAW) the standards of TC 3-20.31.

[10805]

Degradations used for Crew Table (CT) III, IV, V and VI shall be in accordance with Table 3.1.2.1-1.

[10806]

Table 3.1.2.1-1: MGS Degradation

Platform	Degradation Type	Remarks
MGS	Manual Controls	Power control handles are inoperative. VC must not traverse or elevate while the vehicle is moving. This condition may not be used on offensive engagements.
	Auxiliary Sight	Ballistic doors must be closed during prompt to crew. LRF is inoperative.
	Stabilization Off	Stabilization failure. Gunner turns the stabilization switch to off.

3.1.2.1.1 Gunner Training Tasks

[8604]

The system shall train the gunners to perform the gunner tasks listed in Table 3.1.2.1.1-1.

[10475]

Table 3.1.2.1.1-1. Individual Gunnery Tasks (Gunner)

Gunner Training Tasks

- a. Prepare the gunner position for operation.
 - (1) Power up turret and drive system via T-PDP and CCP.
 - (2) Power on the TASP.
 - (3) Operate and adjust seat.
- (4) Adjust brow pads.
 - (5) Operate intercommunications.
 - (6) Set diopter settings.
 - (7) Perform gunner's CMS Daysight assembly setup.
 - (8) Perform gunner's CMS Thermal Sight assembly setup.
 - (9) Operate interior lighting.
 - (10) Operate turret travel lock.
 - (11) Operate the 7.62mm coax machine gun charging handle and manual firing handle.
 - (12) Operate gunner's power control handle.
 - (13) Verify CBRN system operation.
- b. Prepare gunner position for firing.
 - (1) Operate gunner's CMS Daysight assembly.
 - (a) Operate reticle brightness system.
 - (b) Operate focus system.
 - (2) Operate gunner's CMS Thermal Sight assembly via thermal control panel with Gunner's Display Unit.
 - (3) Operate power control handle for the 105mm gun, turret azimuth, and 7.62mm coax machine gun control.
 - (4) Operate the drift controls.
 - (5) Perform update of MRS as required.
 - (6) Perform day and night boresight operation of the 105mm gun.
 - (7) Check manual firing mechanism for manual operation of the 105mm gun.
 - (8) Perform visual observation operations using the CMS Daysight, CMS Thermal Sight, and GAS.
 - (9) Select ammo at CCP.
 - (10) Perform CCP prefire checks.

[9780]

Table 3.1.2.1.1-1. Individual Gunnery Tasks (Gunner) (Continued)

- c. Perform during firing operation.
 - (1) Zero the main gun (105mm) via CCF determination.
 - (2) Fire the main gun (105mm).
 - (3) Confirm Zero of coaxial machine gun.
 - (4) Fire the coaxial machine gun.
 - (5) Engage stationary ownvehicle to stationary target(s) in power with STAB, manual, or power without STAB modes.
 - (6) Engage stationary ownvehicle to moving target(s) in power with STAB, manual, or power without STAB modes.
 - (7) Engage moving ownvehicle to stationary target(s) in power with STAB, manual, or power without STAB modes.
 - (8) Engage moving ownvehicle to moving target(s) in power with STAB or power without STAB modes.
 - (9) Determine range to targets with the day and thermal sights via LRF.
 - (10) Determine range to targets using the GAS stadia reticle.
 - (11) Use firing switches.
 - (12) Engage point targets and area targets with coaxial machine gun.
 - (13) Operate manual firing handle on coax machine gun.
 - (14) Apply misfire procedures for both 105mm gun and coax.
 - (15) React to fire commands.
 - (16) Identify and react to pre- and unannounced malfunctions.
 - (17) Detect, recognize, and identify targets.
 - (18) Operate the system during simulated day, night, reduced visibility, and CBRN conditions.
- d. Power down and secure gunner station.
 - (1) Turn off power via the CCP and T-PDP in proper sequence.
 - (2) Turn off interior lighting.
- e. Perform post-fire operations IAW published TM for the Stryker MGS.

3.1.2.1.2 Commander Training Tasks

[8607]

The system shall train the commander to perform the commander tasks listed in Table 3.1.2.1.2-1.

[9781]

Table 3.1.2.1.2-1. Individual Gunnery Tasks (Commander)

Commander Training Tasks

- a. Prepare commander position for operation.
 - (1) Power up turret and drive system via T-PDP and CCP.
 - (2) Operate and adjust commander's seat.
 - (3) Perform central control panel lamp check & power display.
 - (4) Operate interior lighting.
 - (5) Operate and adjust the Commander's Panoramic Viewer and Commander's Display Unit.
 - (6) Operate the commander's control handle.
 - (7) Operate the communications system.
 - (8) Operate gunnery override controls.
 - (9) Verify CBRN system operation.
 - (10) Power-up FBCB2 system for operation.
- b. Prepare commander position for firing.
 - (1) Operate Commander's Panoramic Viewer.
 - (2) Operate Commander's Display Unit.

- (3) Operate commander's control handle.
- (4) Support CMS day and night sights boresight operation of 105mm gun (manual control handles).
- (5) Adjust Auxiliary Sight for boresight alignment.
- (6) Perform alignment of CPV to CMS day and night sights.
- (7) Coordinate ammo selection and observe ammo selections.
- (8) Check smoke grenade system readiness.
- (9) Perform visual observation operations using the periscopes.
- c. Perform during firing operations.
 - (1) Detect targets with periscopes.
 - (2) Detect targets using commander's panoramic viewer.
 - (3) Recognize and identify targets via Gunner Day & Thermal selections at the Commander's Display Unit.
 - (4) Perform target classification.
 - (5) Designate (hand-off) targets to gunner.
 - (6) Issue fire commands and supervise gunner's duties.
 - (7) Fire 105mm gun.
 - (8) Fire coax from commander's position.
 - (9) Operate the Smoke Grenade Launchers from CCP controls.
 - (10) Engage stationary ownvehicle to stationary target(s) in power with STAB, manual, or power without STAB modes.
 - (11) Engage stationary ownvehicle to moving target(s) in power with STAB, manual, or power without STAB modes.
 - (12) Engage moving ownvehicle to stationary target(s) in power with STAB, manual, or power without STAB modes.
 - (13) Engage moving ownvehicle to moving target(s) in power with STAB, manual, or power without STAB modes.
 - (14) Determine range to targets with the CAS stadia reticle.
 - (15) Operate the system during simulated day, night, reduced visibility, and CBRN conditions.
 - (16) Perform misfire operations.
 - (17) Engage targets with 105mm gun.
 - (18) Engage targets with coaxial machine gun.
- d. Secure commander station.
 - (1) Power down turret following T-PDP and CCP procedures.
 - (2) Turn off interior lighting.

3.1.2.1.3 Driver Station Tasks

[9782]

The Stryker MGS AGTS driver tasks are to follow the vehicle commander's instructions relative to driving the ownvehicle during free movement operations using the controls provided with at the IOS:

- a. Steering wheel control.
 - (1) Direction
 - (2) Speed
 - (3) Brake
- b. Speedometer symbology.
- c. Crew intercom.
- d. Stool seat.

3.1.2.2 CREW GUNNERY TRAINING TASKS

[9482]

Crew training will be provided to vehicle commanders and gunners in precision and degraded gunnery tasks IAW Standards of TC 3-20.31.

[9783]

The crew shall identify and react to pre- and unannounced malfunctions and warnings during crew gunnery training.

- (1) Stabilization failure.
- (2) LRF failure.
- (3) Lead Sensor failure
- (4) Mobile Gun Computer failure.
- (5) Gunner's Control Handle failure.
- (6) Commander's Control Handle failure.
- (7) Coax Machine Gun Firing failure.
- (8) Main Gun Misfire.
- (9) Thermal Imaging System (TIS) failure.
- (10) Results of Direct Hit to ownvehicle.
- (11) Daysight failure.
- (12) CPV failure.
- (13) Loss of CMS Symbolology
- (14) CMS failure.
- (15) Boresight Loss Main Gun.

3.1.2.3 SECTION/PLATOON TRAINING TASKS

[9784]

When interconnected to permit section/platoon interactions, the AGTS shall train crews to perform section/platoon tasks IAW FM 3-20.151 (MGS Platoon).

[9785]

Table 3.1.2.3-1. Section/Platoon Gunnery Tasks

Section/Platoon Gunnery Tasks

- a. Conduct troop-leading operations.
- b. Conduct a reconnaissance.
- c. Prepare a fire plan.
- d. Select and control fire distribution patterns.
- e. Issue section/platoon fire command.
- f. Conduct hasty occupation of a platoon battle position.
- g. Provide overwatch/support by fire.
- h. Bound to a subsequent battle position.
- i. Support infantry movement.
- j. Conduct movement to contact.
- k. Move tactically.
- l. React to enemy contact.
- m. Attack and seize an objective.
- n. React to indirect fire.
- o. Coordinate indirect fire.
- p. Disengage from the enemy.
- q. Report actions to the Company commander (verbal radio communication).
- r. Conduct a hasty defense.
- s. Conduct a mounted hasty ambush.
- t. Consolidate and reorganize.

- u. Conduct a hasty attack.
- v. Conduct a delay.
- w. Perform passage of lines.
- x. Conduct an assault, mounted.
- y. Conduct ammo transfer from supply truck.
- z. Conduct operations with a missing vehicle.
- aa. Conduct Wall Breaching.
- ab. Conduct Bunker Busting.
- ac. Suppress dismounted personnel.
- ad. Conduct convoy escort operations.
- ae. React to chemical/biological attack drill.
- af. Receive Company OPORD.
- ag. Prepare and issue OPORD.
- ah. Identify and react to pre- and unannounced malfunctions and warnings.
- ai. Perform duties as a wingman, section/platoon sergeant, or section/platoon leader IAW FM 3-20.151 (MGS Platoon).

3.1.2.4 SECTION TRAINING TASKS

[9786]

The Section tasks have been defined as combined tasks in paragraph 3.1.2.3.

3.1.3 TRAINING SYSTEM DESCRIPTION

[297]

The AGTS vehicle trainer shall consist of a vehicle simulation and an instructional system.

[298]

The vehicle simulation function shall simulate the aural, visual, tactile, and physical cues that the crew member(s) experience when in the weapon system environment. The crew member(s) respond to these stimuli through physical and oral responses that are monitored. Their responses are used to modify the tactical environment in a manner that results in new stimuli appropriate for the action taken. The crew member(s) responses are compared to performance standards that exist for the response. A control and monitor function provides training equipment and exercise controls, and supports monitoring of the session.

[299]

A computational subsystem shall provide the data interconnection among the cue generation functions, the vehicle simulation and control functions, and the instructional system, as well as providing the interface to the trainer network.

[300]

The crew's physical environment shall consist of a simulation of a portion of the vehicle interior, including the space constraints imposed by the internal turret geometry as well as all indicators, controls, displays, and fire control system components used by the commander and gunner in performing their gunnery tasks.

3.1.3.1 SYSTEM OPERATIONAL MODES

[310]

The system shall be capable of operation in the following modes:

- a. Maintenance
- b. Pre-Brief/After Action Review (PAAR)
- c. Training

[314]

The maintenance mode shall require the dedicated use of the trainer during its activation. This mode shall be used to determine the operational status of the system, perform fault isolation activities, and verify maintenance actions.

[9900]

The pre-brief/after action review monitoring functions and training modes shall operate simultaneously. The after action review mode shall operate independent of the training mode.

3.1.3.2 TRAINING SYSTEM FUNCTIONAL DIAGRAM

[9901]

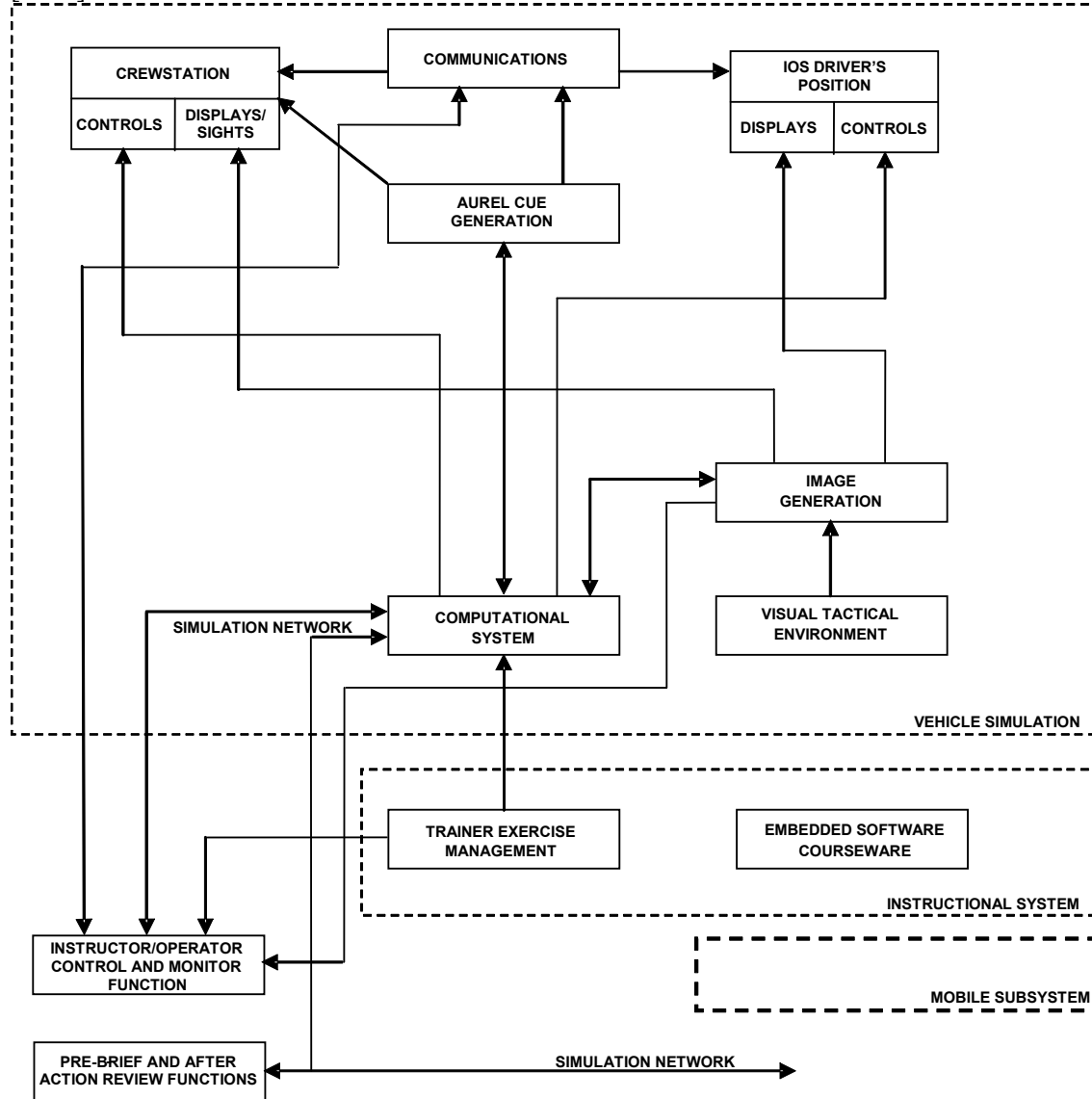


Figure 3.1.3.2-1. AGTS Functional Configuration

3.1.3.3 MAJOR SUBSYSTEM

[9902]

The Stryker MGS AGTS shall have the following major subsystems:

- a. Crew station subsystem
 - (1) Commander's position
 - (2) Gunner's position
- b. Image Generation and Display subsystem
- c. Instructional subsystem
- d. Computational subsystem
- e. Instructor Operator Station
- f. Monitoring subsystem
 - (1) Pre-brief/After Action Review station
 - (2) Linking subsystem
- g. Mobility subsystem

3.1.4 GOVERNMENT FURNISHED PROPERTY LIST

[9291]

The Common Moving Models (CM2) will be provided as Government-furnished information.

[333]

The Government provided to LM STS:

- a. 10 CBRN hoses
- b. 8 CVC helmets
- c. 8 CVC cables

[9162]

The FBCB2 computer, display unit, and keyboard will be provided as Government-furnished property.

The FBCB2 computer will be delivered with Government-furnished FBCB2 baselined software.

[8617]

The Government will be providing 2 sets of FBCB2.

3.1.5 GOVERNMENT LOANED PROPERTY LIST

[335]

There is no Government-loaned property.

3.2 CHARACTERISTICS

3.2.1 PERFORMANCE

[338]

The training system shall have the flexibility, fidelity, and capability to permit a wide variety of simulated tactical engagements to be presented to the trainees in order to support training from basic level to sustainment of fully qualified crews.

[339]

It shall provide a problem world in which the trainees shall interact to perform their respective functions and tasks.

3.2.1.1 SYSTEM OPERATION

[341]

The AGTS shall provide for control and orchestration of networked operation.

[6108]

AGTS operation shall be reconfigurable to provide individual, crew, section, and platoon training sessions, based on the AGTS vehicle trainer's system configuration.

[343]

In all cases, the training sessions identified in 3.1.1 shall be capable of being completely independent and separate from each other.

[6109]

Assignment of trainers to individual, crew, section, and platoon sessions shall be flexible.

3.2.1.2 SYSTEM SECURITY

[346]

Access to the AGTS shall be via password controlled accounts.

[347]

There shall be separate log-in procedures for each type and level of student training, for the training manager, and for the instructors.

[348]

The training manager shall have a unique account for performing the training records management activities reserved to this person.

3.2.2 PHYSICAL CHARACTERISTICS

3.2.2.1 WEIGHT

[351]

The weight of the basic AGTS trainer, not including the Relocatable or Mobility subsystems, shall not exceed a uniformly distributed maximum load of 100 pounds per square foot or a concentrated load of 1000 pounds per square inch.

3.2.2.2 CEILING HEIGHT

[353]

The AGTS trainer system and support equipment shall be capable of operation within a ceiling height of 90.75 inches.

3.2.2.3 DIMENSIONS

[355]

All units of the AGTS trainer system and special support equipment shall fit through a doorway 74 inches wide and 86 inches high.

[10211]

The dimensions for the Integrated Mobility Subsystem trailer are specified in 3.7.7.4.1.1.

[10212]

The AGTS trainer system and support equipment shall be capable of operation within the internal volume constraint of the IMS, as illustrated in Figure 3.2.2.3-1 and Figure 3.2.2.3-2.

[10213]

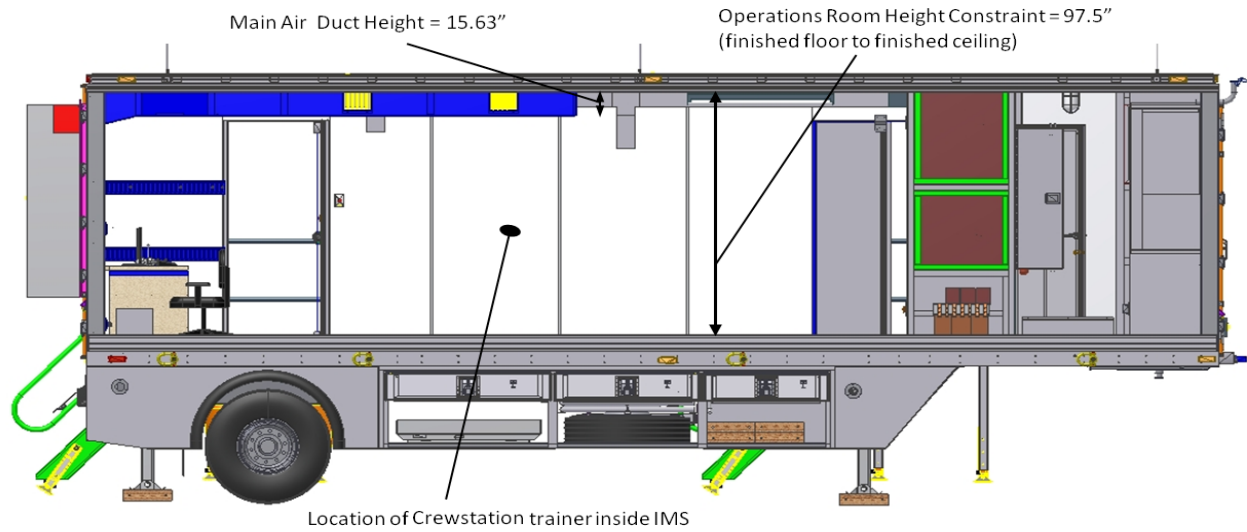


Figure 3.2.2.3-1. IMS Trailer Volume Constraint - Side View

[10214]

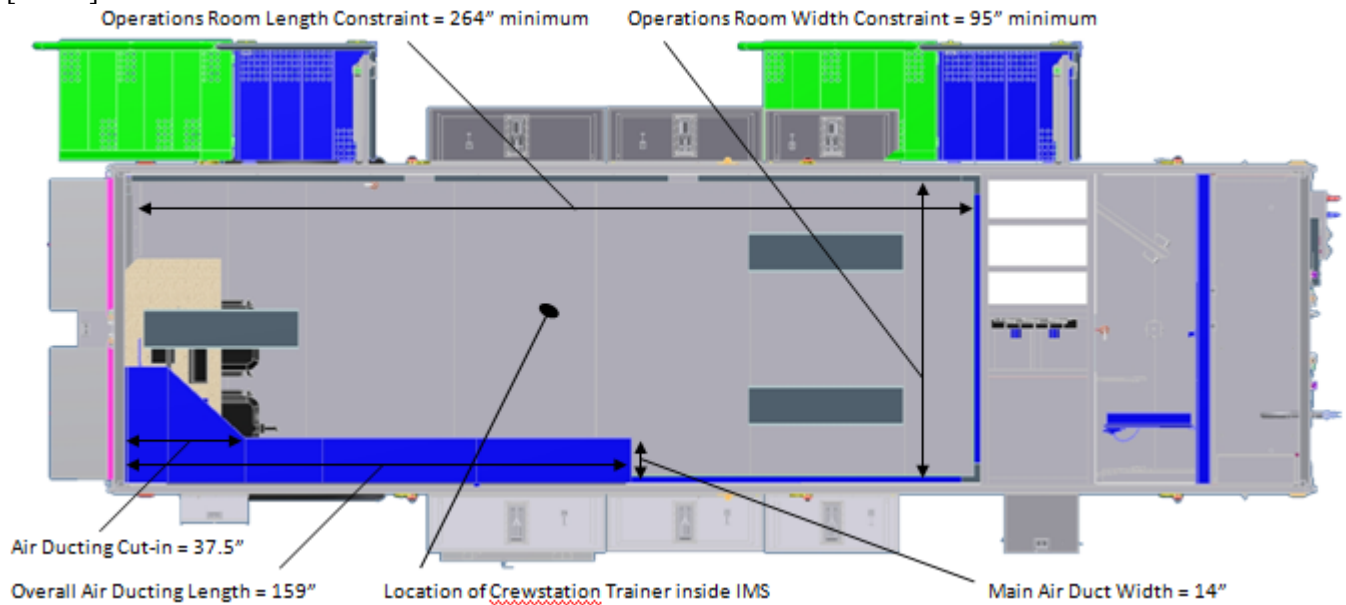


Figure 3.2.2.3-2. IMS Trailer Volume Constraint - Top View

[10215]

All units of the AGTS trainer system and special support equipment, shall fit through a doorway with size constraints as illustrated in Figure 3.2.2.3-3.

[10216]

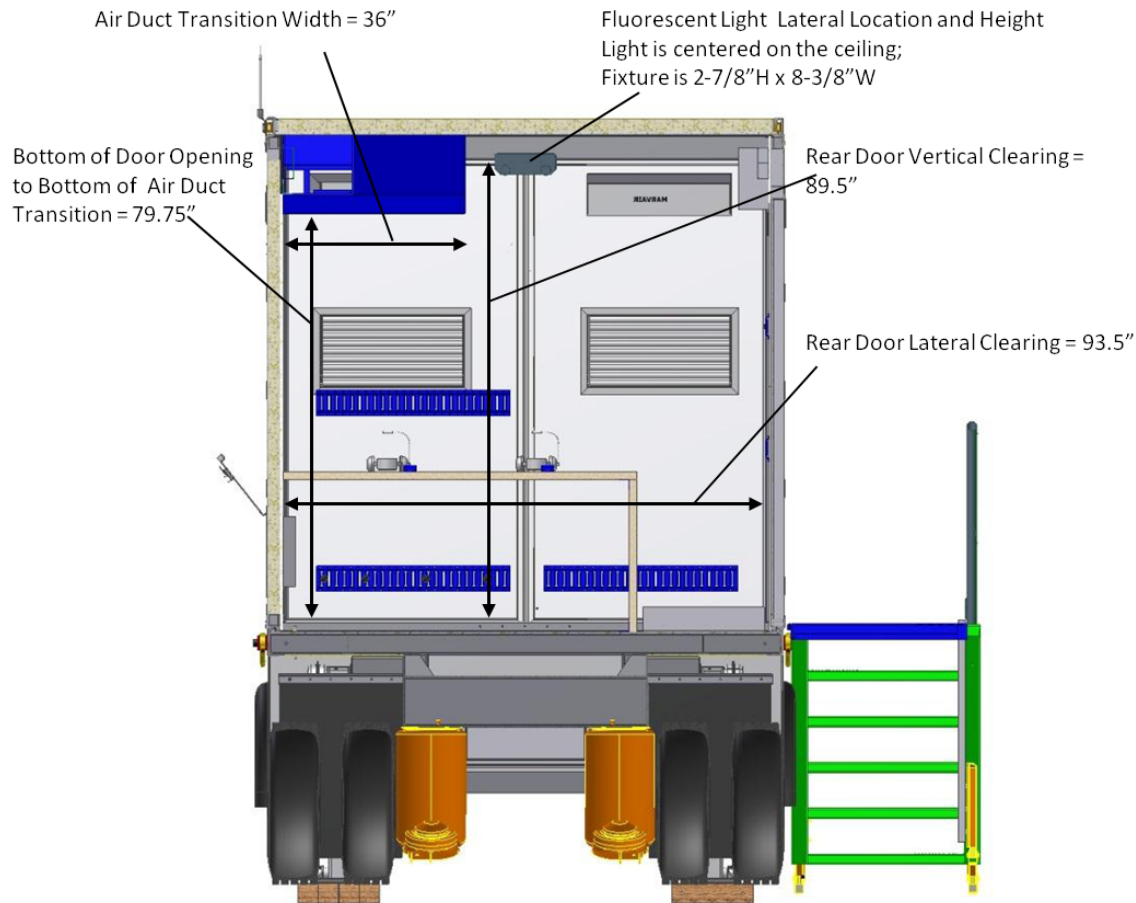


Figure 3.2.2.3-3. IMS Trailer Doorway Constraint

3.2.2.4 COLORS

[357]

The interior colors shall match that of the simulated operational vehicle crew compartments.

[358]

The AGTS exterior color for trainers shall be gloss white color #17875 in accordance with the requirements of FED-STD-595.

[359]

Commercial Off-the-Shelf (COTS) and Non-Developmental Item (NDI) equipment are exempt from color requirements.

3.2.2.5 ELECTRICAL POWER

[361]

The AGTS trainer shall be designed to operate on standard 208/120 V ac +/-10 percent, three phase, 50/60 Hz power.

[362]

The equipment shall be designed to tolerate the stated input power frequency +/-1 percent.

[363]

Power monitoring shall be provided to protect the equipment by removing power for voltage fluctuations, sags, and surges that exceed +/-10 percent.

[364]

Equipment shall also be provided to protect the trainer from power line transients.

[10217]

The Mobile AGTS configuration shall provide the option for selecting an Electrical Service Center (ESC) line drop or on-board motor generator as a source of power. These electrical power sources are specified in paragraph 3.7.7.2.2 for the integrated mobility subsystem.

3.2.2.5.1 Electrical Design

[366]

The design of the electronic equipment shall meet the requirements of NFPA 70.

3.2.2.5.2 External Shelter Power

[6151]

The Relocatable PAAR shelter shall be provided external power from a secondary electrical power source of the following basic characteristics:

Voltage;	208Y/120 V ac +/-10 percent
Frequency;	50/60 Hz +/-1 percent
Phases;	3 Phase, wye connected
Wires;	4 Wire (fifth wire for safety ground).

3.2.2.5.3 Emergency Disconnect

[369]

Emergency power disconnect switches shall be located at all primary exits to the training area.

[370]

The emergency power disconnects shall remove all power from the AGTS components.

3.2.2.5.4 Trainer Utility Power

[372]

Trainer utility electrical power receptacles shall be provided as part of the equipment installation.

[373]

The receptacles provided in the shelter, shall be placed so that a 120 volt duplex receptacle will be within 8 feet of any area where maintenance is to be performed.

3.2.2.6 TRANSPORT AND STORAGE REQUIREMENTS

[6120]

The AGTS shall be prepared for transport with cushioning, blocking, and bracing to prevent damage. Where necessary, tie-down points shall be provided to prevent damage during shipment and transportation.

3.2.2.7 HEALTH AND SAFETY CRITERIA

[6122]

The AGTS shall be designed and produced to be safe and free of hazards to personnel. The AGTS design shall conform to:

- a. MIL-STD-1474
- b. Guideline 1 of MIL-HDBK-454
- c. Hazards and safety requirements of MIL-STD-1472
- d. NFPA 10
- e. NFPA 70
- f. NFPA 72

3.2.3 RESERVED

3.2.4 MAINTAINABILITY

[387]

Maintainability shall be in accordance with the following requirements and shall be applicable to the total AGTS hardware, unless otherwise specified.

3.2.4.1 RESERVED

3.2.4.2 QUALITATIVE MAINTAINABILITY

[392]

General maintainability of the AGTS shall be in accordance with the following requirements.

3.2.4.2.1 Special Tools

[394]

There shall be no special maintenance tools required for the AGTS system.

3.2.4.2.2 Built-in-Test (BIT)

[396]

A built-in, non-continuous, manually initiated fault detection and locating system shall be provided to support detection of performance degradation and failures. Maximum use of the AGTS computational resources will be made to evaluate the system performance.

[397]

The BIT system shall provide convenience of use and operation.

[398]

The design of controls and readout devices shall be such that they can be easily used and interpreted.

[399]

The circuits and devices which provide BIT and fault isolation functions shall be designed in such a manner that failure of these circuits or devices shall not cause failure of the training device (COTS and NDI equipment are exempt from this requirement).

[400]

Switches shall not be placed in series paths for purposes of introducing stimuli, diverting normal signals, or measuring trainer performance (COTS and NDI equipment are exempt from this requirement).

[401]

Upon indication of failures, diagnostic routines, procedures, and test units shall be used to isolate the faulty hardware.

3.2.4.2.3 Reserved

3.2.4.2.4 Blown Fuse Indicator Light

[408]

Except for COTS and NDI equipment, blown fuse indicator lights shall be provided for each fuse and shall be visible on the outside of the equipment rack when all doors are closed and when standing in front of the rack.

3.2.4.2.5 Accessibility

[410]

Accessibility characteristics shall conform to the best commercial practices as described in the following subparagraphs.

3.2.4.2.5.1 Cable Slack

[412]

Adequate cable slack and cable bending features shall be provided to assure access to equipment during maintenance.

[413]

Adequate cable service loops shall also be provided in the cables for repair access.

3.2.4.2.5.2 Assemblies

[415]

The design of each major assembly, subassembly, and unit of the training system shall permit access to its interior components and parts for maintenance. It shall not be necessary to displace or remove wires, cables, subassemblies, or assemblies in order to gain access to mounting screws, test points, adjustment points, lubricating points, for example.

COTS and NDI equipment are exempt from this requirement.

[417]

The placement of parts shall be such as to provide space for the use of test probes and soldering tools.

COTS and NDI equipment are exempt from this requirement.

[419]

Assemblies subject to replacement or service shall not be permanently secured.

COTS and NDI equipment are exempt from this requirement.

3.2.4.2.5.3 Wiring Board Extender Cards

[422]

Where connector termination points are not accessible for testing, extender cards shall be provided.

3.2.4.2.5.4 Covers, Panels, and Doors

[424]

The best commercial practices shall be applied in electrical equipment cover, panel, and door design IAW MIL-STD-1472.

[425]

Where parts or assemblies are mounted on hinged doors, panels, or covers, electrical ground return shall not depend on the hinge contact for electrical continuity; a separate grounding means shall be provided for the electrical ground return. COTS and NDI equipment are exempt from this requirement.

3.2.4.2.5.5 Handles

[427]

Best commercial practices shall be applied to assure suitable carrying handles or hand grasp areas are provided for equipment IAW MIL-STD-1472.

3.2.4.2.5.6 Replacement of Modular Assemblies

[429]

Best commercial practices shall be used to permit replacement of modular assemblies IAW Company Standard 16331-R17521.

3.2.4.2.6 Circuit Card Design

[431]

Except for COTS and NDI equipment, all circuit card connectors shall have a means of positive connection in the mating/unmating cycles.

[432]

Except for COTS and NDI equipment, power and ground shall be placed on the same pin number location on all card slots so that inadvertent insertion of a card in the wrong slot will not result in damage to the card or to other parts of the system.

3.2.5 ENVIRONMENTAL CONDITIONS

3.2.5.1 TRAINING EQUIPMENT

3.2.5.1.1 Operational Climatic Environment

[436]

The training equipment, including all components shall be designed for operation within the ambient air environmental temperatures of 16 to 26 degrees C (61 to 79 degrees F).

[437]

The training equipment, including all components shall be designed for operation within the ambient air environmental relative humidity range of 30 percent to 70 percent at 21 degrees C (70 degrees F).

3.2.5.1.2 Nonoperational Climatic Environment

[439]

The AGTS shall be designed such that it shall not be damaged, nor shall the performance be degraded when activated, during transit, site nonuse, and storage above the climatic extremes of minus 40 degrees C (-40 degrees F), with no solar load.

COTS and NDI equipment are exempt from this requirement.

[441]

The AGTS shall be designed such that it shall not be damaged, nor shall the performance be degraded when activated, during transit, site nonuse, and storage below the climatic environment extreme of plus 63 degrees C (+145 degrees F).

COTS and NDI equipment are exempt from this requirement.

[443]

The AGTS shall be designed such that it shall not be damaged, nor shall the performance be degraded when activated, during transit, site nonuse, and storage within the relative humidity range of 0 percent to 95 percent, non-condensing.

COTS and NDI equipment are exempt from this requirement.

[6129]

Should failure occur as a result of damage attributable to low temperature, the contractor shall assume responsibility for repair or replacement of the component.

3.2.5.1.3 Acoustic Noise

[446]

The control of acoustical noise generation and penetration shall be under the guidance of the requirements of MIL-STD-1472.

[447]

The acoustical noise level in operational areas of the system is specified in paragraph 3.3.6.4 (Personal Safety).

3.2.5.1.4 Vibration

[449]

The AGTS shall be designed such that it shall not be damaged, nor shall the performance be degraded when activated, when it is subjected to vibrational stresses produced during shipment as specified in 3.2.6 and operational use.

3.2.5.1.5 Shock

[451]

The AGTS shall be designed such that it shall not be damaged, nor shall the performance be degraded when activated, when it is subjected to infrequent nonrepetitive shocks or transient vibrations encountered during handling, transportation as specified in 3.2.6, and service environments.

3.2.5.2 RESERVED

3.2.5.3 RELOCATABLE AND MOBILE SHELTERS

[6130]

Mobile and relocatable shelters shall withstand the following environmental conditions without deformation, cracking, damage, and unusual wear of internal and external components.

3.2.5.3.1 Operational Climatic Environment

[6156]

Training shall take place without degradation, within the relocatable and mobile shelter when the outside temperatures are between the following extremes:

- a. Low Extreme: Minus 40 degrees C (-40 degrees F), with no solar load
- b. High Extreme: Plus 52 degrees C (+125 degrees F), plus a solar load of 1120 Watts per Square Meter (W/m^2) ($355 \text{ BTU/ft}^2/\text{hr}$) on the shelter exterior skin.
- c. Relative Humidity: 0 percent to 95 percent, non-condensing

All components of the relocatable and mobile shelters shall be fully functional within this temperature/humidity range. Set-up and dismantling of relocatable and mobile shelters for training shall not be affected within this temperature range.

3.2.5.3.2 Nonoperational Climatic Environment

[6157]

The AGTS shall be designed such that it shall not be damaged, nor shall the performance be degraded when activated, during transit, site nonuse, and storage within the following climatic environment extremes:

- a. Low Extreme: Minus 40 degrees C (-40 degrees F), with no solar load
- b. High Extreme: plus 63 degrees C (+145 degrees F), plus a solar load of 1120 Watts per Square Meter (W/m^2) ($355 \text{ BTU/ft}^2/\text{hr}$) on the shelter exterior skin.
- c. Relative Humidity: 0 percent to 95 percent, non-condensing

COTS and NDI equipment are exempt from this requirement. These conditions shall not affect the relocatable and mobile shelter operation for transit.

Should failure occur as a result of damage attributable to low temperature, the contractor shall assume responsibility for repair or replacement of the component.

3.2.5.4 INTEGRATED MOBILITY SUBSYSTEM

[453]

The integrated mobility subsystem shall withstand the following environmental conditions without deformation, cracking, damage, and unusual wear of internal and external components.

3.2.5.4.1 Operational Climatic Environment

[10218]

Training shall take place without degradation, within the integrated mobility subsystem, when the outside temperatures are between the following extremes:

- a. Low Extreme: Minus 40 degrees C (-40 degrees F), with no solar load
- b. High Extreme: Plus 52 degrees C (+125 degrees F), plus a solar load of 1120 Watts per Square Meter (W/m²) (355 BTU/ft²/hr) on the exterior skin.
- c. Relative Humidity: 0 percent to 95 percent, non-condensing

COTS and NDI equipment are exempt from this requirement. These conditions shall not affect the integrated mobility subsystem operation for transit.

Once internal temperature is stabilized between 65 degrees F to 80 degrees F prior to powering training equipment, the integrated mobility subsystem shall be fully functional within this temperature range. Set-up and dismantling of the integrated mobility subsystem for training shall not be affected within this temperature range.

3.2.5.4.2 Nonoperational Climatic Environment

[10219]

The AGTS shall be designed such that it shall not be damaged, nor shall the performance be degraded when activated, during transit, site nonuse, and storage within the following climatic environment extremes:

- a. Low Extreme: Minus 40 degrees C (-40 degrees F), with no solar load
- b. High Extreme: plus 54 degrees C (+130 degrees F), plus a solar load of 1120 Watts per Square Meter (W/m²) (355 BTU/ft²/hr) on the exterior skin.
- c. Relative Humidity: 0 percent to 95 percent, non-condensing

Should failure occur as a result of damage attributable to low or high temperature, the contractor shall assume responsibility for repair or replacement of the component.

COTS and NDI equipment are exempt from this requirement. These conditions shall not affect the integrated mobility subsystem operation for transit.

3.2.6 TRANSPORTABILITY

[466]

The training system components shall be designed to be transportable to the installation site by surface or air transportation.

[467]

The surface transportation shall be on air-ride vehicles.

[6131]

The relocatable shelters shall be capable of sea transport; however, no cargo should be stacked on top of these shelters.

[468]

Except for the IMS, air transportation may be accomplished by C-130 or larger aircraft, both military and commercial.

[469]

The training system components shall be constructed such that disassembly, installation and assembly can be accomplished without the necessity of soldering, cutting, welding, or other destruction of material.

[10220]

The Integrated Mobility Subsystem shall be designed and built for internal air transport in the C-5A and C-17 in accordance with MIL-HDBK-1791, with the capability of being on/off-loaded in a C-5A and C-17 without the aid of a shoring kit.

3.2.7 DEPLOYABILITY

[471]

The AGTS trainer and monitoring system may be packed and shipped in crates or installed and deployed in the relocatable shelters, or installed and deployed in the Integrated Mobility Subsystem.

[6133]

Trainer components not semi-permanently attached to the crew station, shelter, or instructional hardware shall be separately crated for transport.

[6134]

Two AGTS trainers with or without relocatable shelters, may be transported on a C-5 aircraft.

[6135]

For each relocatable shelter, the time from site arrival to ready for training, and the time to de-install and prepare for shipping shall be no longer than 1 week.

3.3 DESIGN AND CONSTRUCTION

[473]

Design and construction of the AGTS hardware shall be in accordance with the following requirements.

3.3.1 MATERIALS, PROCESSES AND PARTS

[475]

All materials, processes, and parts used in the AGTS shall be in accordance with the requirements of Appendix I of this specification. Nondevelopmental items (includes COTS equipment) and GFE are exempt from Appendix I requirements, unless otherwise specified. However, in order to be exempt, the hardware must comply with the conditions established by the Non-Developmental Item (NDI) definitions set forth in Section 1.2 of the Work Statement.

3.3.2 ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E3)

3.3.2.1 ELECTROMAGNETIC COMPATIBILITY (EMC)

[478]

The AGTS shall be electromagnetically compatible with itself and adjacent electrical, electro-mechanical, and electronic equipment at the installation sites.

[479]

The AGTS shall be able to operate within the electromagnetic environment without being a source of electromagnetic interference or a victim of site generated electromagnetic emissions, whether radiated or conducted, for electromagnetic radiation environments with less than 0.5 volt/meter field strength at a distance of 1 meter from the equipment.

[480]

All COTS and NDI shall meet FCC Rules Part 15, Subpart J.

3.3.2.1.1 Wire and Cable EMC

[482]

All interconnecting and internal wires and cables that may connect to interference-sensitive equipments or circuits shall provide physical separation or shielding necessary to meet the EMC requirements of this specification.

3.3.2.1.2 Audio/Communication Systems

[484]

The audio/communication systems shall meet 50 dB signal-to-noise ratio and 50 dB crosstalk requirements.

3.3.2.1.3 Electrostatic Discharge (ESD) Effects

[486]

All electronic equipment, components and controls that are operator accessible shall not exhibit any degradation of performance when subjected to electrostatic discharges to operator accessible controls, switches, chassis, and frames. All COTS and NDI shall be exempt from this requirement.

[487]

Test discharge shall be 15,000 volts and will simulate air discharge or equivalent contact discharge from a human body. All COTS and NDI shall be exempt from this requirement.

3.3.2.2 EMC ELECTRICAL BONDING AND GROUNDING

[489]

The EMC electrical ground for AGTS equipment shall be provided by electrically bonding together major trainer elements (crew station, IOS, shelter, integrated mobility subsystem, as applicable) and by electrically bonding together the equipment within each separate trainer element. All COTS and NDI shall be exempt from this requirement.

[490]

The electrical resistance between each major trainer element ground reference (stud) and earth ground shall not exceed 0.1 ohms.

[491]

All external safety grounds (Crew Station, Racks, Generators, Shelter, etc.), with COTS exempted, shall each provide a ground conductor of equivalent size and current capacity as that supplying current to the unit per NFPA 70, Article 250-122.

3.3.3 IDENTIFICATION AND MARKINGS

3.3.3.1 WARNING MARKING FOR SIMULATED AND MODIFIED EQUIPMENT

[494]

The following types of AGTS equipment shall be identified and marked "FOR TRAINING USE ONLY":

- a. Modified operational/tactical equipment which is for AGTS use only.
- b. Simulated equipment which has overall outward appearance which is substantially identical to the operational/tactical equipment for which it could be mistaken.

3.3.3.2 TRAINER NAMEPLATES AND MAJOR UNIT MARKINGS

[10324]

A trainer nameplate shall be permanently affixed to the AGTS and PAAR.

[10323]

The trainer nameplate shall include a two-dimensional (2-D) Data Matrix bar code and shall be accompanied by the corresponding human readable markings (see Figure 3.3.3.2-1 for sample layout).

[10322]



US ARMY PROGRAM EXECUTIVE OFFICE SIMULATION, TRAINING AND INSTRUMENTATION ORLANDO, FLORIDA		
		
DVC NO.		
DVC SN.		
CONTRACT NO.		
MFR NAME		
MFR CAGE CODE		
MFR P/N		
DATE		

Figure 3.3.3.2-1. Trainer Nameplate

[10321]

The bar code shall contain the training device IUID number, consisting of the manufacturer's CAGE code, manufacturer's part number, and training device serial number.

[10320]

All 2-D data matrix shall be permanently affixed and have the ability to withstand and perform within the same environmental conditions as the training system.

[500]

Each major unit of the trainer shall be identified with a product marking tag supplied by the contractor designed and located in conformance with Company Standard 16331-R17521.

3.3.3.3 ESD MARKING

[502]

Electrostatic discharge sensitive assemblies shall be marked in accordance with MIL-STD-1686. All COTS and NDI shall be exempt from this requirement.

3.3.3.4 NON-DEVELOPMENTAL ITEM (NDI) MARKING

[504]

All nameplates, instruction labels, and equipment identification furnished with authorized NDI shall be written in the English language and numbering system.

3.3.3.5 TRAINER UNIQUE EQUIPMENT (TUE) MARKING

[506]

The identification and marking of TUE (trainer equipment other than GFE and approved NDI) parts, assemblies, and equipment shall be under the guidance of MIL-T-23991.

3.3.3.5.1 Assemblies/Units/Modules

[508]

Assemblies and units shall be tagged in accordance with Company Standard 16331-R17521.

[509]

Plug-in modules shall be keyed or permanently color coded so as to minimize the probability of incorrect connection/insertion.

[510]

Where keying or color coding is impractical, a permanent, legible directory or chart shall be posted conspicuously on or adjacent to the equipment, showing location or orientation of such module.

3.3.3.5.2 Cable and Wire Markings

[512]

Cables and wires shall be permanently and legibly marked in accordance with IEEE 200 and Company standard 16331-R17485.

[513]

All wires and cables capable of being disconnected shall be identified with "to-from" reference designators in addition to "W" and "P" designations. These types include plugs, jacks, lugged terminals, and push-on captivated wires. Jumpers or links located on terminal boards, jacks, or plugs are exempt from such marking.

[514]

Markings shall not damage the wires or cables attached to and shall be located within approximately 3 inches from the terminal or plug, oriented in such a manner as to be readable without removal of the wire or cable or support clamps. Soldered or wire wrap connections shall be exempt from such marking.

[515]

For purposes of this marking specification, units comprised of multiple cabinets or bays permanently welded or bolted together shall be considered as having separate cabinets.

[516]

The underlying criteria for wire and cable marking shall be ease of maintenance and reduction of chances for misconnection.

3.3.3.5.3 Terminals, Boards, and Strips

[518]

Terminals, boards, and strips shall be identified in a permanent manner to facilitate replacement of connections. Where space limitations prohibit marking on the terminal, strip, or board, the marking shall be on the chassis adjacent to the terminal, strip, or board.

3.3.4 WORKMANSHIP

[520]

Workmanship shall be in accordance with Company Standard 16331-R17521. All COTS and NDI shall be exempt from this requirement.

3.3.5 INTERCHANGEABILITY

[522]

Interchangeability within the training system shall be to as great an extent as engineering practices permit. For purposes of this specification, an interchangeable item is defined as one which:

- a. Possesses such functional and physical characteristics as to be equivalent in performance, reliability, and maintainability, to another item of similar or identical purposes, and
- b. Is capable of being exchanged for the other item without selection for fit or performance, and without alteration of the items themselves or of adjoining items, except for adjustment.

3.3.6 SYSTEM SAFETY AND HEALTH HAZARDS

[527]

The system shall provide fail-safe features for safety of personnel during installation, operation, maintenance, and testing.

[528]

Design shall be under the guidance of Section 4 of MIL-STD-882.

[529]

Any safety or health hazards associated with any phase of operation to include storage and disposal shall be eliminated or its associated risk controlled to a level acceptable to the Government in accordance with the methods stated in the Work Statement (WS).

3.3.6.1 HAZARDOUS MATERIAL

[531]

The AGTS system shall not incorporate any asbestos.

[532]

Glass fiber materials shall not be used as the outer surface or covering on cables, wire, or other items where they may cause skin irritation to operating personnel.

[533]

When maintenance procedures require access to glass fibers, such as insulation, a proper caution note shall be provided.

[6144]

Polyvinyl Chloride (PVC) materials may be used in the crew compartment, but only with approval of the level used in the crew station. This approval shall be referred to in the applicable Safety Assessment Report CDRL.

[535]

Class one ozone depleting materials shall not be delivered as part of the equipment.

[536]

The system shall preclude exposure of personnel or the environment to excessive levels of toxic, carcinogenic, or otherwise hazardous materials as defined by the Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), and the Department of Transportation (DOT).

3.3.6.2 ELECTRICAL SAFETY

[538]

Electrical circuitry and installation shall comply with the requirements of the National Electric Code (ANSI/NFPA 70) and under the guidance of MIL-HDBK-454 (Guideline 1, Personnel Safety; and Guideline 8, Electrical Overload Protection).

[539]

An emergency power disconnect switch shall be as specified in 3.2.2.5.3, clearly labeled, and shall cut off power to the complete equipment.

[540]

Internal protective measures shall be as defined under the guidance of Table 1-II of MIL-HDBK-454.

[541]

Danger, caution, warning, etc., signs shall be used and designed to warn of specific hazards such as voltage, current, thermal, and radiation hazards.

[542]

For potential hazards between 70 and 500 volts, warning shields and sign labels shall read: "CAUTION - (insert maximum voltage) VOLTS".

[543]

For potential levels over 500 volts, warning shields and sign labels shall read: "DANGER - HIGH VOLTAGE (insert maximum voltage) VOLTS".

[544]

Circuit breakers shall be on the equipment side of the power switch, adequately labeled/marked, and capable of manual reset only.

[545]

Computer equipment shall meet the requirements of chapter 7 NFPA 75.

[546]

Batteries shall be sufficiently separated from electronic components to prevent damage from corrosion.

[547]

Battery compartment design shall be under the guidance of MIL-HDBK-454 Guideline 27, paragraph 5, unless COTS or NDI equipment.

3.3.6.3 MECHANICAL SAFETY

[549]

Moving parts shall be guarded or provided with safety devices to prevent mechanical injury to operator and maintenance personnel.

[550]

Edges and corners shall be rounded and free from burrs.

[551]

Center of gravity shall be such that the system is easy to handle and stable.

[552]

A means shall be provided to lock/disengage the wheels, so the system cannot be inadvertently moved.

3.3.6.4 PERSONNEL SAFETY

[554]

The design shall provide maximum safety to personnel and system equipment when installing, operating, adjusting, and maintaining the equipment.

[555]

The system shall not exceed noise levels defined in MIL-STD-1474 Requirement 1 (Steady-State Noise) Table 1-II and Requirement 4 (Impulse Noise) paragraph 5.1.2.

[556]

The design shall also follow the guidance of MIL-HDBK-454, Guidelines 3 and 9.

[557]

The following paragraphs of MIL-STD-1472 shall be used as guidance: 5.7.7 for ingress/egress (except for crew station); 5.8.1.2 for ventilation; 5.9.11.3 for weight limits and weight labeling; 5.9.11.5 for handles and grasp areas; and 5.13 for hazards and safety requirements.

[558]

Where COTS equipment is used, if commercial (e.g., UL) safety standards are met, then the COTS equipment need not be modified, except by labeling to meet the additional safety requirements stated in this section.

[559]

Fire extinguishers shall be provided for all confined space areas as well as be easily accessible within the facility as described within 29 CFR 1910 (Occupational Safety and Health Standards).

[560]

Emergency power off switches shall be provided that can easily be reached by all operator personnel in the event of an emergency.

3.3.6.5 IONIZING RADIATION

[562]

Each AGTS monitor shall have an x-radiation exposure rate not higher than 0.5 milliroentgen (mR) per hour at a distance of 5 centimeters from an external point as required in section 1020.10 of Public Law 90-602, The Radiation Control for Health and Safety Act.

3.3.6.6 RADIOACTIVE MATERIAL RESTRICTION IN OPTICAL PRODUCTS

[564]

Optical products shall contain no thorium or other source materials, as defined by Title 10, Code of Federal Regulations, Part 40, in excess of 0.05 percent by weight (500 ppm) or no other radioactive materials. Optical products are defined as optical glass constituents or raw materials, optical glass components such as windows, filters, reflectors, prisms, beam splitters, lens elements and fiber optics, optical assemblies, and optical coatings, except for IR objective lenses. Radioactive material is defined as radioactive material per item in excess of concentrations listed in Schedule A, Title 10, Part 40 or in quantities greater than 0.001 microcuries.

3.3.7 HUMAN PERFORMANCE/HUMAN ENGINEERING

[566]

Simulated vehicle work spaces and positions for personnel shall be representative of the actual vehicle equipment.

[567]

Simulated crew equipment shall replicate actual vehicle equipment locations, operation, and functions.

[568]

All aspects of the equipment uniquely designed for the AGTS, except those portions that replicate actual military hardware, shall be under the guidance of MIL-STD-1472 (not to include paragraphs 2.1.1, 2.1.2, 4.10, 4.11, 5.10, 5.11, 5.12, and 5.14).

[569]

Equipment characterized by a workstation with video display terminal(s) and computer input devices shall conform to the requirements of ANSI/HFS 100.

[570]

Maintenance and support of the AGTS shall physically accommodate the 5th percentile through 95th percentile male general forces anthropometric range.

[571]

Equipment designed for use by personnel identified in 3.6.2 shall be governed by the dimensional range of the 5th percentile through 95th percentile male population.

[572]

Software-user interfaces uniquely designed for AGTS will follow the guidelines of the DoD Human Computer Interface Style Guide. Other aspects of the user-computer interface shall conform to MIL-STD-1472, paragraph 5.15.

3.3.8 OPTICS

[574]

All reflective optics used in the display subsystem shall be front surface reflective coated.

[575]

No chromatic aberration shall be discernible.

[576]

There shall be no spurious images or reflections, including light leaks, mirror imperfections, and reflections, or from any other source.

[577]

High power sight focus range (diopter adjustment), apparent FOV, pupil size, and eye relief shall be as follows:

REQUIREMENT	CMS Daysight	Gnr & Cmdr Auxiliary
Diopter Adjustment (D)	+2/-6 (+/-1)	+4/-4 (+/-1)
Exit Pupil (MM)	0.29 +/-0.025 (min)	0.25 +/-0.025 (min)
Eye Relief (MM)	0.95 +/-0.075 (min)	1.0 +/-0.075 (min)

3.3.9 TRAINING SYSTEM SOFTWARE

[600]

Trainer system software shall consist of developed software and non-developed software IAW the contractor Software Development Plan (SDP).

3.3.9.1 SOFTWARE DEVELOPMENT REQUIREMENTS

[602]

Software shall be developed for this system using recognized modern software engineering methods, IAW Section 4, General Software Development Activities, as defined in the SDP to maximize a modular architecture.

3.3.9.2 SOFTWARE COMPONENTS

[606]

The trainer system software shall consist of the following components:

- a. Application programs - The application programs provided shall consist of:
 - (1) Programs necessary to meet the simulation performance requirements of this specification.
 - (2) Programs necessary to meet the instructional and training performance requirements of this specification.
 - (3) The underlying computer systems software, e.g., executive program, required to control the simulation and instructional performance of the trainer.
 - (4) Programs which are required to test or demonstrate compliance of the trainer with this specification.
- b. Operating system/run time environment - The operating system or other run time environment software provided shall be COTS software.
- c. Diagnostic software - The diagnostic software provided shall be the COTS software provided to, or available for purchase by, any commercial purchaser of the hardware provided. Additional developed or non-developed diagnostic software shall also be provided. Diagnostic software shall test the operation of the computers, peripheral equipment, and other trainer hardware and identify, to the lowest replaceable unit, a malfunctioning component. The diagnostic software includes but is not limited to the following:
 - (1) Computer diagnostic programs - Commercially available diagnostic programs for the selected computers (including computer peripherals) shall be used, if available.

3.3.9.3 SOFTWARE CAPABILITIES

[617]

The following minimum functional capabilities of the trainer system software shall be provided:

- a. Vehicle dynamics simulation
- b. Weapon and weapon effect(s) simulation
- c. Target simulation
- d. Exercise control
- e. Visual system control
- f. Crew station control
- g. Aural cues control
- h. Communications control
- i. Distributed Interactive Simulation (DIS) network interface
- j. Pre-brief and after-action review functional support
- k. Instructor/Operator support

3.4 DOCUMENTATION

[632]

See the Contract Data Requirements List (CDRL).

3.5 LOGISTICS

3.5.1 MAINTENANCE

3.5.1.1 OPERATOR LEVEL MAINTENANCE

[636]

Operator level maintenance shall be performed by the personnel that perform instructor tasks at the trainer location. This shall include on-line fault detection and limited correction of failures in accordance with the system operator's manual. The instructor/ operator will notify the on-site or on-call Contractor Logistic Support (CLS) field service representative (FSR) when the maintenance action is beyond the capability of the instructor/operator.

3.5.1.2 ORGANIZATIONAL LEVEL MAINTENANCE

[638]

Organization level maintenance shall be performed by the CLS FSR's. This shall include the use of on-line system level diagnostics, Built-In-Test (BIT), and troubleshooting procedures defined in the system maintenance manual to fault isolate to the Lowest Replaceable Unit (LRU).

[639]

The CLS FSR's shall disassemble, remove, replace, reassemble and test to verify that a failure has been corrected using resources available at the field location.

[640]

The CLS FSR shall repair the failed LRU off-line or shall return it to the general support maintenance activity for repair and/or replacement when the required maintenance action is beyond his capability.

[641]

The CLS FSR shall perform periodic scheduled maintenance in accordance with the system maintenance manual.

3.5.1.3 GENERAL SUPPORT LEVEL MAINTENANCE

[643]

General support level maintenance, including the repair and/or replacement of spared LRU's, shall be performed by the CLS contractor or by subcontractor suppliers at their facilities. This shall include the performance of computer system maintenance in accordance with paragraph 3.5.1.4.

3.5.1.4 COMPUTER SYSTEM MAINTENANCE

[645]

The CLS contractor shall be responsible for computer system maintenance. The computational subsystem vendor or his designated representative may provide repair to the piece part level.

[646]

The CLS contractor shall provide support equipment, as necessary, to perform database updates and software updates.

3.5.2 SUPPLY

[653]

The supply support shall be provided by contractor logistics support.

3.5.3 FACILITIES AND FACILITY EQUIPMENT

3.5.3.1 PERMANENT SITE FACILITIES

[656]

The permanent site facilities provided by the Government will include building, heating, ventilating, air conditioning, fire suppression, electrical power, and lighting. The contractor shall distribute power from the Government-provided utility point to the AGTS equipment.

3.5.3.1.1 Floor Space

[658]

Twenty-one hundred square feet will be available for the contractor to install the AGTS system at any permanent site. The contractor shall use the overall space available for AGTS as seen fit. There are no restrictions on particular areas being used for certain purposes (i.e., maintenance, office space, computer and programmer's room, etc.).

3.5.3.1.2 Raised Flooring

[660]

The AGTS devices shall be designed to be installed on raised flooring which is in accordance with MIL-HDBK-1012/1, unless otherwise specified.

3.5.3.1.3 Grounding

[662]

The contractor shall be responsible for connecting the AGTS equipment to the building ground connection provided.

3.5.3.1.4 Ground Resistance

[664]

The Government provided facility earth ground system will have a maximum resistance to earth of 10 ohms.

3.5.3.1.5 Equipment Grounding

[666]

A single ground plate will be provided by the Government in the electronic equipment area. The contractor shall connect his equipment signal and chassis grounds to the plate.

3.5.3.1.6 Equipment Cooling

[668]

The permanent AGTS equipment shall utilize the conditioned air provided by the facility.

[669]

All cabinets and consoles which contain heat producing components shall be provided with a means of heat removal.

3.5.3.1.7 Lighting

[671]

The Government provided lighting will meet the illumination criteria of Table XXI of MIL-STD-1472. If several different illumination criteria are applicable for a single trainer area, the highest recommended illumination level shall be provided for the entire area.

[672]

Emergency lighting for the facility will be Government furnished. The contractor shall provide lights for illumination of areas not open to lighting by the facility.

3.5.3.2 SHELTER SITE FACILITIES

[6172]

The contractor shall be responsible for the preparation of any sites receiving a relocatable AGTS.

[7959]

As required, site preparation shall include, but not be limited to, construction of a concrete pad, installation of communication lines, installation of tiedowns, installation of a grounding system including a connection for the lightning protection system, installation of a transformer with connection to the Government provided utility point, distribution of power from the transformer to the shelter and other actions required for the construction of the site.

3.5.3.3 MOBILE AND SHELTER SITE FACILITIES

[6174]

The contractor shall be responsible for the preparation of any sites receiving a mobile or relocatable AGTS as follows:

Site preparation shall include installation of tiedowns, installation of a grounding system, and connection to the Government provided utility point.

Site preparation shall include installation of bearing plates and installation of an electrical service center with connection to the Government provided utility point.

A level area adequate for the setup of the mobile AGTS system will be provided by the customer.

3.6 PERSONNEL AND TRAINING

3.6.1 GENERAL

[677]

A MANPRINT program integrating all information involving human performance with design in order to influence and optimize total system effectiveness and availability shall be conducted in accordance with the System Engineering Management Plan (SEMP). The goals of MANPRINT in the AGTS are to contribute to cost and training effectiveness by determining, during design, the equipment and design which yields the highest level of human performance with the minimum burdens upon projected manpower, their personal aptitudes, and training.

3.6.2 PERSONNEL

3.6.2.1 INSTRUCTORS

[680]

The system interfaces shall be user friendly to the extent that the instructors, within the skill capabilities and with no more training than identified in 3.6.3.2, shall be able to competently operate the AGTS.

[681]

These interfaces shall not require personnel with special computer aptitudes.

3.6.2.2 MAINTENANCE SUPPORT

[683]

The AGTS shall be designed and packaged so that the personnel required to support the system during both utilization hours and maintenance shifts shall be consistent with the maintenance levels specified in 3.5.1.

3.6.3 TRAINING

3.6.3.1 TRAINEES

[9176]

The target audience for training by the AGTS will be a function of the particular training program. There shall be levels available for training initial, qualification and sustainment training for individuals, crews, sections and platoons.

3.6.3.2 INSTRUCTORS

3.6.3.2.1 Prerequisites and Qualifications

[689]

The following prerequisites are required for Crew Instructor/Operator training:

- a. Must have a working knowledge of the fire control system of the operational vehicle for which training is to be conducted, including all operational systems of the Commander's station and the Gunner's station.
- b. Must have experience in instruction in precision gunnery including Combat Tables or equivalent live-fire training and be familiar with offensive and defensive situation operations.
- c. Must be computer literate, familiar with personal computer operations and keyboard, and capable of basic typing.

[9164]

In addition to the above, the following are prerequisites for section and platoon Instructor/Operator training:

- a. Must be experienced with section and platoon-level mission training plans and standards.
- b. Must have expertise in section and platoon precision gunnery and gunnery instruction.
- c. Must have expertise in section, platoon and company level tactics, communications, and command and control.
- d. Must have experience in the use of training devices.

3.6.3.2.2 Special Training Required

[699]

Crew Instructor/Operators must be trained to perform the preparation for training, conduct of training, and critique tasks that are unique to the use of the AGTS training system. Examples of these tasks include power-up/power-down, training session initialization, keypad and mouse control of exercise flow, use of performance monitoring and measurement aids, and access of student records. Some designated Crew Instructor/Operators must also be trained to perform records backup, manipulation, and reporting tasks associated with the Training Management System.

[9165]

Section and platoon Instructor/Operators must be trained to perform the section and platoon mode unique preparation for training, conduct of training, and after-action review tasks that are unique to the use of the AGTS in a networked configuration. Examples of these tasks include orchestration of networked operations, section and platoon communications preparation, training session initialization, command and control of platoon training exercises, use of performance monitoring and measurement aids, and control of Pre-brief/After Action Review (PAAR) functions.

3.6.3.3 MANPOWER

[703]

The AGTS will not require additional Government personnel in order to conduct training. No additional MOS's will be required for AGTS operation. Instructor/Operator personnel will be drawn from existing instructor resource pools at the institutions and installations.

3.7 MAJOR COMPONENT CHARACTERISTICS

3.7.1 CREW STATION SUBSYSTEM

3.7.1.1 CREW STATION COMPARTMENT

[9923]

Tolerances for the crew compartment design with respect to the respective vehicle design criteria shall be as follows:

- a. Interior dimensions - Space constraints within the compartments and interior dimensions shall be within 2.5 inches of the actual vehicle.
- b. Component dimensions - The replicated components within the compartments shall be dimensionally accurate to within +/-0.25 inches. Items which are non-functional and non-tactile (i.e., viewable by the trainee but not touched during training) shall be dimensionally accurate to within 5 percent of maximum component dimension.
- c. Component placement - Except where noted, placement of components within the compartment shall replicate the location within the baseline vehicle to an accuracy of +/-1.5 inches and distances between adjacent components shall be within +/-0.25 inches.
- d. Indication response - The simulated instruments, gauges, lights, and displays shall duplicate the performance of the baseline vehicle within +/-10 percent. Rates of change and lags normally

experienced in the operational environment shall be replicated in the trainer indicators and display responses.

- e. Control response - Components which are not required for target acquisition, tracking, and weapons firing shall be within 15 percent of the operational equipment. Components which are required for target acquisition, tracking, and weapons firing shall replicate the location, feel, reaction, and outward physical characteristics of the actual equipment in the vehicle.
- f. The location, feel, reaction, and outward physical characteristics of the trainer fire control equipment shall replicate the location, feel, reaction, and outward physical characteristics of the actual fire control equipment in the vehicle and, unless specified otherwise, shall meet the following:
 - (1) Limits of travel shall be within 8 degrees for rotational travel and one inch for linear travel.
 - (2) Control forces shall be simulated (+/-1.0 pounds breakaway force, +/-2.0 pounds ending force).

[716]

Crew station design shall ensure that Combat Vehicle Communications (CVC) helmets can be worn at the gunner and commander positions without restriction of movement or degradation of ability to operate controls in the same manner as in the actual vehicle.

3.7.1.2 COMMANDER'S POSITION COMPONENTS

[10485]

The commander's position shall be configured to simulate the commander's position of the Stryker MGS vehicle. (See Figure 3.7.1.2-1 for a partial illustration of the commander's compartment.) The following components shall be simulated:

- a. Central Control Panel (CCP) - shared
- b. Commander's Display Unit (CDU)
- c. Commander's Control Handle (CCH)
- d. Commander's Auxiliary Sight (CAS) with Brow Pad
- e. Turret Power Distribution Panel (T-PDP) - shared
- f. Emergency Manual Firing Device
- g. Manual Elevation Handle
- h. Elevation Handle Electrical Trigger (EHET)
- i. Manual Traverse Handle
- j. Vehicle Intercommunication System
- k. Seven Periscopes
- l. Commander's Seat and height adjustment mechanism
- m. Force XXI Battle Command Brigade and Below (FBCB2) Display and Keyboard
- n. CBRN Blower and Hose
- o. Utility Light
- p. Turret Lock
- q. Replenish Position Indicator
- r. Grab Handle
- s. Auxiliary Sight AZ/EL Boresight (2) Controls

[10474]

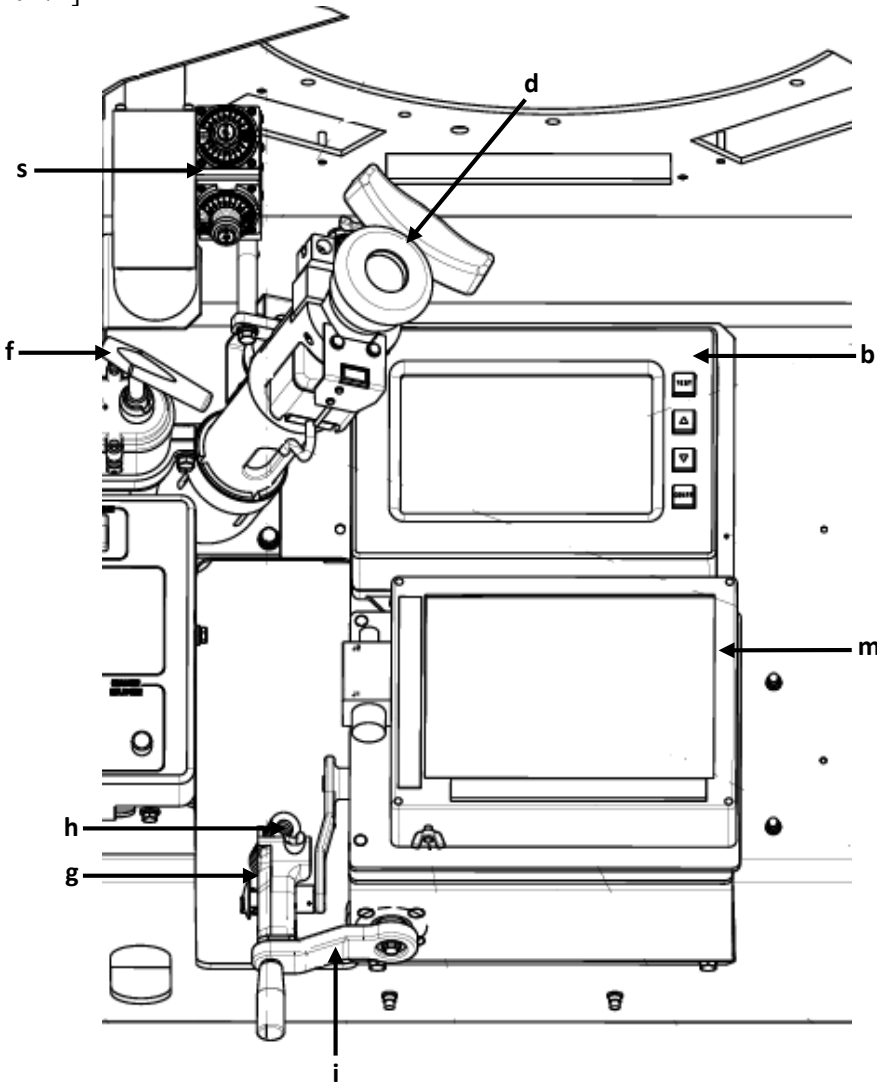


Figure 3.7.1.2-1. Commander's Position Components (partial)

3.7.1.3 GUNNER'S POSITION COMPONENTS

[10479]

The gunner's position shall be configured to simulate the gunner's position of the Stryker MGS vehicle. (See Figure 3.7.1.3-1 for a partial illustration of the gunner's compartment.) The following components shall be simulated:

- a. Compact Modular Sight (CMS) Day Sight with Brow Pad
- b. Compact Modular Sight (CMS) Thermal Sight
- c. Modular Control Panel (MCP)
- d. Gunner's Control Handle (GCH)
 - (1) Hand Controller
 - (2) Left and Right Laser Switch
 - (3) Left and Right Load Switch
 - (4) Left and Right Fire Trigger
 - (5) Left and Right Palm Switches

- e. Gunner's Auxiliary Sight (GAS) with Brow Pad
- f. Central Control Panel (CCP) - shared
- g. Turret Power Distribution Panel (T-PDP) - shared
- h. Turret Auxiliary Switch Panel (TASP)
- i. Vehicle Intercommunication System
- j. Four Unity Periscopes
- k. Gunner's Seat with height adjustment mechanism
- l. CBRN Blower and Hose
- m. Utility Light
- n. Turret Lock
- o. COAX MG Manual Firing Handle
- p. 7.62 Ammo Box
- q. Ammo Temperature Gauge
- r. COAX Charging Handle

[10480]

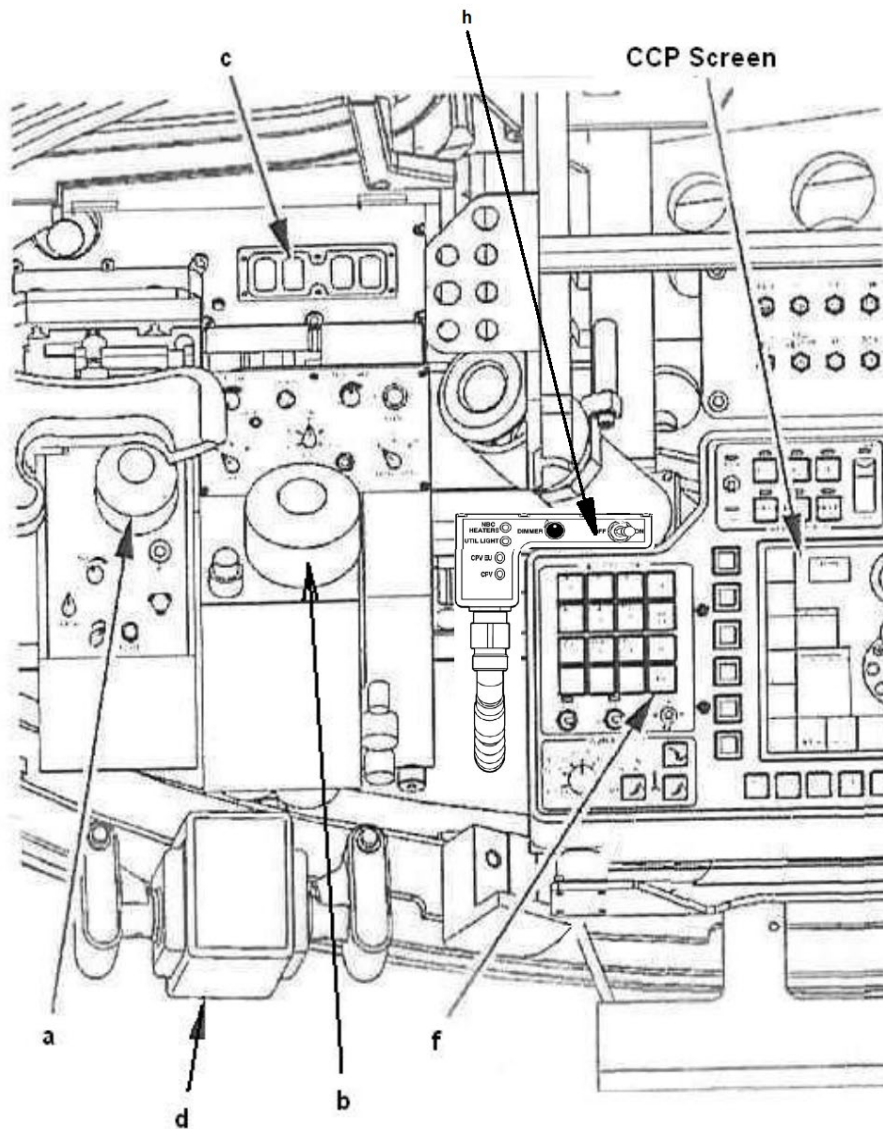


Figure 3.7.1.3-1. Gunner's Position Components (partial)

3.7.1.4 SIMULATED WEAPONS

[8627]

Firing of the ownvehicle main gun, the coax machine gun, and smoke grenades will produce the following responses:

- a. Browpad recoil (main gun only) (see 3.7.1.7.4).
- b. Aural cues (see 3.7.1.12.2).
- c. Projectile tracer paths (main gun and coax only) (see 3.7.2.8.3.4.1.4).
- d. Impact indication (main gun and coax only) (see 3.7.2.8.3.4.1).
- e. Scene obscuration (main gun and smoke grenades) (see 3.7.2.8.3.4.1.1 and 3.7.2.8.3.4.2.5).

3.7.1.4.1 7.62 Coax Machine Gun Representation

[9329]

The 7.62 coax machine gun mockup shall not be provided since the coax is located above the turret ceiling.

[9330]

A spring-loaded charging handle shall be provided. It shall be located behind the gunner's head, as it is on the tactical vehicle. A spring-loaded charging handle shall be used to reset a COAX charge malfunction (misfire).

[10486]

The handle shall require a force of 20 pounds +/-3 pounds to operate.

[9332]

The charging handle shall require a travel of 3.5 inches +/-0.25 inches to activate a successful charging.

[9334]

A coaxial machine gun manual firing handle shall be provided which shall be located below and to the right of the gunner's CMS units. To fire the coaxial machine gun manually, turn the manual firing handle clockwise or counterclockwise to unlock, then pull it to the rear. (See Figure 3.7.1.4.1-1 for an illustration of the handle.) Activation of the coaxial machine gun manual firing handle shall fire the coaxial machine gun, overriding any current fire control system inhibit conditions.

[9242]

The manual firing handle travel to activate the coaxial machine gun shall be 0.75 inches +/-0.15 inch. The pull force shall be 13 pounds +/-4.5 pounds.

[9335]

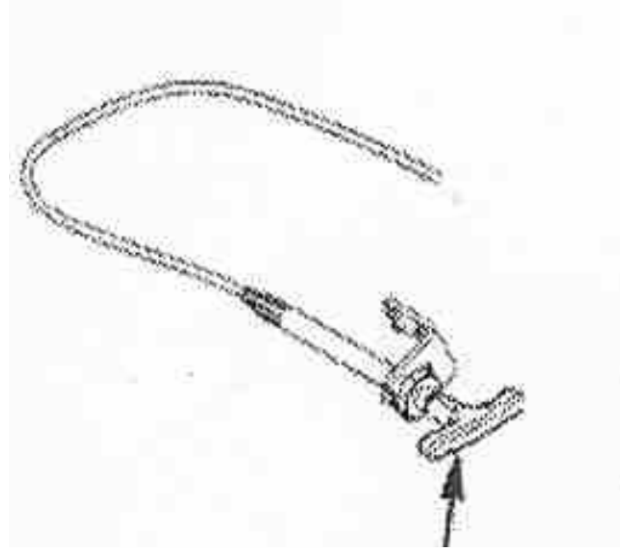


Figure 3.7.1.4.1-1. Coax Machine Gun Manual Firing Handle

[9336]

The torque required to activate and deactivate the coaxial machine gun manual firing handle "safe" position, fully clockwise or counterclockwise, shall be provided by using the tactical twist lock control head assembly.

3.7.1.4.2 Autoloader System

[9247]

The carousel console cover with protective netting located within the turret shall be provided in mockup form as a space constraint.

[9248]

Surfaces of the mockup that correspond to actual vehicle surfaces shall be dimensionally accurate to within 2.5 inches of the actual vehicle.

3.7.1.5 SIMULATED AMMUNITION

[862]

Simulated weapons firing shall provide accurate trajectory and dispersion calculations for the ammunition type listed in Table 3.7.1.5-1.

[863]

Coax projectiles shall be simulated for each round fired, with every fifth projectile being a tracer round. Table 3.7.1.5-1 illustrates the required ammunition characteristics.

[9337]

Table 3.7.1.5-1. Ammunition Characteristics

Ammunition	Series	Tracer Burnout Range (M)	Projectile Deactivation Range (M)	Firing Rate (Rnds/Min)
7.62mm Coax MG	M240	900	1,200 +/- 15	600
105mm APFSDS-T	M900	2,100	4,000 +/- 25	---
105mm HEAT -T	M456A2	2,100	4,000 +/- 25	---
105mm HEP	M393A3	2,100	4,000 +/- 25	
Canister	M1040		1,200 +/- 25	
Smoke Grenades	L8A1	---	N/A	2 Salvos/Exercise

[9454]

Projectile deactivation range shall be limited to 4000 meters for main gun. Coax range shall be limited to 1200 meters.

[897]

Operation of the grenade launcher shall be simulated as described in 3.7.1.10.4.8 and following subparagraphs.

[898]

Firing shall be limited to two grenade salvos per exercise.

3.7.1.6 SIMULATED OPERATING MODE REQUIREMENTS

[9338]

The gun and turret shall be operated in power with stabilization, manual, and power without stabilization modes, shall allow precision gunnery to be performed using the stabilized coax and main gun with the Gunner's CMS Day Sight Channel, CMS Thermal Channel, or the Commander's Panoramic Viewer during simulated night or day conditions. The commander views the CMS Day Sight Channel, CMS Thermal Channel, or the Commander's Panoramic Viewer day or thermal through the Commander's Display Unit video.

[9455]

Either the gunner's power handle or the commander's power or manual handles shall control the direction and rate of travel of the turret system.

[902]

The control handles shall produce the fire control signals only if a palm switch on the handle is depressed.

[10511]

The commander's handle shall have priority over the gunner's handle when operating the turret with Commander Display/Mode selected for Gunner Day or Thermal. If the Pan Day or Thermal is selected and the commander designates a target, the commander shall have control until the designation process is complete or the commander's palm switch is released.

[904]

The manual elevation handle shall be active in manual mode only.

[905]

The following functions shall occur in power with stabilization mode:

- a. Azimuth and elevation stabilization

[907]

Manual mode is a backup for the power mode with or without stabilization. In manual mode, the manual elevation and traverse handles shall control the gun and turret movement (without stabilization). The palm switches on the gunner's and commander's control handles must be disengaged.

[9457]

The gun (main gun and coax) and turret shall be operable in any mode.

[10497]

The Elevation Handle Electrical Trigger (EHET) shall be active in all operating modes whenever the manual elevation handle palm switch is depressed.

3.7.1.7 SIMULATED FIRE CONTROL FUNCTIONS

[919]

The fire control components shall provide the crew with the capabilities for surveillance, detection, acquisition, and engagement of targets under day, dawn/dusk, and night with limited visibility environments.

[9339]

The simulated components of the fire control system shall include:

- a. Stabilization system (see 3.7.1.7.2)
- b. Gunner's CMS daysight and Thermal Channel (see 3.7.2.5.1.1.2 and 3.7.1.10.2)
- c. Gunner's Auxiliary Sight (see 3.7.2.5.1.1.4 and 3.7.1.10.6)
- d. Commander's Display Unit (see 3.7.2.5.1.1.3 and 3.7.1.10.5)
- e. Commander's Auxiliary Sight (see 3.7.2.5.1.1.4 and 3.7.1.10.6).

3.7.1.7.1 Mobile Gun Computer

3.7.1.7.1.1 Crosswind Sensor

[6235]

The functions of the crosswind sensor shall be simulated and shall provide simulated wind data to the simulated ballistic computer.

[6236]

Each exercise shall have a constant crosswind.

[6237]

For crew exercises, crosswind shall be initialized at the start of each training exercise and shall be perpendicular to the initial orientation of ownvehicle and have a random direction (left to right or right to left) and a random speed of 0 - 5 mph.

[6238]

For platoon exercises, crosswind shall be initialized at the platoon leader's trainer and shall be supplied to the other platoon ownvehicles at the start of each training exercise. For platoon exercises, the initialized crosswind shall be perpendicular to the initial orientation of the platoon leader's ownvehicle and have a random direction (left to right or right to left) and a random speed of 0 - 5 mph.

[6239]

The capability for manual crosswind inputs into the ballistic solution shall be provided in both crew and platoon modes.

3.7.1.7.1.2 Range

[969]

Refer to 3.7.1.9.1, Gunner's Control Handle, 3.7.1.9.2, Commander's Control Handle, and 3.7.1.10.2, Compact Modular Sight (CMS) for simulated range determination.

3.7.1.7.1.3 Muzzle Reference Sensor

[6264]

The Muzzle Reference Sensor (MRS) is used to determine the amount of change in the main gun tube resulting from uneven heating and cooling. The MRS provides the computer with a relationship (angle) between the CMS Day LOS and the end of the main gun tube. When activated, the MRS reticle (a moving model) shall appear in the CMS Day sight.

[6265]

When the MRS is activated, the main gun model shall appear with the MRS reticle positioned at the end of the gun tube offset with the MRS error less the adjust value from the reticle adjust four-way toggle switch.

[6266]

The main gun model shall be positioned at a zero degree main gun elevation and the background scenery shall remain visible whenever MRS is selected, and one squeezes and holds the palm switch(es) on the Gunner's control handle or Commander's control handle.

[6267]

At the start of each exercise, gun bend errors shall accumulate as a function of the number of rounds fired. Starting with the third round fired, gun bend errors shall accumulate at the rate of 0.08 mils per round and shall be added to the gun angles as the exercise progresses.

[6268]

Performing an MRS update to within tolerance after the sixth round fired shall result in a gun tube bend of 0.01 mils per round.

[6269]

The maximum accumulated gun tube bend shall be 1.0 mil.

[6270]

The reticle adjust four-way toggle switch shall be used to align the CMS Day reticle with the MRS.

[6271]

The MRS function shall allow ± 3 mils of CMS Day reticle correction.

[6272]

Gun bend errors shall be simulated in all exercises except those exercises which malfunction the MRS update sight.

3.7.1.7.1.4 Battlesight Adjust

[6276]

The mobile gun computer shall store separate battlesight range values for each ammo type.

3.7.1.7.1.5 Diagnostic Menu

[8669]

The diagnostic menu functions shall not be simulated.

3.7.1.7.1.6 Ballistic Solution

[6288]

The mobile gun computer shall selectively solve the ballistic equations and provide offset commands according to the main gun and/or coax weapon modes defined by the ammo select switch.

[6289]

The ballistic computer shall limit firing of the main gun to within ± 0.60 mils in elevation or azimuth of the computed offset angle, or when the ballistic solution calculation is not ready.

[6290]

The ballistic computer shall limit firing of the coaxial machine gun to within ± 5.0 mils in elevation or azimuth of the computed offset angle, or when the ballistic solution calculation is not ready.

[6291]

The ballistic solution shall be performed whenever either palm switch is activated and a range has been fed to the ballistic computer (lasing, battle sight adjust, or manually indexing range).

3.7.1.7.1.7 Lead System

[6299]

When the lead sensor system is enabled and the active control handle is rotating, lead shall be induced directly into the fire control system after range is entered.

[10961]

Lead shall be set to zero when the active control handle is centered and range is entered to the Mobile Gun Computer (MGC).

[6298]

Release of the activated palm switch shall deactivate the lead sensor system.

3.7.1.7.2 Stabilization Systems

[1009]

The simulated stabilization system shall automatically elevate or depress the main gun and traverse the turret to compensate for simulated vehicle angular motion.

[9340]

The simulated stabilization system shall be activated by setting the STAB switch to ON position at the CCP.

[1011]

The azimuth stabilization system shall keep the turret pointed in the same direction within the performance capability of the stabilization system, relative to the earth regardless of hull movement (i.e., the turret shall remain relatively stationary while the hull rotates).

[1012]

The elevation system shall keep the gun at the same elevation regardless of hull and turret movement, within the performance capability of the stabilization system.

[9341]

The AZ DRIFT Knob on the CMS daysight unit shall be functional and shall provide the means to null out any excessive azimuth drift only that may exist in the stabilization system to a value of less than 5 mils in 15 seconds. The AZ DRIFT Knob shall only work in STAB mode.

[9342]

The EL DRIFT control on the CMS daysight unit shall be used to null elevation drift in both the CMS day and thermal sights.

[9343]

Azimuth/elevation drift shall be in a random direction and speed at a maximum rate of 1.0 mil/second added to the null conditions and shall be initialized by the host computer at the start of each training session.

[1016]

The initial drift shall be limited to ± 1 mil/second.

3.7.1.7.2.1 Stabilization and Power System Characteristics

[1018]

The stabilization and power system turret and gun control characteristics shall be simulated both in feel and performance.

[10507]

Gun elevation and turret traverse rates shall approximate those of the actual Stryker MGS based on SME input. The maximum slew rates are 25 degrees per second in elevation and 42 degrees per second in azimuth.

[1020]

To make maximum use of trainer time, stabilization warm-up shall be one minute, including CCP initialization.

[9345]

The main gun and coaxial machine gun angular movement shall be simulated in accordance with the following requirements (these requirements apply to manual mode and power mode with stabilization and without stabilization).

Traverse: The control system shall provide the capability of turret movement through 360 degrees continuous uninterrupted azimuth rotation in both clockwise and counterclockwise directions in STAB ON mode.

Elevation: A 15 \pm 0.5 degree maximum elevation shall be achievable throughout the range of azimuth travel except for a 5.5 degree \pm 0.5 limit over the rear deck, between azimuth 98 degrees to 279 degrees. See Figure 3.7.1.9.3.1-1 for reference.

Depression: 3.5 \pm 0.5 degrees maximum depression in the sector 35 degrees right and 25 degrees left of front vehicle centerline. 5 \pm 0.5 degrees maximum depression over the balance of the traversal.

NOTE: The scene and reticle selected shall change, as in the vehicle, whenever there is an elevation/depression limit change due to azimuth position as indicated above. Rear deck limits shall be simulated for each mode as follows:

a. Manual Mode - When the rear deck elevation or depression limit is reached, the manual controls shall continue to rotate, but the scene and FOV shall stop rotating. The simulated main gun shall not change in elevation when the rear deck elevation or depression limit is reached.

b. STAB OFF Mode - When the rear deck elevation (or depression) limit is reached, the simulated gun and sight shall both move to the respective gun elevation (or depression) level. The gun and sight shall not return to their previous elevation (or depression) unless so directed by the handles after the rear deck elevation (or depression) limit is passed.

c. STAB ON Mode - When the rear deck elevation or depression limit is reached, the CMS Day/CMS Thermal/CPV Day/CPV Thermal shall continue as directed, but the simulated gun shall move to the respective gun elevation (or depression) level. A fire inhibit signal shall be generated while the gun and sights are offset (see 3.7.1.7.2.15). After clearing the deck, the gun shall realign itself with the sight, taking into account super elevation.

3.7.1.7.3 Weapon Triggers, Arming, and Firing Circuits

[10498]

The main gun shall fire from any one of four trigger sources (four for coax) as shown in Table 3.7.1.7.3-1.

[9725]

Table 3.7.1.7.3-1 depicts the Main Gun and Coax triggers, weapon selection (via ammo selection), palm switch function, and safety mechanism state for firing the 105 mm Main Gun or Coax. In addition, the READY-TO-Fire state must be enabled before each of the triggers can fire the main gun or the 7.62 mm coax machine gun.

[10499]

Table 3.7.1.7.3-1. Weapon Arm/Safe Mechanism Required to Fire

Trigger	Bal. Comp or Ammo Sel	Palm Switches	CCP Armed/Safety Sw State
Coaxial MG Manual Firing Handle	Coax or Main Ammo sel'd	N/A	N/A
Manual Firing Mechanism (Main Gun Only)	Coax or Main Ammo sel'd	N/A	N/A
Gunner's Control Handle	Coax or Main Ammo sel'd	Yes (Depressed)	ARMED
Commander's Control Handle	Coax or Main Ammo sel'd	Yes (Depressed)	ARMED
Manual Elevation Handle	Coax or Main Ammo sel'd	Yes (Depressed)	ARMED

[9727]

The Armed/Safe switch at the CCP being in SAFE position shall prevent the corresponding trigger device from firing the selected weapon. The simulation shall not utilize the SAFETY DRIVER inhibit function to lock out weapon firing.

[9965]

The Fire Inhibit condition for the Stryker MGS shall be active based on the main gun elevation limits being met. The main gun shall be able to be depressed -5 +/-0.5 degrees over the full traverse range, with the exception of -3.5 +/-0.5 degrees in the sector 35 degrees right and 25 degrees left of front vehicle centerline. The system provides for a gun elevation of +15 +/-0.5 degrees over the frontal arc of 98 degrees to the right and 81 degrees to the left of the centerline of the vehicle. It provides gun elevation of +5.5 +/-0.5 degrees over the remaining arc of 181 degrees.

3.7.1.7.4 Main Gun and Browpad Recoil

[1058]

Whenever the main gun is fired, a 1.0 degree step input shall be introduced to the suspension model for a duration of 0.5 second.

[1059]

The duration of the recoil shall be 0.5 second.

[9728]

Browpad recoil shall be initiated at the gunner's CMS Daysight and both the gunner's and commander's auxiliary sight browpads.

[1061]

Browpad recoil shall be used as an indication of main weapon firing and will act as a distraction to influence gunnery training.

[1062]

When activated, the browpad recoil travel shall be .5 inches +/- .5 inches and shall exert a force of 3 pounds +/- .1 pound prior to reaching the end of its travel.

3.7.1.7.4.1 Main Gun Obscuration

[9729]

When the main gun is fired, all day sights, including the CCP Commander Display/Mode selected Gunner's Day and Pan Day views, of the firing vehicle, shall be obscured within 0.1 seconds.

[1065]

The original visibility conditions shall begin to be restored within 0.5 seconds of firing and shall be completely restored 2 seconds after firing.

[1066]

The thermal sight shall be obscured in all magnification settings.

[1067]

There shall be no main gun firing obscuration during rain conditions.

3.7.1.7.5 Sight Scene Activation

[9730]

Both the GAS and CAS auxiliary sight extensions shall activate their scenes whenever the gunner's eye is at a distance 5 inches or less away from and directly in front of the eyepiece lens. The range of deactivation is any distance greater than the adjusted activation range. Since both the CMS Daysight and GAS share video, the CMS Daysight scene shall be designated as the default scene.

[9731]

The proper gunner's CMS Daysight scene shall activate when the GAS video is not active. The gunner's CMS Thermal scene shall be active at all times.

[9732]

The scene shall be active as long as the crewman continues to meet the activation criteria. In the case of the CMS Thermal, the assembly must be turned on.

[1074]

The video scene shall be presented to the crewman within 0.36 second after coming within the specified activation range.

[9733]

The Commander's Display Unit (CDU) shall be active at all times, unless due to a sight malfunction. The displayed scene shall be determined by the CCP Commander Display/Mode source switch selection (Pan Day, Pan Thermal, Gunner Day, or Gunner Thermal video view).

3.7.1.7.6 Commander's Periscope Scene Activation

[9734]

The seven commander's periscopes shall be active with the proper video scene at all times. The proper video scene refers to representing the correct field of view and orientation relative to the ownvehicle turret.

3.7.1.7.7 Gunner's Periscope Scene Activation

[9737]

The four gunner's periscopes shall be active with the proper video scene at all times. The proper video scene refers to representing the correct field of view and orientation relative to the ownvehicle turret.

3.7.1.7.8 Boresight

[9736]

Boresighting is the alignment of the gunner's CMS Day, gunner's CMS Thermal, and Auxiliary sight with the main gun. The capability to adjust azimuth and elevation boresight shall be provided as in the Stryker MGS.

3.7.1.7.9 Commander's Pan Viewer Display

[9739]

The MGS Commander's Panoramic Viewer (CPV) shall be simulated. The CPV shall provide the commander independent capability to track targets and conduct surveillance operations during conditions of darkness, daylight, and periods of reduced visibility.

[9740]

The CPV shall provide both Day and Thermal view selections. The CPV Day shall provide 3.3x and 8x magnification. The CPV Thermal shall provide 1.7x and 8.6x magnification. The fields-of-view and reticle definitions are found in 3.7.2.1 and 3.7.2.5.2, respectively.

[10038]

The CPV shall be deployed at all times on the trainer. Therefore, no erection or stowing operations shall be simulated (no control dynamics or aural cues). The Mast "Up" light shall be illuminated during training.

[9743]

The CPV panning operations shall be simulated, as controlled from the Commander's Control Handle (CCH), when the CCP Commander Display/Mode selector switch is in the PAN DAY or PAN THERMAL positions. If a PAN DAY or PAN THERMAL CDU selection is made at the CCP and the CCH palm switch is pressed, the CPV azimuth and elevation shall follow the inputs from the CCH.

3.7.1.7.10 Compact Modular Sight (CMS) Day Sight

[9745]

The simulated gunner's CMS day sight shall provide a daylight view of the tactical environment providing a magnification of 3x and 8x. The fields-of-view and reticle definitions are found in 3.7.2.1 and 3.7.2.5.2, respectively.

[9746]

Gunner's CMS day sight FOV selection shall be made via the WFOV/NFOV pushbutton on the Modular Control Panel (MCP).

3.7.1.7.11 Compact Modular Sight (CMS) Thermal Sight

[9748]

The simulated gunner's CMS thermal sight shall provide a FLIR thermal-like view of the trainer virtual environment providing a magnification of 3.3x, 10x, and 20x. The fields-of-view and reticle definitions are found in 3.7.2.1 and 3.7.2.5.2, respectively.

[9749]

The simulated gunner's CMS thermal sight FOV selection shall be made via the Magnification Selector on the CMS Thermal control panel.

3.7.1.8 OWNVEHICLE SIMULATED MOVEMENT

[1137]

Movement of ownvehicle shall be simulated by visual scene perturbation.

[1138]

This movement shall include that associated with operations over uneven terrain.

[9750]

Sight movement such as that imparted when climbing a hill or traversing a ditch shall be provided.

[1140]

See 3.7.3.3.14 for Free Movement operation description.

3.7.1.8.1 Ownvehicle Movement Through the Scene

[1142]

Ownvehicle simulated movement shall support both preprogrammed and non-preprogrammed (free) modes of control.

[1143]

In the preprogrammed mode, the simulated movement of ownvehicle shall be generated by using a preprogrammed path procedure.

[1144]

The positional coordinates (x, y, z), the attitudes (r, j, q), and velocity of ownvehicle shall be predefined for each exercise.

[1145]

As each exercise is executed, the predefined ownvehicle path data shall be used.

[1146]

Ownvehicle segment paths shall be allowed within the simulated environment except where collision volumes are defined.

[1147]

Capability will be provided to allow the preprogrammed movement control to be supplemented by movement commands from an instructor in response to ownvehicle movement ordered by the commander during an exercise.

[1148]

The movement commands will provide stop, start, and when in section/platoon mode, increase/decrease velocity.

[9751]

In the non-preprogrammed mode, the ownvehicle simulated movement shall respond to the steering and speed inputs provided at the IOS driver interface.

[8006]

Ownvehicle terrain following data shall be used to maintain the ownvehicle position and attitude consistent with underlying terrain surface in moving crew, section and platoon exercises.

[1151]

The crew stimulus produced from ownvehicle movement will be aural cues from the sound system as specified in paragraph 3.7.1.12.2 and the visual scene movement in the crew station sights as specified below:

3.7.1.8.2 Ownvehicle Dynamics

[1153]

The hull/suspension model shall provide for pitch, roll, and yaw of the ownvehicle at rest or moving consistent with underlying terrain.

[1154]

The hull/suspension model shall provide for 360 degrees of turret rotation with respect to the hull.

[9752]

Ownvehicle shall be capable of speed of 0 to 60 mph.

[1156]

The simulated turret movement shall be capable of a continuous azimuth rotation with respect to the hull.

[1157]

Turret movement shall be in response to crew member control inputs, motion from the hull simulation, and the stabilization and elevation systems.

[1158]

During unstabilized mode of operation, the turret shall move with the same attitude of the hull when the ownvehicle is turning, climbing, and descending a hill.

[1159]

A pitch bounce with an initial magnitude of 0.75 degrees for acceleration and -0.5 degrees for deceleration shall be simulated when ownvehicle is either stopped or started.

[9753]

Unless specified, acceleration shall be at a rate of no greater than 1.5 meters/second/second and deceleration at a rate of no greater than 4.8 meters/second/second, during moving ownvehicle exercises, in response to activating the "STOP/GO" IOS function.

[1161]

Ownvehicle steady state turn rate shall be 360 +/- 5 percent mils/second for all ownvehicle speeds. This speed is selected for an effective ownvehicle turn during transition from one programmed path segment to the next--not a vehicle limit.

3.7.1.8.3 Ownvehicle Defilade

[9754]

If ownvehicle is exposed (enfilade) in a defensive firing position, selecting enfilade/defilade GUI button shall cause the ownvehicle to move from enfilade position to defilade position.

[1164]

Once in defilade, all the sights shall remain unobscured by the ground.

[1165]

During vehicle movement between defilade and enfilade, acceleration shall be no greater than 4.5 meters/second/second.

3.7.1.8.4 Commanded Movement

[9755]

During the preprogrammed movement exercises that utilize defensive firing positions or during defensive free movement exercise situations (after section/platoon vehicle "capture"), the ownvehicle preprogrammed movements shall be modified by the following commands:

- a. Stop/Go - The stop/go commands shall cause the ownvehicle simulated movement to be slowed to a halt and to resume programmed motion. Note, each situation in an exercise shall not begin until ownvehicle is in the appropriate location along the vehicle path.
- b. Enfilade/Defilade Position - The enfilade/defilade command shall occur when ownvehicle is stationary. At the defilade position the ownvehicle shall move to the enfilade position. When ownvehicle is stationary at the enfilade position, activation shall cause ownvehicle to move to the defilade position.
- c. Alternate Firing Position - The ability to relocate to an alternate firing position shall be provided on command. When ownvehicle is in the defilade position, the alternate firing position command shall cause the ownvehicle to move laterally at least 25 meters and then stop at a new defilade position. Subsequent enfilade/defilade commands shall cause ownvehicle to move between the new enfilade and defilade position. Activation of this GUI button while in a one-tiered battle position shall cause the ownvehicle to follow a preprogrammed path laterally at least 25 meters and then stop in an alternate one-tiered battle position.
- d. Alternate Ownvehicle Path - The ability to select an alternate ownvehicle path segment shall be provided in selected section/platoon exercises during preprogrammed movement.

3.7.1.8.5 Sight Movement

3.7.1.8.5.1 GAS and CAS Stabilized/Nonstabilized

[6339]

The GAS and CAS shall follow the movement of the main gun regardless of the mode of operation. When the simulated main gun moves, the GAS and CAS shall exhibit the corresponding sight movement.

3.7.1.8.5.2 Gunner's Biocular Display Stabilized

[6341]

When the stabilized fire control mode is selected the Gunner's Biocular Display shall be limited to a 2.5 mils random movement in azimuth and elevation when ownvehicle is moving. The LOS shall remain within 2.5 mils of its originally designated inertial attitude when the tank turns, climbs, or descends, i.e., as the hull changes its attitude in elevation or azimuth, the Gunner's Biocular Display shall remain fixed to within 2.5 mils of its original attitude.

3.7.1.9 GUN/TURRET POINTING CONTROLS

3.7.1.9.1 Gunner's Control Handle

[6343]

The gunner's control handle shall be provided and its functions simulated (see Figure 3.7.1.9.1-1).

[6344]

Depressing the palm switch and turning the gunner's handle clockwise shall cause the simulated turret to traverse right. Counterclockwise turning shall cause the simulated turret to traverse left.

[6345]

Moving the gunner's control handle rearward and forward shall cause the simulated main gun to elevate or depress, respectively.

[9756]

If the control handle is moved without palm switch actuation, the handle shall not command a rate until such time as the palm switch is activated.

[9757]

The commander's power control handle shall override the gunner's control handle if the GUNNER DAY or GUNNER THERMAL is selected at the CCP Commander Display/Mode sub-panel.

[9758]

Index finger operated trigger switches shall be provided for firing the weapon selected on the Central Control Panel.

[9759]

The MGS gunner's control handle drift adjustment shall be inoperable.

[9760]

Turret power, the turret drive system, and the palm switch must be activated before the computational system shall accept positional data from the power handle.

[9761]

Palm switch activation shall be required for firing the main gun or coax from the GCH.

[10058]

The Drift button shall be non-functional on the Stryker MGS variant simulation.

[10059]

The LRF button shall fire the CMS eyesafe laser rangefinder, if the other conditions are met for enabling the laser rangefinder.

[10060]

The Load button shall initiate the selected autoloader sequence, if the autoloader is On and the gunner's control handle is enabled.

[10061]

Coax firing shall be inhibited during the autoloader sequence.

[10509]

The power handle characteristics shall be as follows:

- a. Throw: Traverse: + 60 degrees +/- 5 degrees
Elevation: + 45 degrees +/- 5 degrees
- b. Rate: Maximum traverse: 42 degrees/second
Maximum elevation: 25 degrees/second

The actual function provided for both azimuth and elevation shall be monotonic within the tolerance bands shown.

- c. Ending Torque:
Traverse Right: 19.0 +/- 5.0 inch - pounds
Traverse Left: 19.0 +/- 5.0 inch - pounds
Elevation: 16.0 +/- 4.0 inch - pounds
Depression: 16.0 +/- 4.0 inch - pounds
Break-away Torque:
Traverse Right: 9.0 +/- 2.0 inch - pounds
Traverse Left: 9.0 +/- 2.0 inch - pounds
Elevation: 9.0 +/- 2.0 inch - pounds
Depression: 9.0 +/- 2.0 inch - pounds
All torques measured about axis of rotation.

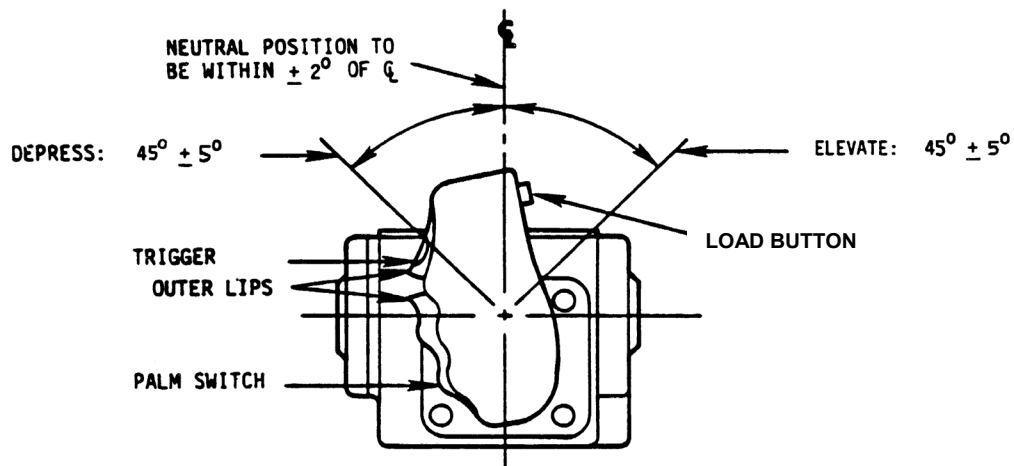
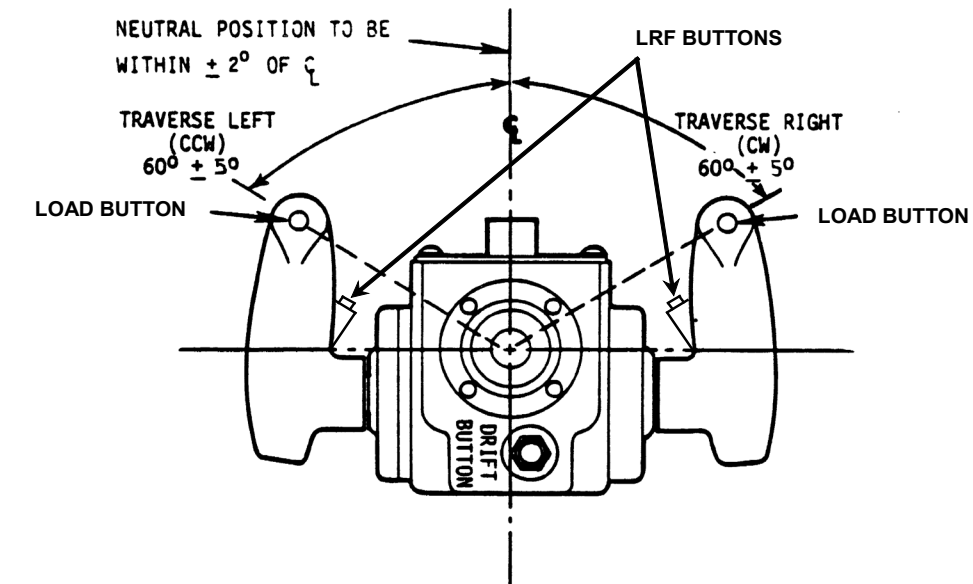
- d. Neutral Position: within +/- 2 degrees of mechanical center (shown as center line).

- e. Switch Actuation Travel and Force

The force required to actuate the handle switches shall be as specified herein. The switches shall return to normal (de-energized) position when the force on the switch is removed. The force and travel are to be measured at the farthest point (outer lip) from the switch actuator fulcrum.

Switch	Actuation Force
Trigger	2.5 to 4.5 pounds
Palm	1.5 to 3.0 pounds
Load Button	3.0 to 5.0 pounds
Drift Button	2.5 to 4.5 pounds
LRF Button	3.0 to 5.0 pounds

[9763]



5g1004

Figure 3.7.1.9.1-1. Gunner's Control Handle

[6348]

Index finger operated trigger switches shall be provided.

[6350]

The switches shall return to normal (de-energized) position when the force on the switch is removed.

[6351]

The force and travel shall be measured at the farthest point from the switch actuator fulcrum.

3.7.1.9.2 Commander's Control Handle

[9765]

The Commander's Control Handle shall provide the speed and movement control input to the Commander's Panoramic Viewer simulation in Pan Day or Pan Thermal Commander's Display/Mode, and power control system in commander's override mode. The Commander's Control Handle utilized in the trainer crew station shall be a trainer equivalent unit of the one used in the Stryker MGS turret. Therefore, the fidelity matches that of the target vehicle. See Figure 3.7.1.9.2-1.

[9766]

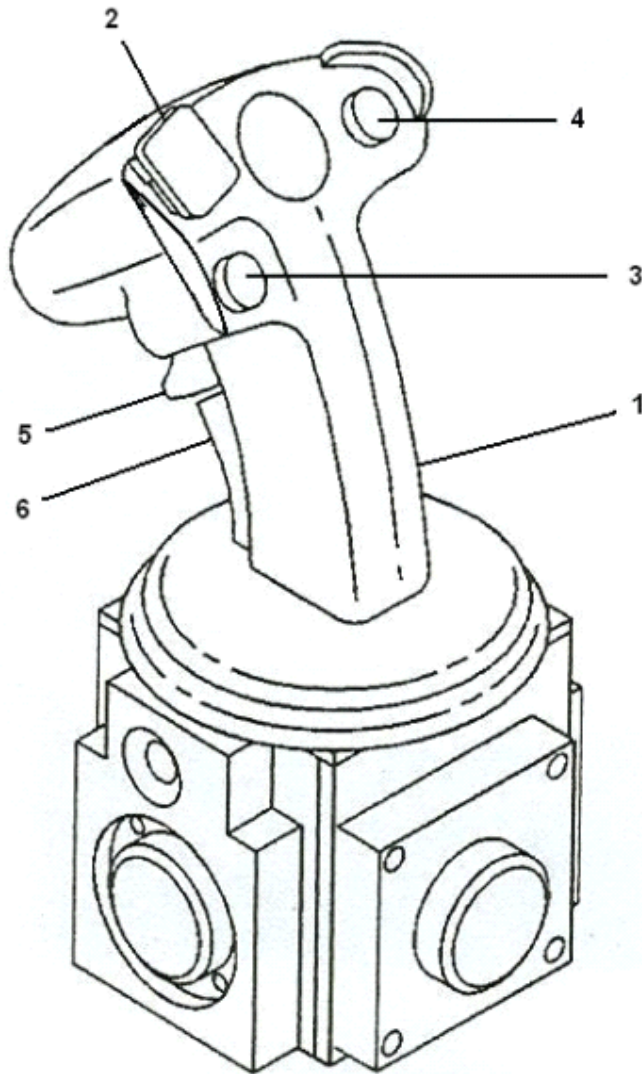


Figure 3.7.1.9.2-1. Commander's Control Handle

[10496]

The commander's Control Handle shall contain the following controls with their effect(s) defined:

- a. The Designation Button (2) shall provide the effect of moving the gunner's line of fire to the commander's line of sight. With the main gun offset from the CPV line of sight and the PAN DAY or PAN THERMAL view selected at the CCP Commander Display/Mode panel, activation of the Commander's Control Handle and the Designate Button shall align the main gun line of sight with the CPV line of sight. Activation of the Designation Button during the ammo loading process shall align the line of sight azimuth and elevation as well as the gun tube azimuth. At the completion of the ammo loading process the gun tube elevation shall be aligned to complete the designation process.

- b. The Laser/Lead Button (3) shall be used to range to targets. The Lead button aids in tracking moving targets.
- c. The Load Button (4) shall be used to initiate the selected autoloading sequence.
- d. The Fire Trigger (5) shall allow the commander to fire during emergency conditions.
- e. The Palm Switch (6), when gripped and in alignment mode, shall give the commander control of the turret. The palm switch must also be closed in order to operate the commander's panoramic sight.

[6358]

The handle and switches shall return to normal (de-energized) position when the force on them is removed.

[10510]

The maximum speed of the Target Designate traversal shall be 23 degrees/sec, and maximum elevation rate shall be 14 degrees/sec.

[10508]

The maximum speed of Commander's Control Handle traversal shall be 42 degrees/sec, and maximum elevation rate shall be 25 degrees/sec.

[9769]

The maximum deflection of the tactical Commander's Control Handle utilized shall be 28 +/- 3 degrees.

[9770]

The CCH switch activation forces shall be as follows:

- a. Fire Trigger: 4.0 +/-1.0 pounds
- b. Palm Switch: 2.5 +/-1.0 pounds
- c. Laser/Lead Button: 3.0 to 5.0 pounds
- d. Designation Button: 4.0 +/-1.0 pounds
- e. Load Button: 3.0 to 5.0 pounds

3.7.1.9.3 Manual Elevation Handle Assembly

[10500]

The manual elevation handle shall be provided along with a space constraint mock-up of the balance of the elevation drive assembly and its functions simulated to manually elevate and depress the simulated main gun and coax machine gun (See Figure 3.7.1.9.3-1).

[10471]

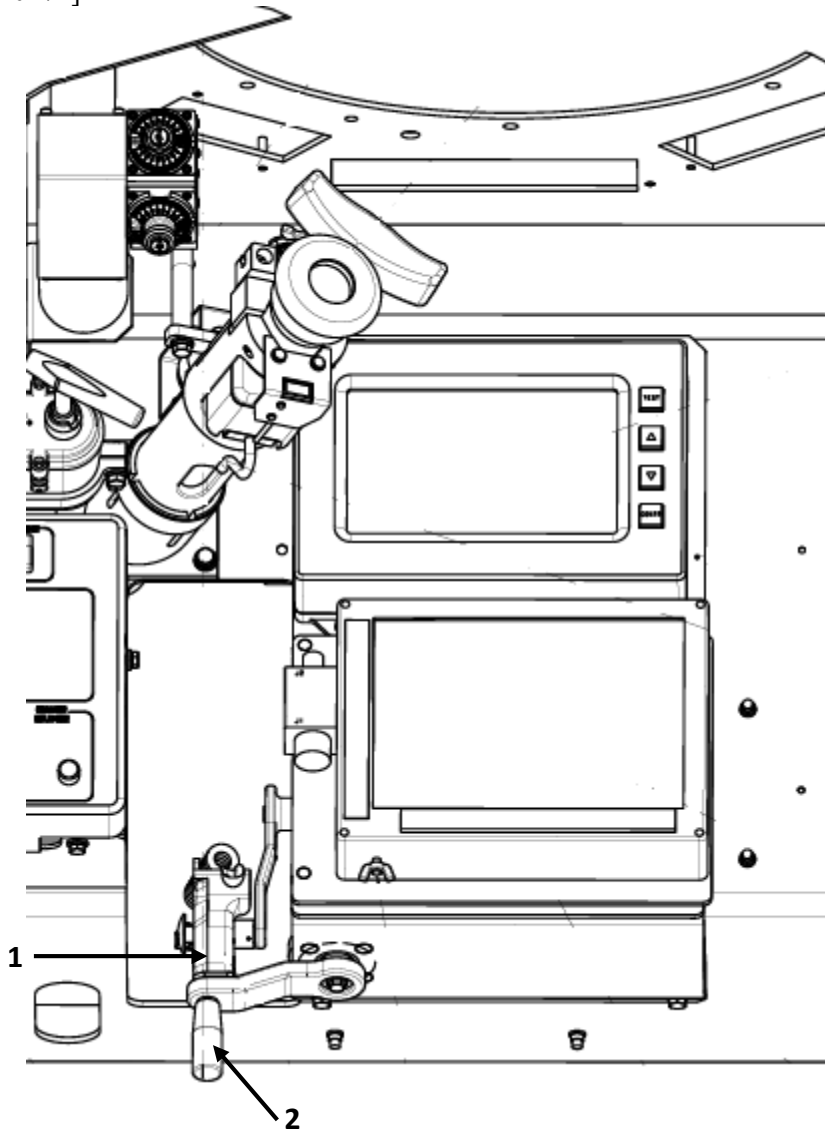


Figure 3.7.1.9.3-1. Manual Elevation and Traverse Handles

[10501]

There shall be several set-up steps that must be taken before operating the manual elevation handle:

- a. The gun travel lock shall not be simulated, therefore unlocking this tactical mechanism shall not be required condition in the simulation.
- b. The TDS switch on the T-PDP shall be in the OFF position.
- c. Rotating the manual elevation handle shall control the elevation or depression of the main gun and coax machine gun:
 - (1) To elevate the guns, rotate the manual elevation handle clockwise (facing the handle).
 - (2) To lower the guns, rotate the manual elevation handle counterclockwise (facing the handle).
 - (3) To fire main gun or coaxial machine gun depress the palm switch on the manual elevation handle and then press the Elevation Handle Electrical Trigger (EHET).

3.7.1.9.3.1 Elevation / Depression

[9349]

In power mode, the simulated gun shall be limited in elevation and depression as shown in Figure 3.7.1.9.3.1-1. The maximum main gun elevation shall be 15 ± 0.5 degrees from horizontal. The maximum main gun depression shall be 5 ± 0.5 degrees from horizontal.

[10179]

In manual mode, rotating the manual elevation handle clockwise (viewed from the left side) shall elevate the main gun and coaxial machine gun. Rotating the manual elevation handle counterclockwise (viewed from above) shall depress the main gun and coaxial machine gun. The manual mode elevation / depression limits shall be the same limits as defined for power mode.

[9764]

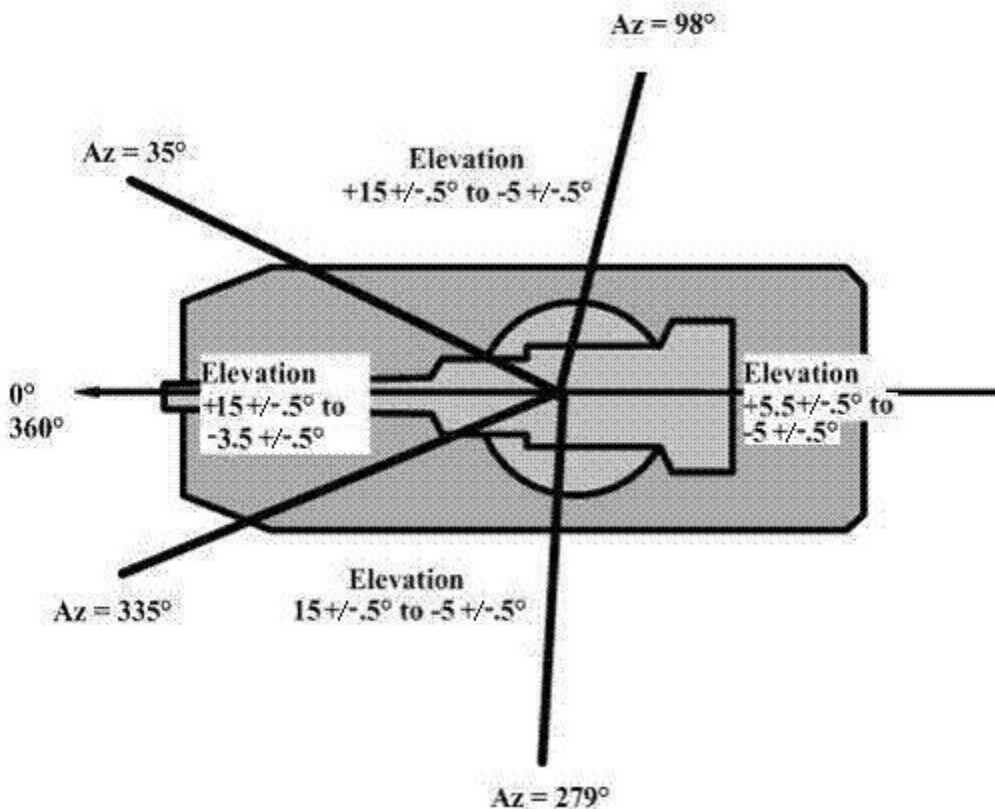


Figure 3.7.1.9.3.1-1. Power Mode Elevation / Depression Limits

[9350]

The manual elevation handle shall drive the simulated gun at a rate of 9 mils ± 1 mil per revolution of the handcrank.

[9351]

The torque to operate the manual elevation handle shall be 48 pound/ins ± 5.0 pound/ins after breakaway.

[9352]

The elevation handle shall be disabled during carousel ammo load.

3.7.1.9.4 Manual Turret Traversing Handle Assembly

[9353]

The manual traverse handle shall be provided along with the manual elevation handle and its function to manually traverse the turret right and left at a nominal rate of 10 mils +/- 1 mil per crank revolution. See Figure 3.7.1.9.3-1 for view of simulated manual traverse handle, shown with the manual elevation handle and mount assembly.

[9354]

The following actions shall be satisfied before the manual traverse handle shall operate:

(Note: The gun travel lock shall not be simulated, therefore unlocking this tactical mechanism shall not be required condition in the simulation.)

- a. The turret azimuth locks shall be unlocked.
- b. The TDS switch on the T-PDP shall be in the OFF position.

[9355]

By rotating the manual traverse handle counterclockwise, the turret shall traverse left.

[9356]

By rotating the manual traverse handle clockwise, the turret shall traverse right.

[9357]

The torque applied tangentially to the traverse handle at a uniform rate to maintain simulated turret movement shall be 40 pound-ins +/- 4.0 pound-ins.

[9358]

The traverse handle shall provide 360 degrees of simulated turret traverse rotation.

[9359]

The traverse handle shall be disabled during carousel ammo load.

3.7.1.10 SIMULATED PANELS AND DISPLAYS

[1242]

Operations requiring either the manipulation or observation of multiple controls and indicators shall have those controls and associated indicators grouped to simulate the appearance, location, number, arrangement, and function of the corresponding vehicle controls and displays.

[1243]

The following panels, with their associated lamps, displays, pushbuttons, levers, toggles, and adjustment knobs and the functions represented by the panels, shall be simulated as described below.

3.7.1.10.1 Gunner's Thermal Sight Control

[9360]

The gunner's CMS thermal sight control panel (GCP) layout is presented in Figure 3.7.1.10.1-1. CMS thermal sight control function descriptions follow:

[9361]

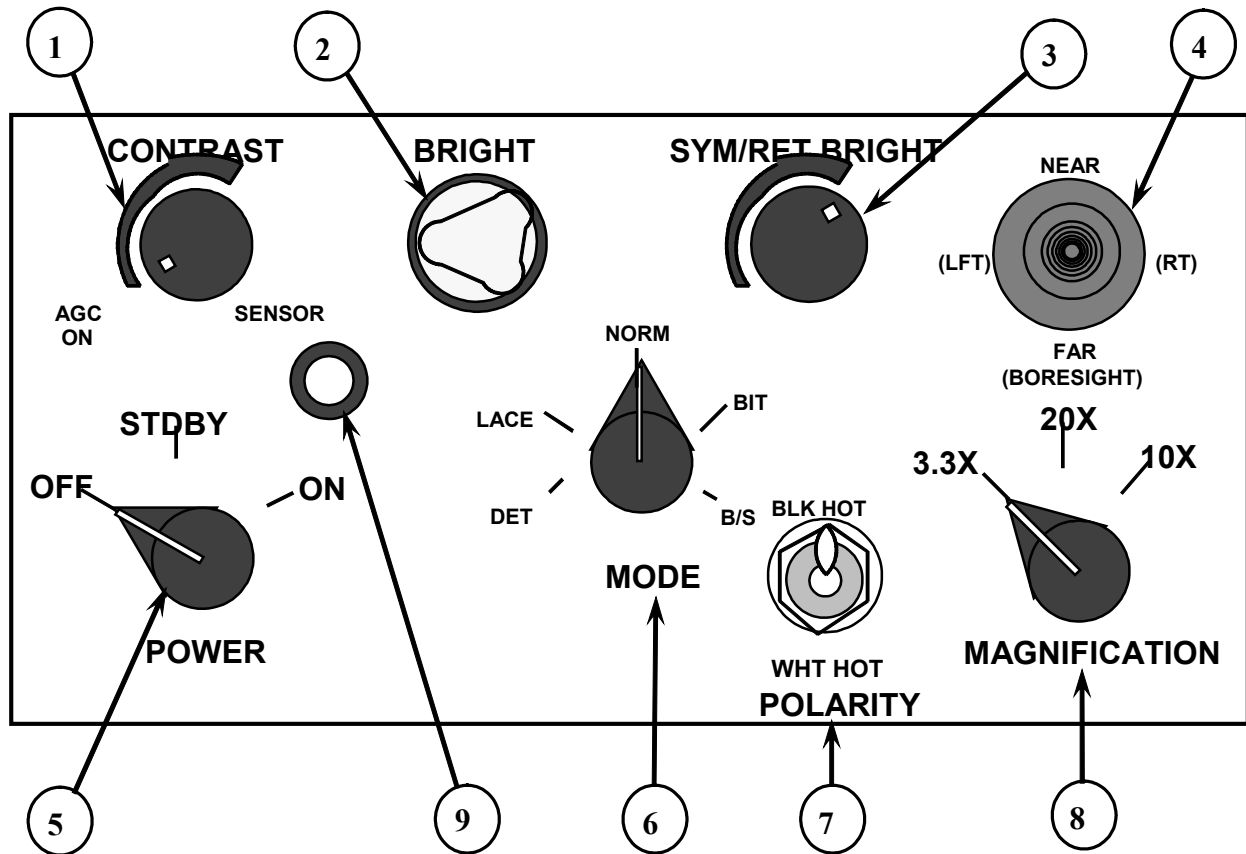


Figure 3.7.1.10.1-1. Gunner's Thermal Sight Control Panel

[9362]

1. **CONTRAST** - Rotary knob to turn on Automatic Gain Control (AGC) or adjust Gunner's Display Unit (GDU) contrast and brightness. When set to AGC ON, contrast and brightness shall be adjusted automatically. When turned clockwise out of AGC ON detent, turning clockwise shall increase and counterclockwise shall decrease GDU contrast and brightness. The control knob shall rotate 284 +/-35 degrees stop-to-stop. The knob shall only have effect when the CONTRAST knob is not in the AGC position.
2. **BRIGHT** - Lobed rotary knob to adjust GDU thermal video brightness. Turning clockwise shall increase and counterclockwise shall decrease GDU thermal video brightness. The control knob shall rotate 284 +/-35 degrees stop-to-stop.
3. **SYM/RET BRIGHTNESS** - Rotary knob to turn on and adjust CMS thermal sight reticle and symbology brightness. Turning clockwise shall turn on CMS thermal sight reticle and symbology. While turned on, turning clockwise shall increase and counterclockwise shall decrease reticle and symbology brightness. The control knob shall rotate 284 +/-35 degrees stop-to-stop.
4. **(BORESIGHT)** - 4-way pushbutton to focus CMS thermal sight image or adjust CMS thermal sight reticle position for boresighting. To focus CMS thermal sight image, pressing NEAR or FAR shall adjust focus of the CMS thermal sight image. When Gunner's Control Panel (GCP) MODE Switch is set to B/S, pressing NEAR or FAR shall move the CMS thermal sight reticle up or down and pressing LEFT or RIGHT shall move the CMS thermal reticle left or right.
5. **POWER** - 3-position rotary switch to set CMS thermal sight power to one of the following setting:

- a. OFF: CMS thermal sight power shall be turned off,
 - b. STBY: CMS thermal sight shall be in standby and shall be ready for use,
 - c. ON: CMS thermal sight power shall be on and thermal image shall be viewable in GDU.
6. MODE - 5-position rotary switch to set CMS thermal sight to one of the following modes:
- a. DET (Detection): Not provided on AGTS,
 - b. LACE (Large Area Contrast Enhancement): Not provided on AGTS.
 - c. NORM (Normal): This CMS thermal sight setting shall be used for normal operations,
 - d. BIT (Built In Test): Not supported on AGTS.
 - e. B/S (Boresight): This setting shall allow the gunner to boresight the CMS thermal sight using the (BORESIGHT) 4-way pushbutton on the GCP.
7. POLARITY BLKHOT/WHTHOT - 2-position toggle switch to select presentation of hot objects in CMS thermal sight. Setting BLKHOT shall present hotter objects as darker in CMS thermal sight. Setting WHTHOT shall present hotter objects as brighter in CMS thermal sight.
8. MAGNIFICATION - 3-position rotary switch to set CMS thermal sight magnification to one of the following settings:
- a. 3.3X: This setting shall magnify the CMS thermal sight image to 3.3X for use in searching for targets. Corner symbols that outline 10X FOV shall be displayed in the GDU.
 - b. 10X: This setting shall magnify the CMS thermal sight image to 10X for use in identifying and engaging targets. The non-ballistic reticle shall be displayed in the GDU.
 - c. 20X: This setting shall magnify the CMS thermal sight image to 20X for assisting in identifying and targets. The non-ballistic reticle shall be displayed and a 'Z' zoom indicator shall appear in the GDU to the right of the range value and fault indicator.
9. SENSOR STATUS - CMS thermal sight sensor status indicator light. The SENSOR STATUS indicator light shall simulate CMS thermal sight reaching operating temperature by illuminating for a duration between 20 to 30 seconds when the GCP POWER switch is set to STDBY. The SENSOR STATUS indicator light shall illuminate for a duration between 7 to 9 seconds when the POWER switch is set to ON. Indicator goes off after simulated cooldown. The SENSOR STATUS indicator light shall illuminate when operating CMS thermal sight when a CMS thermal fault is detected.

3.7.1.10.2 Compact Modular Sight (CMS)

[9363]

The Compact Modular Sight (CMS) refers to the gunner's entire sight package, excluding the Gunner's Auxiliary Sight (GAS). The CMS includes the gunner's daysight, thermal unit and associated control panels, the MCP control panel, and the (thermal) Gunner's Display Unit as shown in Figure 3.7.1.10.2-1.

[9364]

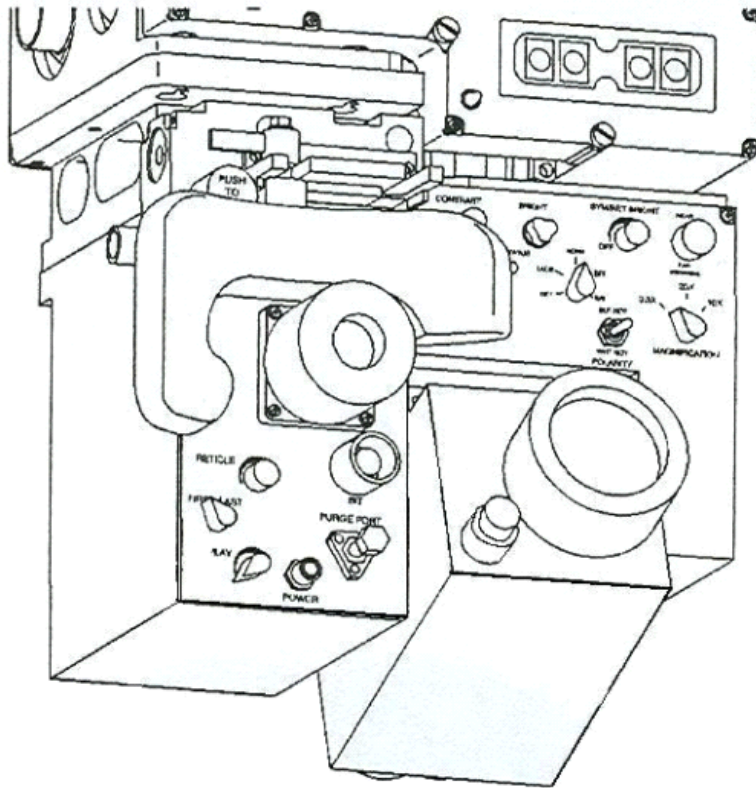


Figure 3.7.1.10.2-1. Compact Modular Sight (CMS)

[9365]

The gunner's CMS daylight sight control panel layout is presented in Figure 3.7.1.10.2-2. CMS daylight sight control function descriptions follow:

1. Diopter Adjustment - Ring on CMS daylight sight eyepiece to adjust reticle focus. Turning the Diopter Adjustment ring clockwise or counterclockwise shall adjust focus of the reticle.
2. POWER - The POWER indicator light shall illuminate when FCS ON/OFF switch on CCP is set to ON, indicating CMS day sight is turned on.
3. DISPLAY - Rotary knob to adjust CMS daylight sight display brightness is non-functional in the simulation.
4. FIRST/LAST - 2-position rotary switch for selecting ELRF returns. Selecting FIRST shall provide range data for ELRF first return and LAST shall provide range data for ELRF last return.
5. RETICLE - Rotary knob to adjust CMS daylight sight reticle brightness. Turning clockwise shall increase CMS daylight sight reticle brightness and counterclockwise shall decrease CMS daylight sight reticle brightness. The control knob shall rotate 284 +/-35 degrees stop-to-stop.
6. BIT - Pushbutton to perform a built in test on the CMS day sight. Pushing in and holding BIT button shall display 8888's and a circle in the CMS daylight sight reticle view. (Not supported on AGTS).

7. AZ DRIFT - Rotary knob to adjust CMS daylight sight azimuth drift. Pushing in and turning clockwise (adjust right) or counterclockwise (adjust left) shall increase, decrease, or null CMS day sight azimuth drift with no mechanical limits.
8. EL Drift - Rotary knob to adjust CMS daylight sight elevation drift. Pushing in and turning clockwise (adjust up) or counterclockwise (adjust down) shall increase, decrease, or null CMS day sight elevation drift with no mechanical limits.
9. Brow Pad Adjustment - The CMS brow pad shall be adjustable for the following:
 - a. Fit around CVC helmet,
 - b. Inward and outward from CMS viewing position,
 - c. Using CMS with either left or right eye.

[9366]

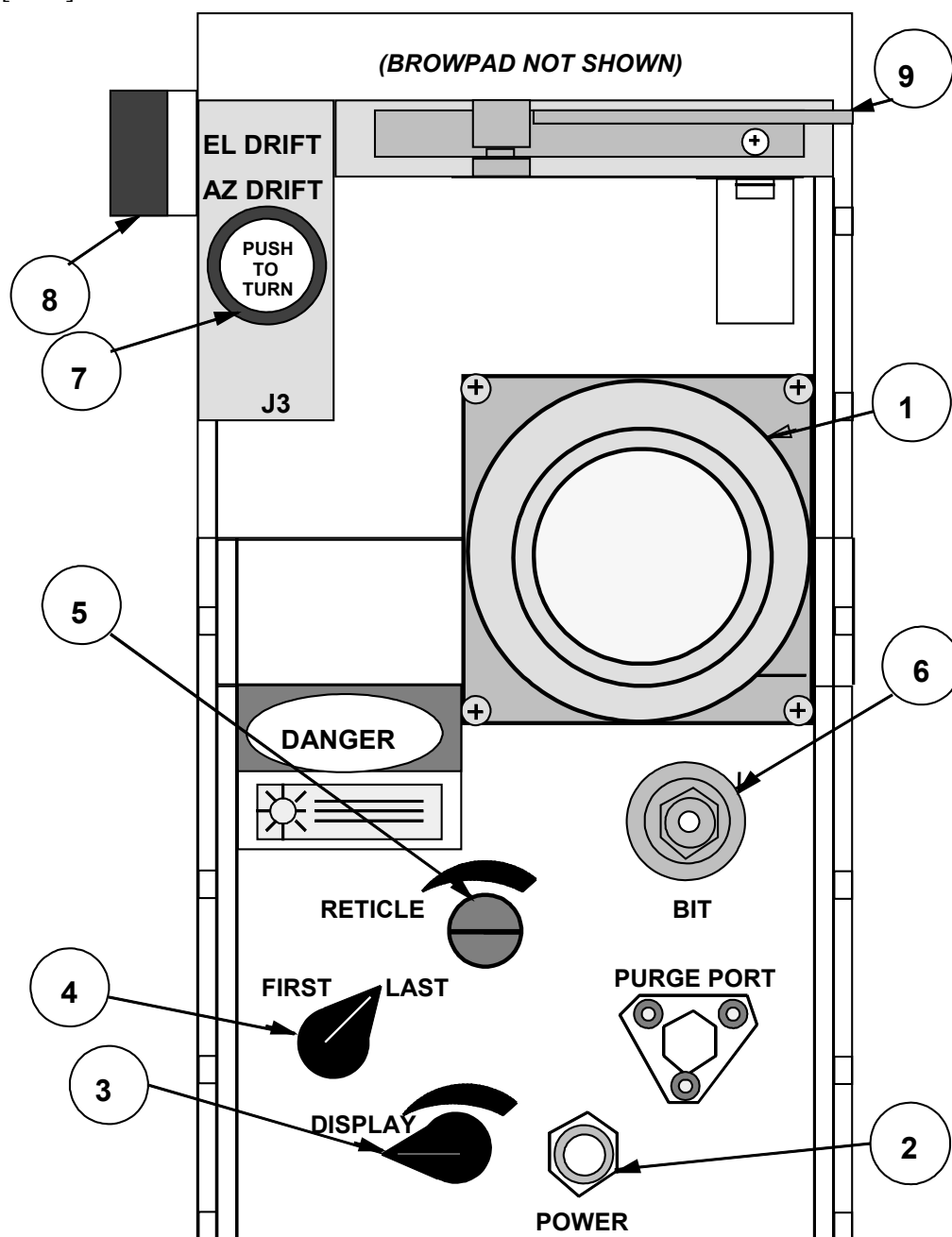


Figure 3.7.1.10.2-2. Gunner's Daysight

[9367]

The CMS daysight shall provide a wide field of view (WFOV) with 3X magnification and a narrow field of view (NFOV) with 8X magnification selected at the Modular Control Panel. Both field of view scenes shall provide a non-ballistic reticle scaled to the corresponding field of view (see Figure 3.7.1.10.2-3).

[10487]

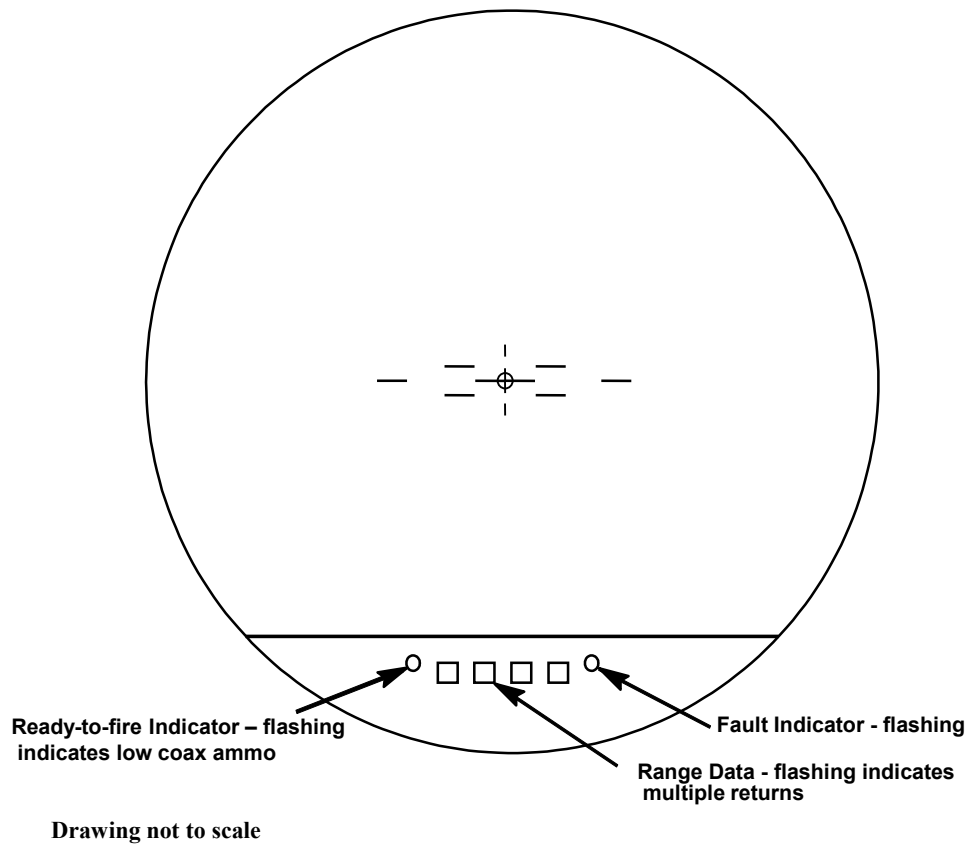


Figure 3.7.1.10.2-3. CMS Reticle and Symbology

3.7.1.10.2.1 Modular Control Panel (MCP)

[9370]

The Modular Control Panel (MCP) shall be located directly above the gunner's CMS thermal sight control panel (GCP) and shall be configured as shown in Figure 3.7.1.10.2.1-1.

[9371]

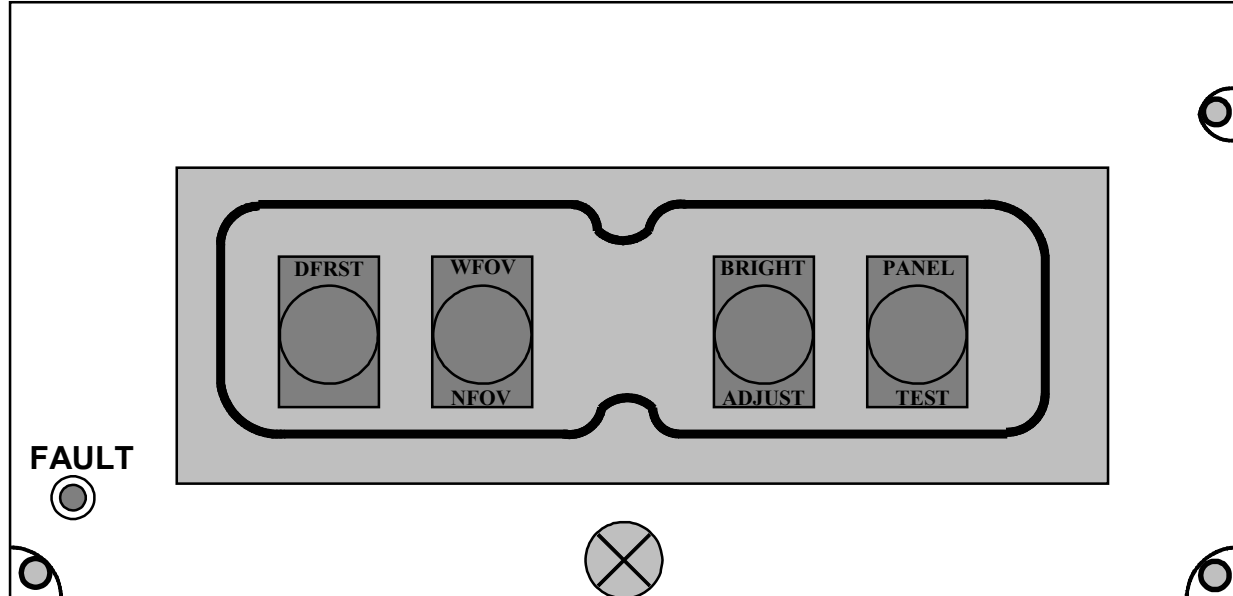


Figure 3.7.1.10.2.1-1. Modular Control Panel

[9372]

The MCP pushbuttons (in left to right orientation) shall function as follows:

1. DFRST - Non-functional in simulation, but lettering shall be backlit.
2. WFOV/NFOV - Pressing this pushbutton shall alternate between 8X magnification NFOV and 3X magnification WFOV in the CMS daysight display. The selected field-of-view lettering shall be backlit, except during a CMS fault condition (no WFOV/NFOV backlighting). NFOV and WFOV selections shall display the non-ballistic reticle, scaled to the field-of-view.
3. BRIGHT/ADJUST - Pressing this pushbutton shall adjust the 8 levels of brightness on the Modular Control Panel (MCP). The minimum brightness level is dim, but still illuminated. The BRIGHT and ADJUST lettering shall remain backlit when the CMS unit is powered.
4. PANEL/TEST - Pressing this pushbutton shall test Modular Control Panel lights. The PANEL and TEST lettering shall remain backlit when the CMS unit is powered.
5. FAULT - The CMS FAULT indicator light (in the lower-left corner of the panel) shall illuminate when a CMS fault is detected, either a CMS daysight or CMS thermal malfunction condition. The fault light color shall be red, and also shall light with PANEL/TEST pushbutton activation.

3.7.1.10.2.2 Eyesafe Laser Rangefinder (ELRF)

[10128]

The Eyesafe Laser Rangefinder (ELRF) shall not operate unless the CMS Day reticle is set to Narrow Field Of View (NFOV).

[10130]

When MAIN is selected on the CCP, ranges from 100 to 4000 meters shall be applied to the ballistic solution automatically. Range shall be displayed in the CMS day sight or CMS thermal sight. If the range return is not within the above parameters, the following criteria shall be used.

- a. Excluding M1040 Canister ammunition, if the target return is less than 100 meters, the system shall display the minimum range of 100 meters and enter 100 meters into the ballistic solution.
- b. Excluding M1040 Canister ammunition, if the target return is greater than 4000 meters, the system shall display the actual range momentarily, followed by the maximum range of 4000 meters and enter 4000 meters into the ballistic solution.
- c. Excluding M1040 Canister ammunition, if no range is returned, the ballistic solution shall maintain the last valid range.
- d. For M1040 Canister ammunition, if the ELRF receives a range less than 100 meters, the default range of 150 meters shall be displayed in the CMS day sight or CMS thermal sight and shall be entered into the Mobile Gun Computer (MGC) automatically to be used in the ballistic solution.
- e. For M1040 Canister ammunition, if the target return is greater than 700 meters, the system shall display the default range of 150 meters and enter 150 meters into the ballistic solution.
- f. If no range is returned, the system shall display the last valid range entered into the system.

[10129]

When COAX is selected on the CCP, ranges from 25 to 2000 meters shall be applied to the ballistic solution automatically. Range shall be displayed in the CMS day sight or CMS thermal sight. If the range return is not within the above parameters, the following criteria shall be used.

- a. If the target return is less than 25 meters, the system shall display the minimum range of 25 meters and enter 25 meters into the ballistic solution.
- b. If the target return is greater than 2000 meters, the system shall display the maximum range of 2000 meters and enter 2000 meters into the ballistic solution.
- c. If no range is returned, the system shall display the minimum range of 25 meters and enter 25 meters into the system for the ballistic solution.

[10470]

The system shall be capable of displaying multiple returns for both First and Last return values for the Gunner to evaluate by changing the position of the FIRST/LAST switch on the GCP while displayed range is flashing (within 5 seconds of lasing) to enter the corresponding value into ballistic solution.

3.7.1.10.3 Gunner's Display Unit

[9373]

The gunner's remote display, referred to as the Gunner's Display Unit (GDU) on the Stryker MGS, shall be comprised of a 2-inch CRT display with a lens to magnify the image generated. This unit shall provide video imagery of the simulated thermal scene developed by the image generator thermal channel output. In addition to video imagery, system status information shall be displayed in the area reserved for symbology. Refer to Figure 3.7.1.10.3-1 for the remote display unit layout.

[9374]

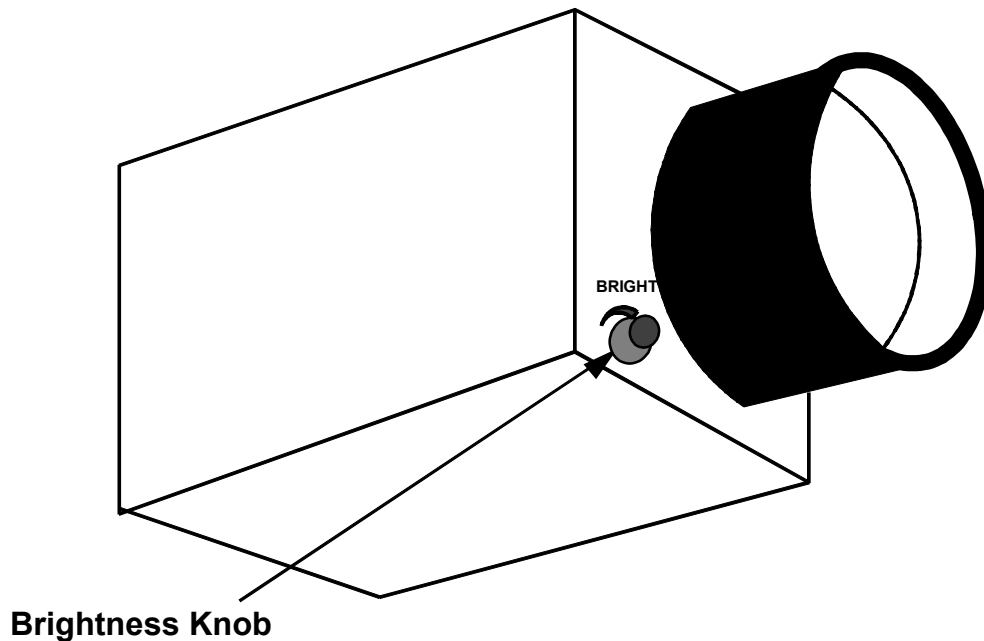


Figure 3.7.1.10.3-1. Gunner's Display Unit

[9375]

The GDU shall be located to the immediate right of the gunner's CMS daysight assembly. The Gunner's Thermal Sight Control panel shall be located directly above the GDU assembly.

3.7.1.10.4 Central Control Panel (CCP)

[9377]

The Central Control Panel (CCP) layout is presented in Figures 3.7.1.10.4-1 and 2. The CCP control states shall be saved and then restored when turret power is removed and subsequently powered on. This restore capability shall not be time lapse limited. The CCP controls shall include the following functional areas:

[9378]

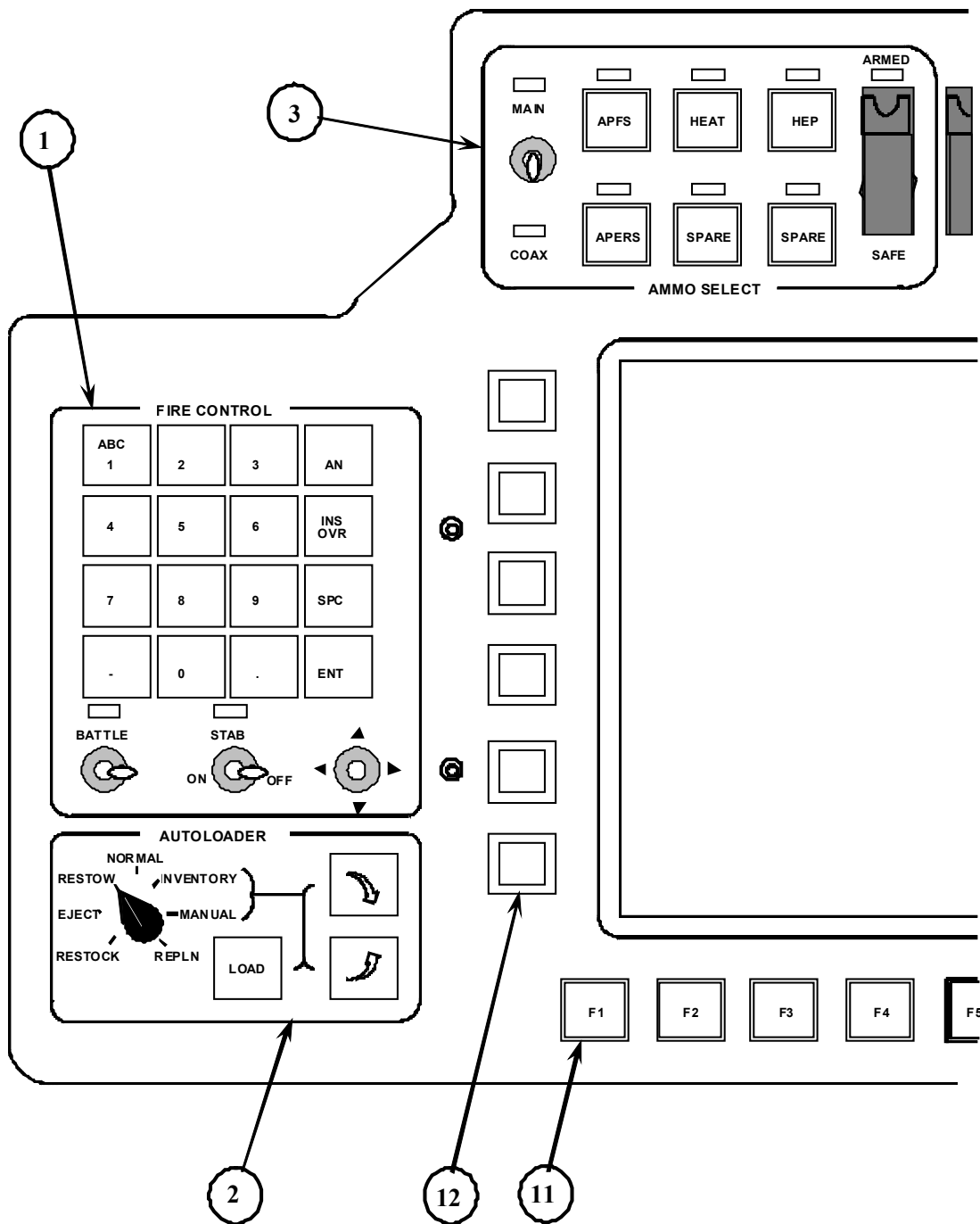


Figure 3.7.1.10.4-1. Central Control Panel - Left Half

[9379]

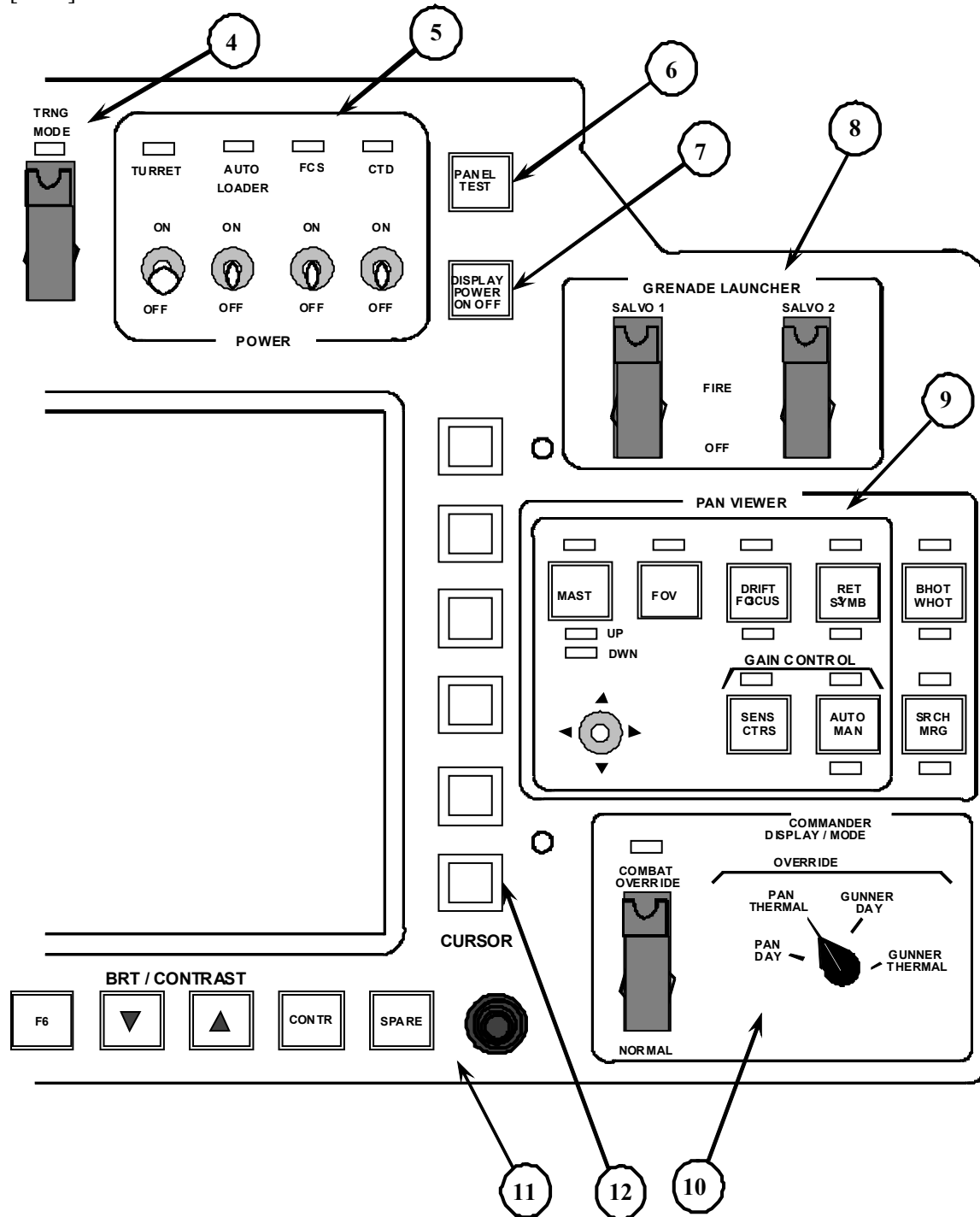


Figure 3.7.1.10.4-2. Central Control Panel - Right Half

3.7.1.10.4.1 Fire Control

[9381]

The CCP Fire Control (1) shall provide the gunner with the following fire control functions (see Figure 3.7.1.10.4-1):

1. Keypad - The keypad shall provide alphanumeric keys for operator data entry into the Fire Control System (FCS). Only numeric data shall be entered using the keypad.
 - a. 0-9/A-Z Keys: The 0-9/A-Z keys shall provide numeric data entry by the operator.
 - b. Minus (-) Key: The Minus Key shall enter a negative number (minus value).
 - c. Decimal Key: The Decimal Key shall enter a decimal point.
 - d. A/N Key: Non-functional.
 - e. INS OVR Key: Non-functional.
 - f. SPC Key: Non-functional.
 - g. ENT Key: The ENT Key shall send data entered into a data field to the Mobile Gun Computer (MGC). Note: The individual keypad keys shall provide tactile feedback upon activation.
2. BATTLE Select Switch - The BATTLE two position (L-R) toggle switch, when Battle position is selected, shall be used to manually enter target range for the selected ammunition.
3. BATTLE Indicator Light - The BATTLE Indicator Light shall illuminate green when the BATTLE Select Switch is activated.
4. STAB ON/OFF Select Switch - 2-position toggle switch for turning stabilization system on and off. The left switch position shall turn on the stabilization system, and the right switch position shall turn off the stabilization system.
5. STAB Indicator Light - The STAB Indicator Light shall illuminate green when the STAB ON/OFF Select Switch is switched to ON.
6. 4-way Switch - 4-way toggle switch for entering data into the FCS and changing battlesight range when the BATTLE Select Switch is activated. Left/right switch positions shall be non-functional. Up/down switch positions shall increase/decrease battlesight range when the BATTLE Select Switch is activated.

3.7.1.10.4.2 Autoloader

[9383]

The CCP Autoloader [see Figure 3.7.1.10.4-1 (2)] shall provide the gunner control of the Ammunition Handling System (AHS) Autoloader when the AUTOLOADER ON/OFF switch (Ref. 3.7.1.10.4.5 - CCP Power) is set to ON. CCP Autoloader controls shall provide the following Autoloader control functions:

1. AUTOLOADER Selector Knob - 7-position rotary switch providing the following selections:
 - a. RESTOCK: Provides the capability to restock the replenisher with ammunition and update replenisher inventory.
 - b. EJECT: Provides the capability to eject an unfired round from the breech.
 - c. RESTOW: Provides the capability to unload ammunition from the breech and transfer to the carousel. Coax firing shall be inhibited during the restow cycle.
 - d. NORMAL: Provides the capability to automatically load ammunition into the breech prior to firing the main gun. Coax firing shall be inhibited during the automatic load cycle. It shall take 6 seconds to autoloading a round from the carousel.
 - e. INVENTORY: Non-functional.
 - f. MANUAL: Provides the capability to manually rotate the carousel using the Clockwise Pushbutton (down arrow) and Counterclockwise Pushbutton (up arrow).
 - g. REPLN: Provides the capability to transfer ammunition from the replenisher to the carousel. Ten seconds shall be required to transfer each round.
2. LOAD Pushbutton - Non-functional - handled via the control handle load button.

3. Clockwise Pushbutton (down arrow) - When Clockwise Pushbutton (down arrow) is pressed, the AUTOLOADER carousel shall rotate clockwise.
4. Counterclockwise Pushbutton (up arrow) - When Counterclockwise Pushbutton (up arrow) is pressed, the AUTOLOADER carousel shall rotate counterclockwise.

3.7.1.10.4.3 Ammo Select

[9385]

The CCP AMMO SELECT [see Figure 3.7.1.10.4-1 (3)] controls shall provide the following ammunition selection controls:

1. MAIN/COAX Select Switch - 2-position toggle switch to select between the main gun and coax gun. Setting the MAIN/COAX switch to the up position shall select the main gun. Setting the MAIN/COAX switch to the down position shall select the coax gun.
2. MAIN Indicator Light - The MAIN Indicator Light shall illuminate green when the MAIN/COAX Select Switch is set to MAIN.
3. COAX Indicator Light - The COAX Indicator Light shall illuminate green when the MAIN/COAX Select Switch is set to COAX.
4. Ammunition Select Pushbuttons and Indicator Lights - When pressed, shall index ammunition type data into the MGC.
 - a. APDS Pushbutton and Indicator Light: When pressed, shall index SABOT ammunition type data into the MGC.
 - b. HEAT Pushbutton and Indicator Light: When pressed, shall index HEAT ammunition type data into the MGC.
 - c. HEP Pushbutton and Indicator Light: When pressed, shall index HEP ammunition type data into the MGC.
 - d. APERS Pushbutton and Indicator Light: When pressed, shall index APERS ammunition type data into the MGC.
 - e. (2) SPARE Pushbuttons and Indicator Lights: Non-functional.

An ammunition selection can be made if no ammunition of that type is found in the carousel. A CCP message indicating Ammo Not Available shall be displayed.
5. ARMED/SAFE Select Switch - 2-position toggle switch to select between weapon armed and weapon safe. Setting the ARMED/SAFE switch to the up position shall select ARMED, thereby enabling main gun or coaxial machinegun to be fired electrically (via the GCH or CCH). Setting the ARMED/SAFE switch to the down position shall select SAFE, thereby disabling the machine gun or coaxial machinegun from being fired electrically.
6. ARMED Indicator Light - The ARMED Indicator Light shall illuminate green when the ARMED/SAFE Select Switch is set to ARMED.

3.7.1.10.4.4 Training Mode

[9387]

The CCP Training Mode Pushbutton [see Figure 3.7.1.10.4-1 (4)] is non-functional.

3.7.1.10.4.5 Power

[9389]

The CCP Power Panel [see Figure 3.7.1.10.4-1 (5)] shall provide the following electrical power controls:

1. TURRET ON/OFF Select Switch - 2-position toggle switch for turning power on and off to turret electrical systems. The up switch position shall turn the power on to turret electrical systems, and the down switch position shall turn the power off to turret electrical systems.
2. TURRET Indicator Light - The TURRET Indicator Light shall illuminate green when the TURRET ON/OFF Select Switch is switched to ON.

3. AUTO LOADER ON/OFF Select Switch - 2-position toggle switch for turning power on and off to the Ammunition Handling System (AHS). The up switch position shall turn the power on to the AHS, and the down switch position shall turn the power off to the AHS.
4. AUTO LOADER Indicator Light - The AUTO LOADER Indicator Light shall illuminate green when the AUTO LOADER ON/OFF Select Switch is switched to ON.
5. FCS ON/OFF Select Switch - 2-position toggle switch for turning power on and off to the Eyesafe Laser Range Finder (ELRF), Thermal Imaging System (TIS), Mobile Gun Computer (MGC), and Universal Sight Electronic Unit (USEU). The up switch position shall turn the power on to the ELRF, TIS, MGC, and USEU; and the down switch position shall turn the power off to the ELRF, TIS, MGC, and USEU.
6. FCS Indicator Light - The FCS Indicator Light shall illuminate green when the FCS ON/OFF Select Switch is switched to ON.
7. GTD ON/OFF Select Switch - 2-position toggle switch for turning power on and off to the Gun Turret Drive (GTD) system. The up switch position shall turn the power on to the GTD system, and the down switch position shall turn the power off to the GTD system.
8. GTD ON/OFF Indicator Light - The GTD Indicator Light shall illuminate green when the GTD ON/OFF Select Switch is switched to ON.

3.7.1.10.4.6 Panel Test

[9391]

Pressing the PANEL TEST Pushbutton [see Figure 3.7.1.10.4-2 (6)] shall cause each indicator light to light green on the CCP panel and cause the CCP display to flash.

3.7.1.10.4.7 Display Power On/Off

[9393]

The DISPLAY POWER ON/OFF Pushbutton [see Figure 3.7.1.10.4-1 (7)] is non-functional.

3.7.1.10.4.8 Grenade Launcher

[9395]

The Grenade Launcher [see Figure 3.7.1.10.4-2 (8)] shall provide the following controls:

1. SALVO 1 FIRE/OFF Select Switch - This switch shall be a momentary two-position toggle switch with cover guard. When set to the FIRE position, four smoke grenades shall be fired from each grenade launcher pod. When the SALVO 1 FIRE/OFF Select Switch is released, it shall return to the OFF position.
2. SALVO 2 FIRE/OFF Select Switch - This switch shall be a momentary two-position toggle switch with cover guard. When set to the FIRE position, four smoke grenades shall be fired from each grenade launcher pod. When the SALVO 2 FIRE/OFF Select Switch is released, it shall return to the OFF position. Both SALVO 1 and SALVO 2 shall be capable of being fired at the same time.

3.7.1.10.4.9 Pan Viewer

[9397]

The CCP Pan Viewer panel [see Figure 3.7.1.10.4-2 (9)] shall provide the following controls:

1. 4-way Switch - This toggle switch shall allow the operator to make adjustments to Pan Viewer functions. When either PAN DAY or PAN THERMAL is selected at the Commander's Display/Mode Panel, the 4-way switch shall control the scene zoom function.
2. MAST Pushbutton - Non-functional in simulation. CPV remains erect.
3. MAST Indicator Light - Non-functional in simulation. Light remains off.
4. UP Indicator Light - Shall remain on since the CPV remains deployed.
5. DWN Indicator Light - Shall remain off to simulate the CPV being deployed.

6. FOV Pushbutton - When pressed, shall allow the operator to select the Pan Day or Pan Thermal field of view using the 4-way Switch up and down arrows. Moving the 4-way Switch down shall zoom out image (widen FOV). Moving the 4-way Switch up shall zoom in image (narrow FOV). Pressing the FOV Pushbutton a second time shall exit FOV adjustment.
7. FOV Indicator Light - Shall illuminate green when FOV Pushbutton is selected. FOV Indicator Light shall turn off when FOV Pushbutton is pressed a second time. This controls the Pan Day or Pan Thermal views.
8. DRIFT/FOCUS Pushbutton - Shall allow the operator to select between drift and focus adjustment modes of the Pan Day or Pan Thermal views using the 4-way switch.
 - a. When the DRIFT/FOCUS Pushbutton is pressed initially, Drift adjustment mode shall be selected. Drift adjustment shall be enabled when the palm switch is squeezed on the CCH. Left or right movement of the 4-way switch shall adjust azimuth drift. Up or down movement of the 4-way switch shall adjust elevation drift.
 - b. When the DRIFT/FOCUS Pushbutton is pressed a second time, Focus adjustment shall be enabled using the 4-way switch up and down arrows.
 - c. When the DRIFT/FOCUS Pushbutton is pressed a third time, Drift and Focus adjustment modes shall be exited, and the indicator lights for both Drift and Focus shall turn off.
9. DRIFT Indicator Light - Shall illuminate green when Drift adjustment mode is selected using the DRIFT/FOCUS Pushbutton.
10. FOCUS Indicator Light - Shall illuminate green when Focus adjustment mode is selected using the DRIFT/FOCUS Pushbutton.
11. RET/SYMB Pushbutton - Shall allow the operator to select brightness adjustment for Reticle and Symbology of the Pan Day or Pan Thermal views using the 4-way switch up and down arrows based on the Commander's Display/Mode panel selection.
 - a. When the RET/SYMB Pushbutton is pressed initially, Reticle brightness adjustment shall be selected. Moving the 4-way Switch up shall dim the reticle, and moving the 4-way switch down shall brighten the reticle.
 - b. When the RET/SYMB Pushbutton is pressed a second time, Symbology brightness adjustment shall be selected.
 - c. When the RET/SYMB Pushbutton is pressed a third time, Reticle and Symbology brightness adjustment shall be exited.
12. RET Indicator Light - Shall illuminate green when Reticle brightness adjustment is selected using the RET/SYMB Pushbutton.
13. SYMB Indicator Light - Shall illuminate green when Symbology brightness adjustment is selected using the RET/SYMB Pushbutton.
14. BHOT/WHOT Pushbutton - Shall allow the operator to set Pan Viewer thermal polarity by pushing the button to toggle between BHOT and WHOT.
15. BHOT Indicator Light - Shall illuminate green when BHOT is selected using the BHOT/WHOT Pushbutton.
16. WHOT Indicator Light - Shall illuminate green when WHOT is selected using the BHOT/WHOT Pushbutton.
17. SENS/CTRS Pushbutton - Shall allow the operator to adjust sensitivity and contrast of Pan Day or Pan Thermal scene using the 4-way switch and AUTO/MAN is set to MAN. Moving the 4-way switch up or down shall manually adjust sensitivity. Moving the 4-way switch left or right shall manually adjust contrast.
18. SENS Indicator Light - Shall illuminate green when SENS is selected using the SENS/CTRS Pushbutton, MAN is selected using the AUTO/MAN Pushbutton.
19. AUTO/MAN Pushbutton - Shall allow the operator to select automatic or manual adjustment for sensitivity/contrast of Pan Viewer day or thermal images.
20. AUTO Indicator Light - Shall illuminate green when AUTO is selected using the AUTO/MAN Pushbutton.

21. MAN Indicator Light - Shall illuminate green when MAN is selected using the AUTO/MAN Pushbutton.
22. SRCH/MRG Pushbutton - After a Commander Display/Mode PAN DAY or PAN THERMAL selection is made, this function shall select between Search or Merge states. SRCH shall allow the operator to move the Pan Viewer independently of the main gun to search for targets. When MRG is selected, the Pan Viewer shall automatically move to the CMS line of sight. The CCH shall not override the GCH. The Pan Viewer shall automatically resume Search mode. The commander must select GUNNER DAY or GUNNER THERMAL in order to operate the turret and weapons, and neither the SRCH nor MRG mode shall be active.
23. SRCH Indicator Light - The SRCH Indicator Light shall illuminate green when SRCH is selected using the SRCH/MRG Pushbutton.
24. MRG Indicator Light - The MRG Indicator Light shall illuminate green when MRG is active. It shall extinguish after the Merge is completed.

3.7.1.10.4.10 Commander Display/Mode

[10506]

The CCP Commander Display/Mode Panel [see Figure 3.7.1.10.4-2 (10)] shall provide the following controls:

1. COMBAT OVERRIDE/NORMAL Switch - This switch shall be a two-position toggle switch that is protected by a flip-up guard. When set to the COMBAT OVERRIDE position, the operator shall have the capability to override gun movement, gun firing inhibits, and last round override sensors in Emergency Combat Situations for the main gun and coax machine gun. When set to the NORMAL position, the operator shall not have the capability to override gun movement, gun firing inhibits, and last round override sensors.
2. COMBAT OVERRIDE Indicator Light - The COMBAT OVERRIDE Indicator Light shall illuminate green when COMBAT OVERRIDE is selected at the COMBAT OVERRIDE/NORMAL Switch.
3. COMMANDER DISPLAY MODE Selector Knob - 4-position rotary switch providing the following selections:
 - a. PAN DAY: Provides the capability to display the Pan Viewer daylight images on the CDU. The commander shall have control of the CPV with an active CCH. The commander shall not have the capability to load or fire the main gun when PAN DAY is selected.
 - b. PAN THERMAL: Provides the capability to display the Pan Viewer thermal images on the CDU. The commander shall have control of the CPV with an active CCH. The commander shall not have the capability to load or fire the main gun when PAN THERMAL is selected.
 - c. GUNNER DAY: Provides the capability to display the CMS day sight images on the CDU and override the gunner's control by using the CCH. The commander shall have the capability to load and fire the main gun when GUNNER DAY is selected.
 - d. GUNNER THERMAL: Provides the capability to display the CMS thermal sight images on the CDU and override the gunner's control by using the CCH. The commander shall have the capability to load and fire the main gun when GUNNER THERMAL is selected.

3.7.1.10.4.11 Controls and Indicators

[9401]

The CCP Controls and Indicators [see Figure 3.7.1.10.4-2 (11)] shall provide the following:

1. F1 FUNCTION Pushbutton - Shall be selectable only when Main Tactical Screen or Fire Control Main Menu is not displayed on CCP. When pressed, CCP display shall return to the previously viewed screen or menu.
2. F2 FUNCTION Pushbutton - When pressed, CCP shall display MGC Fire Control Main Menu.
3. F3 FUNCTION Pushbutton - Non-functional.

4. F4 FUNCTION Pushbutton - Shall be selectable only when Main Tactical Screen is not displayed on CCP. When pressed, CCP shall display the Main Tactical Screen.
5. F5 FUNCTION Pushbutton - Non-functional.
6. F6 FUNCTION Pushbutton - Shall be selectable only when Main Tactical Screen is displayed on CCP. When pressed, CCP shall display the AHS Menu.
7. BRT/CONTRAST Down Arrow - When the BRT/CONTRAST Down Arrow is pressed, the CCP display brightness shall decrease. When the CONTR pushbutton is depressed and held and the BRT/CONTRAST Down Arrow is pressed, the CCP display contrast shall decrease.
8. BRT/CONTRAST Up Arrow - When the BRT/CONTRAST Up Arrow is pressed, the CCP display brightness shall increase. When the CONTR pushbutton is depressed and held and the BRT/CONTRAST Up Arrow is pressed, the CCP display contrast shall increase.
9. CONTR Pushbutton - The CONTR Pushbutton shall be depressed and held to adjust CCP display contrast using BRT/CONTRAST Up Arrow and BRT/CONTRAST Down Arrow.
10. SPARE Pushbutton - Non-functional.
11. CURSOR Thumb Switch - Non-functional.
12. MENU OPTION Pushbuttons - Provides selection of options from screens and menus displayed on the CCP.
13. Main Tactical Screen - The Main Tactical Screen shall display the following information to the commander and gunner:
 - a. ADVISORY Message Area: Displays advisory messages.
 - b. CAUTION Message Area: Displays caution messages.
 - c. WARNING Message Area: Displays warning messages.
 - d. CAROUSEL Indicator: Displays carousel ammunition inventory.
 - e. FIRING STATUS: Displays firing status: MAIN ARMED, COAX ARMED, or SAFE.
 - f. BREECH Indicator: Displays breech status: BREECH OPEN, BREECH CLOSED, or BREECH IN TRANSITION.
 - g. MAIN GUN Indicator: Displays type of ammunition loaded in main gun.
 - h. AMMO INVENTORY Indicator: Displays ammunition inventory for autoloader and replenisher.

3.7.1.10.5 Commander's Display Unit

[10481]

The Commander's Display Unit (CDU) shall be capable of displaying a green video image from CMS thermal channel, CMS Daylight optics, CPV daylight optics or CPV thermal channel, using the COMMANDER DISPLAY MODE selector. The CDU shall be provided to match the control and physical characteristics of the tactical unit as shown on Figure 3.7.1.10.5-1 and be properly located in the commander's compartment.

[9404]

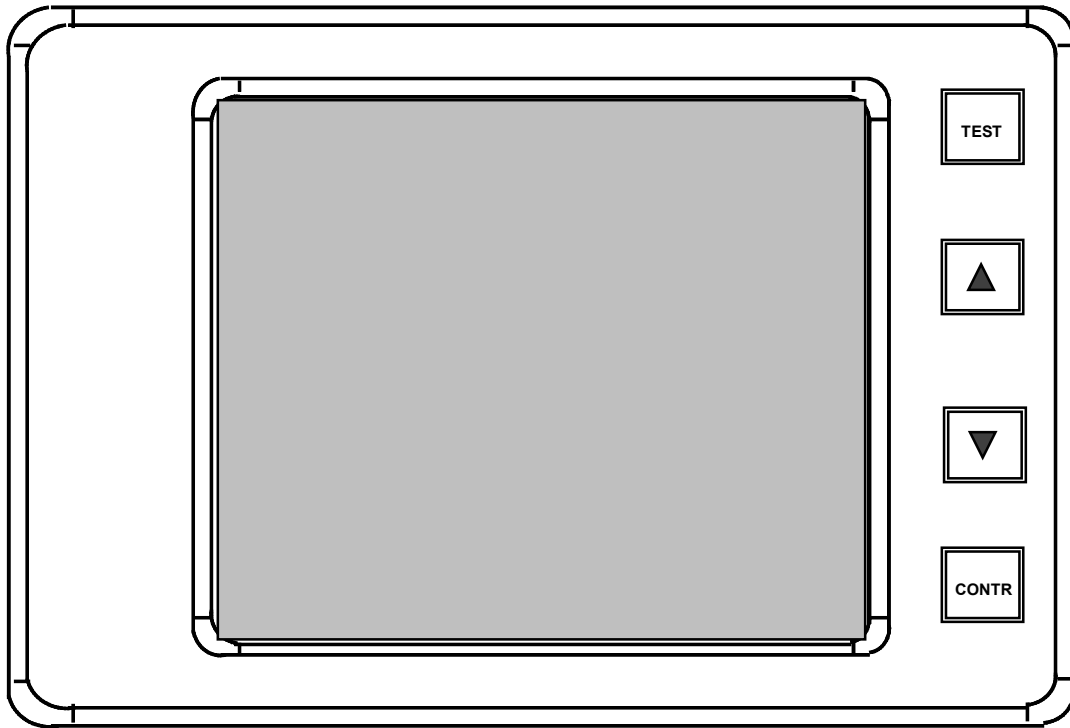


Figure 3.7.1.10.5-1. Commander's Display Unit

[9405]

The CDU shall provide the following pushbutton controls with backlighting:

1. TEST Pushbutton - Non-functional.
2. Up Arrow - When the Up Arrow is pressed, the CDU display and pushbutton backlighting shall brighten. When the CONTR Pushbutton is depressed and held and the Up Arrow is pressed, the CDU display contrast shall increase. There shall be three levels of adjustment for both brightness and contrast control.
3. Down Arrow - When the Down Arrow is pressed, the CDU display and pushbutton backlighting shall dim. When the CONTR Pushbutton is depressed and held and the Down Arrow is pressed, the CDU display contrast shall decrease. There shall be three levels of adjustment for both brightness and contrast control.
4. CONTR Pushbutton - The CONTR Pushbutton shall be depressed and held to adjust CDU display contrast using the Up Arrow and Down Arrow.

3.7.1.10.6 Auxiliary Sight

[9407]

The MGS AGTS Auxiliary Sight configuration contains both a fixed eyepiece at the gunner's station (see Figure 3.7.1.10.6-1) and a fixed eyepiece with a control panel at the commander's station (see Figure 3.7.1.10.6-2). Both the gunner and commander shall view the same scene and reticles through their eyepieces. The Auxiliary Sight shall utilize a stadia line ballistic reticle as shown in Figure 3.7.2.5.2-13.

[9408]

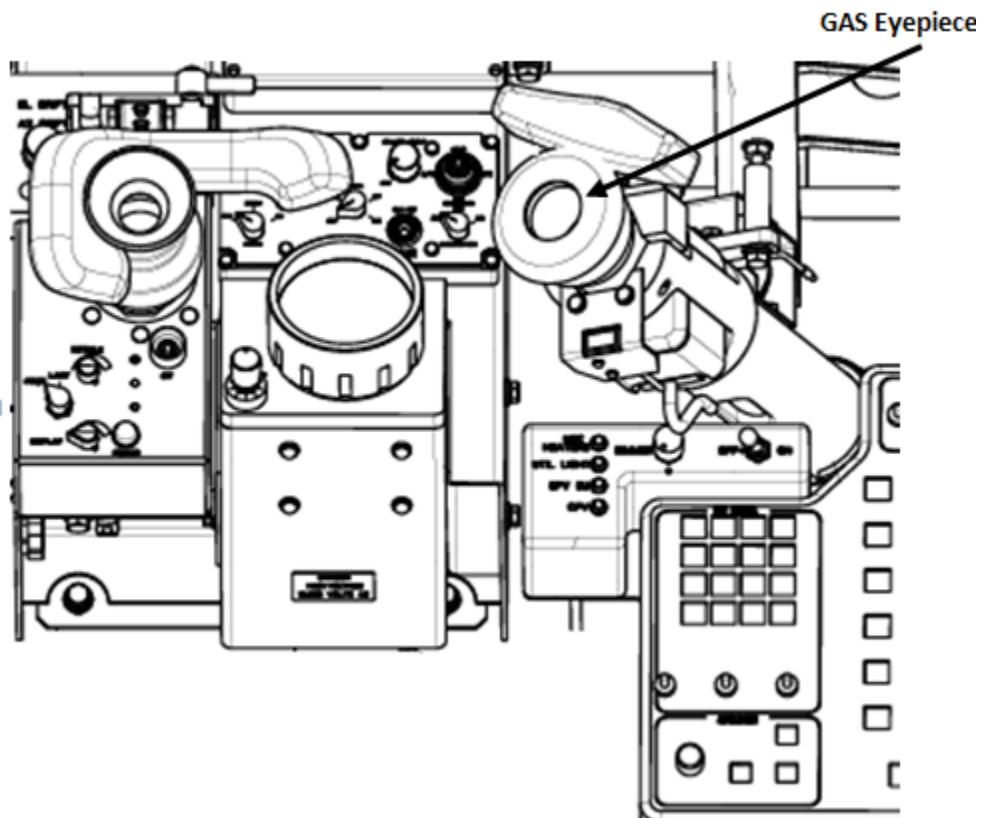


Figure 3.7.1.10.6-1. Gunner's Auxiliary Sight

[9409]

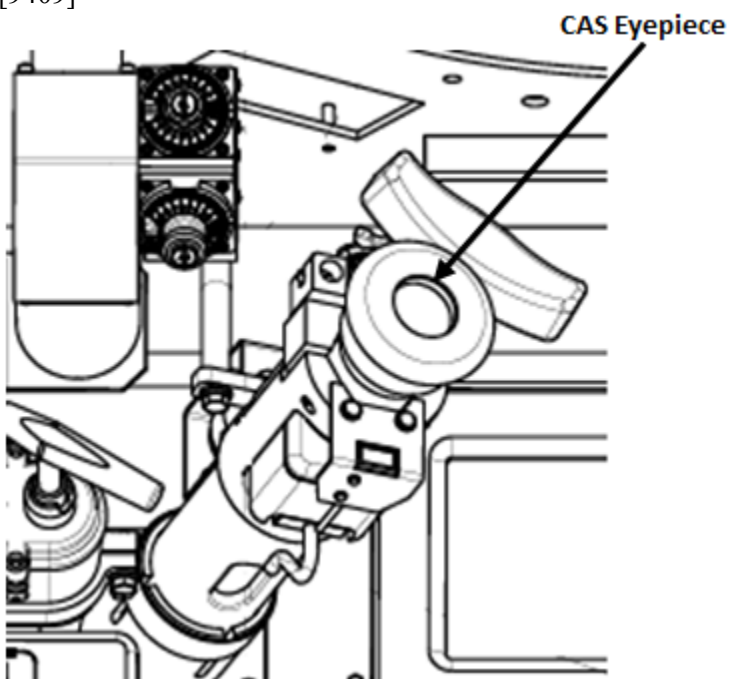


Figure 3.7.1.10.6-2. Commander's Auxiliary Sight

[9412]

The GAS and CAS eyepieces shall be configured with an adjustable brow pad with locking hardware for fixing the brow pad along the axis of the eyepiece.

3.7.1.10.7 Force XXI Battle Command, Brigade and Below (FBCB2)

[1488]

The tactical FBCB2 terminal and keyboard components shall be mounted directly under the CDU and on the crewstation commander's side wall, respectively, in their tactical locations, within the crewstation fidelity tolerances. The mounting hardware shall replicate the look and feel of the tactical hardware. See paragraph 3.7.1.1 for the crewstation compartment tolerances.

[1489]

The tactical FBCB2 computer shall be mounted in the commander's compartment.

[5824]

The placement of the FBCB2 computer in each crewstation shall be for ease of access/maintenance and connection to the FBCB2 display unit and keyboard.

[1490]

A COTS FBCB2 PC and the required switching hardware shall be provided at each IOS to interface to that crew trainer-crewstation for Command and Control messaging/situational awareness.

[1491]

An additional/extension of those crew mode networks shall be selectable at the IOS to link the FBCB2 local networks to form a Section or Platoon network. This network configuration shall provide the same communication capability across the linked trainer stations.

3.7.1.11 CREW STATION AUXILIARY EQUIPMENT FUNCTION REQUIREMENTS

[1513]

The crew station shall be provided with the auxiliary equipment described below.

3.7.1.11.1 CBRN (NBC) Protection System

[9414]

The Stryker MGS CBRN protection system shall be simulated.

[1516]

The crewstation shall provide the CBRN air duct socket assembly for the commander and gunner positions.

[1517]

Air shall be delivered to only the mask hose connectors by way of separate ports at each position.

[1518]

The system shall deliver 5 +/-1 cubic feet of ambient air per minute and shall be adjustable to deliver the most comfortable air delivery to the gunner's and commander's face mask and filter pack assembly.

[9458]

The CBRN heaters shall not be part of the CBRN Protection System simulation.

3.7.1.11.2 Commander's Seat

[1520]

The tactical vehicle commander's seat shall be provided in the crew station, including full range of motion and adjustment capabilities.

3.7.1.11.3 Gunner's Seat

[1522]

The tactical vehicle gunner's seat shall be provided in the crew station, including full range of motion and adjustment capabilities.

3.7.1.11.4 Emergency Firing Device

[6496]

The emergency firing device shall be provided.

[6497]

This device shall be used to fire the main gun if simulated electrical power is lost or the main gun cannot be fired using normal triggers.

[9415]

The emergency firing device handle shall be red in color and marked with "MANUAL FIRING" in white lettering and shall have similar feel and sound as the Stryker MGS vehicle. (See Figure 3.7.1.11.4-1 for an illustration of the device.)

[9481]

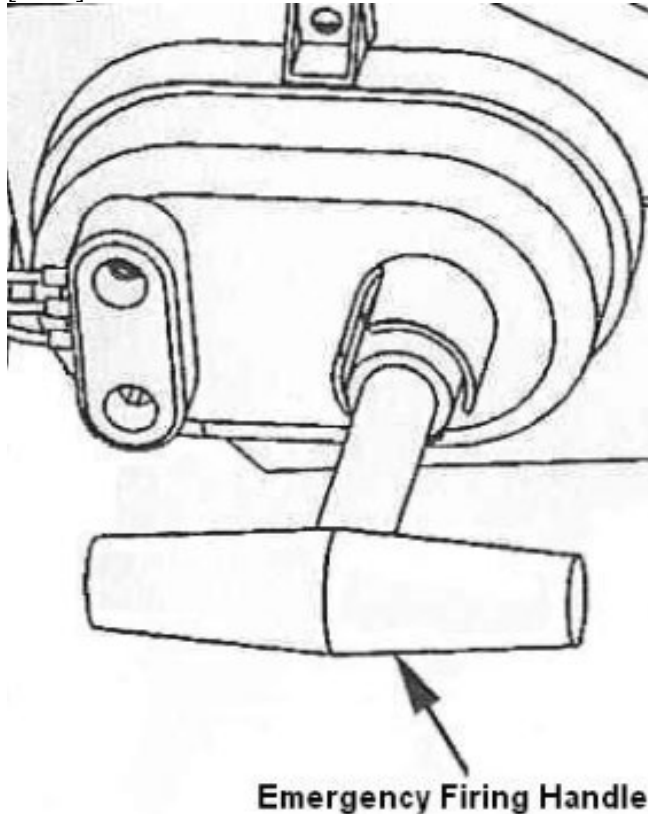


Figure 3.7.1.11.4-1. Emergency Firing Device

[6499]

Rotor shaft rotation shall be clockwise and 150 degrees \pm 5 degrees from the normal position and shall return automatically to the normal position when released.

3.7.1.11.5 Cant Sensor

[9417]

The Cant Sensor shall not be physically simulated unless as an obstruction in the turret model.

3.7.1.11.6 Decals and Instructional Plates

[1549]

The crew station shall be equipped with decals and instruction plates.

[9459]

The decals and instruction plates shall be placed within the interior dimensions tolerance specified in paragraph 3.7.1.1.

[1551]

Decals and instruction plates shall have the same size, color, letter height, and spacing as the decals and instruction plates in the vehicle.

3.7.1.11.7 Gun Turret Drive Electronics/Power Distribution Assembly

[9418]

The Turret Power Distribution Panel (T-PDP) shall be provided to simulate circuit breaker protection for turret electronics, provide on/off switching to operate the Turret Drive System (TDS), and provide dimmer switching for Auxiliary Sight reticle brightness. T-PDP layout is presented in Figure 3.7.1.11.7-1. Circuit breaker pushbutton in their pushed in state shall be on, and pushbuttons which are pulled out shall be off. The circuit breakers, switch, and dimmer controls active on the trainer are defined below.

T-PDP function descriptions follow:

1. AUX SIGHT DIMMER - Rotary switch to turn on and adjust Auxiliary Sight reticle brightness. Turning clockwise shall turn on Auxiliary Sight reticle (red). While turned on, turning clockwise shall increase and counterclockwise shall decrease Auxiliary Sight reticle brightness (to black).
2. TDS ON - 2-position Turret Drive System On/Off switch. Turning this switch On shall power the Turret Drive System. Turning this switch Off shall remove power from the TDS.

[9419]

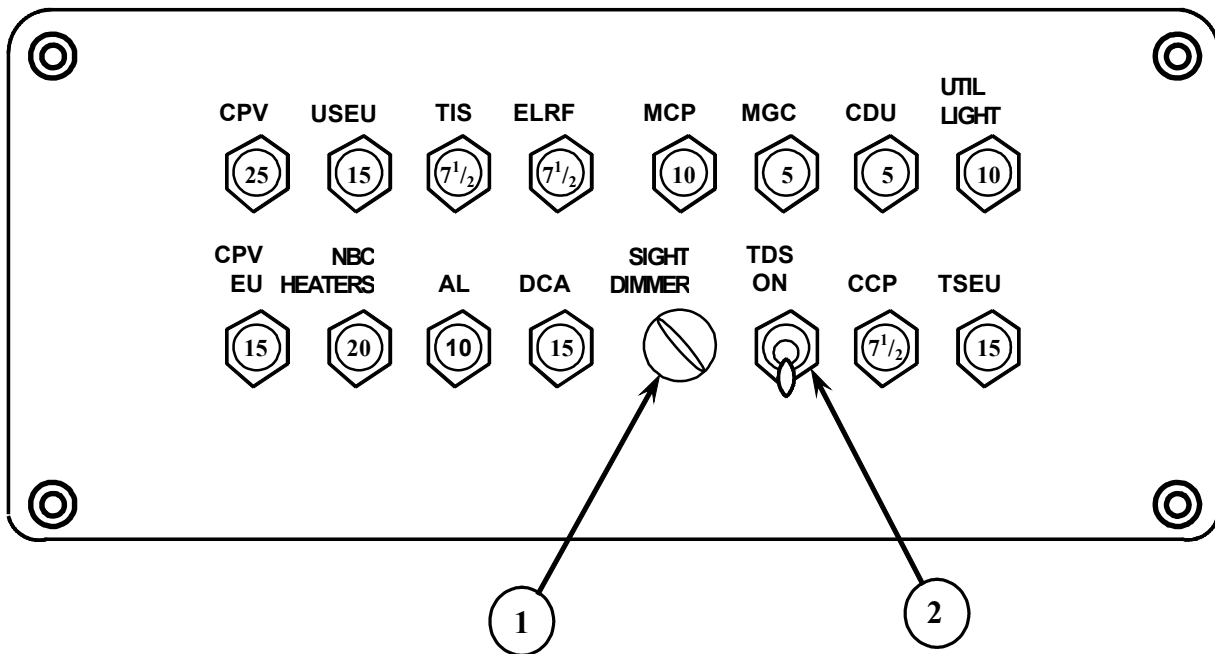


Figure 3.7.1.11.7-1. Turret Power Distribution Panel (T-PDP)

3.7.1.11.8 Turret Locks

3.7.1.11.8.1 Gunner's Turret Lock

[9420]

The gunner's turret or turret azimuth lock (1) shall be located to the left of the gunner's position in the Stryker MGS. It shall prevent the simulated rotation of the turret when in the locked position. When power is engaged or in manual, both the gunner and commander must ensure that their respective turret azimuth locks are disengaged to traverse the simulated turret. See Figure 3.7.1.11.8.1-1.

[9421]

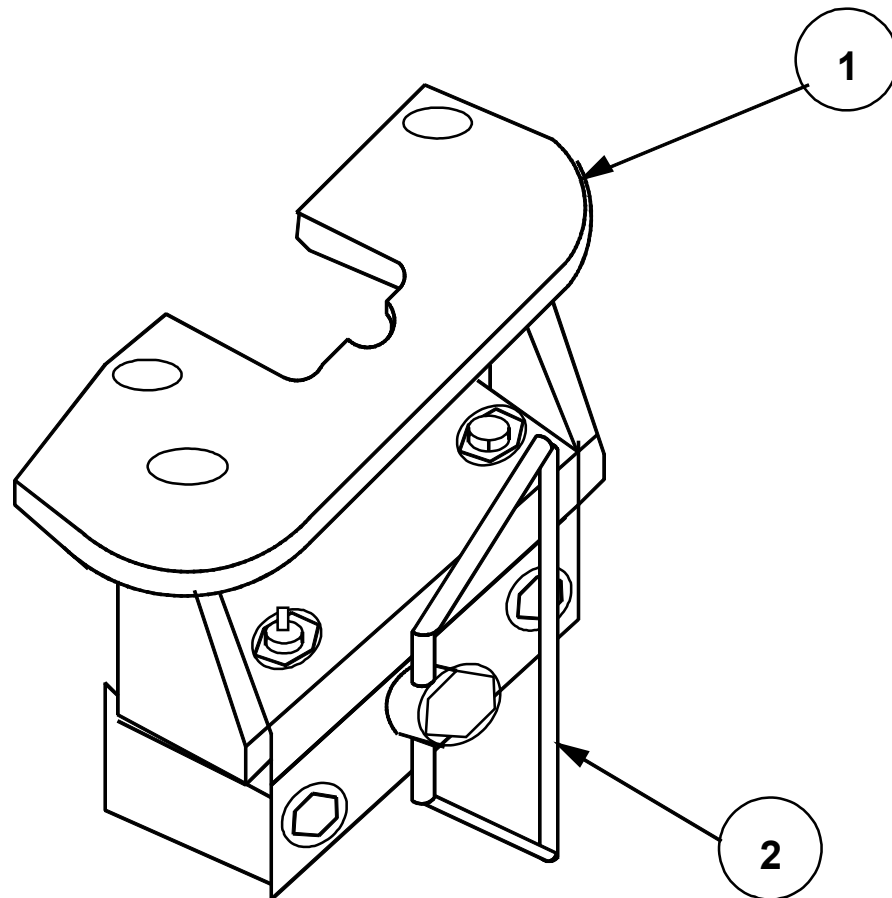


Figure 3.7.1.11.8.1-1. Gunner's Turret Azimuth Lock

[9422]

In order to disengage the gunner's turret azimuth lock, one shall lift up the handle (2) on the turret lock. The operator shall rotate the handle counterclockwise 90 degrees and pull out to disengage the stop. While still pulling out the handle (2), the operator shall rotate the handle back 90 degrees clockwise and fold handle flat against turret azimuth lock to stowed position.

[9423]

In order to lock the gunner's turret azimuth lock, one shall lift up the handle (2) on the turret lock. The operator shall pull out and rotate the handle counterclockwise 90 degrees and push in to engage the stop. While still pushing in the handle (2), the operator shall rotate the handle back 90 degrees clockwise and fold handle flat against turret azimuth lock to stowed position.

[1590]

The measured operational specifications follow:

- The stirrup wire shall be approximately 0.25 inches in diameter.
- The pull force shall be 3 to 5 pounds.
- The outward travel shall be approximately 0.565 inches.
- The handle shall be twisted 90 degrees clockwise to lock (handle horizontal).
- The handle shall be twisted 90 degrees counter-clockwise to unlock (handle vertical).

3.7.1.11.8.2 Commander's Turret Lock

[8197]

The commander's turret lock shall differ in design from the gunner's turret lock defined in 3.7.1.11.8.1 and shall be sensor monitored. The lock shall have a mushroom-scalloped handle as shown in Figure 3.7.1.11.8.2-1. The handle shall rotate counterclockwise $\frac{1}{2}$ turn to unlock. To lock, one shall push in and rotate the handle clockwise.

[8198]

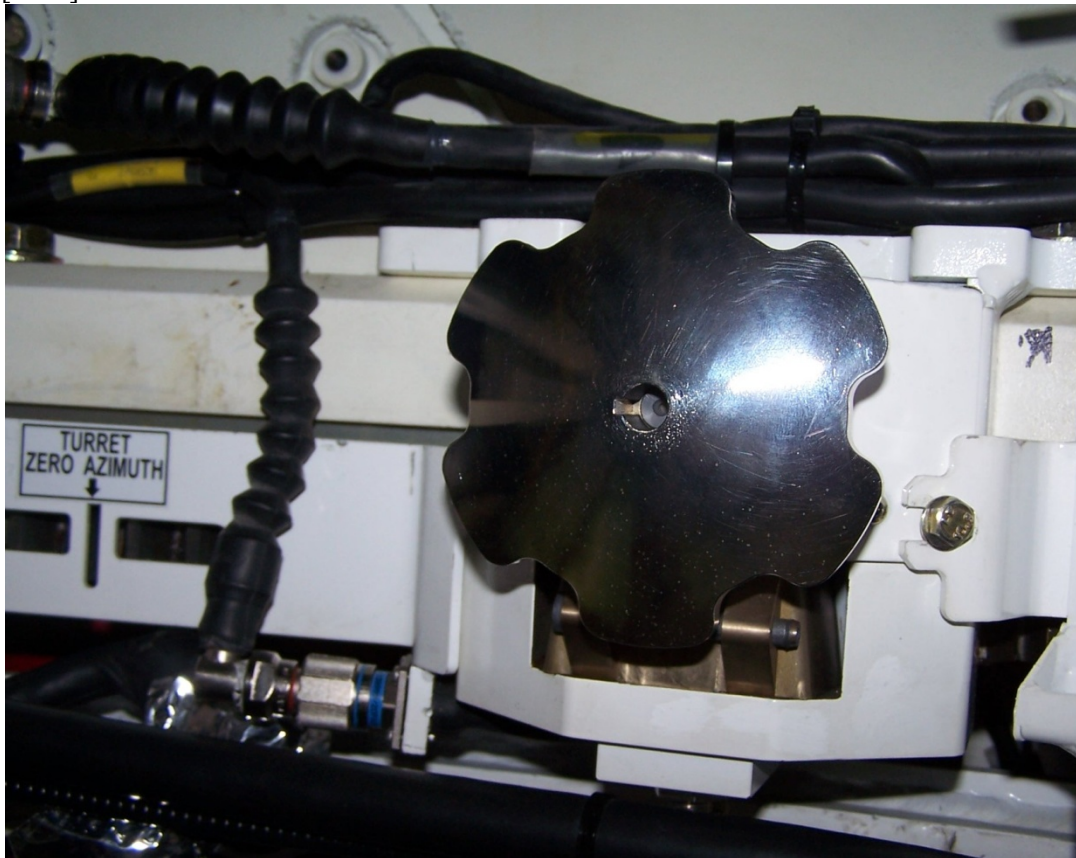


Figure 3.7.1.11.8.2-1. Commander's Turret Azimuth Lock

[8199]

The handle shall be four inches in diameter and have six lobes around the perimeter. Each lobe shall be a little over one inch wide.

[6515]

The handle shall include a LOCKED and UNLOCKED label to mark the current position of the handle as marked on the tactical handle.

[8200]

The measured operational specifications follow:

- Push in approximately 0.56 inches and rotate clockwise 180 degrees to lock. The sensor shall detect full clockwise rotation of the mushroom handle to indicate a locked state.
- Rotate 180 degrees counterclockwise to unlock. The handle shall be spring loaded to disengage. The total rotational travel shall be 180 degrees. There shall be zero resistance to rotate.
- The force to push in shall be 6 +/-1 pounds breakaway and 17 +/-3 pounds depression (for full travel).

3.7.1.11.9 Commander's and Gunner's Hatches

[1591]

The commander's and gunner's hatch equivalent volumes shall be provided, and shall not support open hatch operation.

[9956]

The latch in the gunner's hatch shall be provided as a space constraint in the closed hatch position.

3.7.1.11.10 Replenish Position Indicator

[9424]

A simulated replenish position window shall be provided on the right side of the turret to simulate the alignment viewing "pointer" with the simulated yellow painted tooth of the actual ring gear. The simulated painted gear tooth shall consist of a horizontal array of yellow LEDs. Each vertical LED bar shall illuminate depending on the simulated turret position relative to the Replenish (zero azimuth) position. When the LED bar in the vertical window is lit, the "Replenish position" shall be detected in the trainer. The simulated replenish position window shall be located as in the tactical vehicle. See Figure 3.7.1.11.10-1.

This alignment requirement is part of the replenish procedure for the autoloader carousel.

[8201]

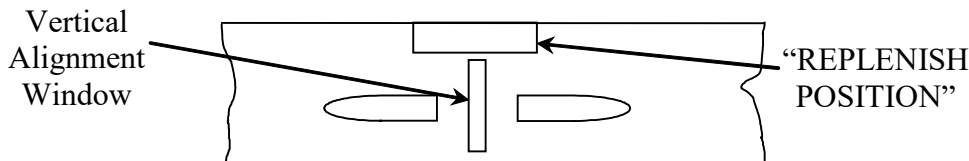


Figure 3.7.1.11.10-1. Replenish Position Indicator

3.7.1.11.11 Commander's Vehicle Intercommunication System (VIS) Control

[1595]

The commander's Vehicle Intercommunication System (VIS) control shall replicate the FFCS Intercom control, radio operator's station in the Crew Station.

[10174]

The Monitor selector switch shall be configured for receiving/listening to WK (whatever network the Work switch is set to), channel A (Platoon Network), channel C (Company Command Network), or ALL (both Platoon and Company Command). If any channel is selected other than WK, A, C, or ALL, the receiving/listening connection shall be made to the intercom.

[1596]

The Work selector switch shall be configured for transmitting to either INT (intercom), channel A (Platoon Network), or channel C (Company Command Network). If any channel is selected other than INT, A, or C, connection shall be made to the intercom. The maximum torque to change switch selections shall be 14 +/-4 oz-in. The angles between positions for each rotary switch follow:

- a. INTERCOM - 30 +/-5 degrees
- b. MONITOR - 30 +/-5 degrees
- c. WORK - 30 +/-5 degrees
- d. VOLUME - 30 +/-5 degrees between detent positions. The volume control shall require 6 oz-in +/-2 oz-in to overcome each detent in both directions. The control shall travel 300 +/-20 degrees stop-to-stop.

[1597]

The VIS box shall be located on the left side wall of the crew station - turret wall within Non Critical Elements tolerances of the component location on the baseline vehicle.

3.7.1.11.12 Gunner's Vehicle Intercommunication System (VIS) Control

[1601]

The gunner's Vehicle Intercommunication System (VIS) control shall replicate the FFCS Intercom control, radio operator's station in the Crew Station.

[10175]

The Monitor selector switch shall be configured for receiving/listening to WK (whatever network the Work switch is set to), channel A (Platoon Network), channel C (Company Command Network), or ALL (both Platoon and Company Command). If any channel is selected other than WK, A, C, or ALL, the receiving/listening connection shall be made to the intercom.

[1602]

The Work selector switch shall be configured for transmitting either INT (intercom), channel A (Platoon Network), or channel C (Company Command Network). If any channel is selected other than INT, A, or C, connection shall be made to the intercom. See 3.7.1.11.11 for performance parameters.

[1603]

The VIS box shall be located on the right side wall of the crew station - turret wall within Non-Critical Elements tolerances of the component location on the baseline vehicle.

3.7.1.11.13 Utility Lights

[9425]

The Utility Lights shall be replicated and located at the same locations as in the tactical Stryker MGS.

3.7.1.11.14 Commander's Loudspeaker

[9957]

The commander's loudspeaker shall be provided as a space constraint. The front face of the box shall be slotted to give the appearance of the tactical unit.

3.7.1.11.15 CBRN (NBC) Heaters

[9958]

Both the commander's and gunner's CBRN heater function shall not be simulated. The heater units are located behind and below the two seats and are not required in the trainer. The hose connections to the commander and gunner provide air from a blower on top of the crew station to the crew CBRN masks via a hose interconnection as defined in 3.7.1.11.1.

3.7.1.11.16 Elevation Quadrant

[9460]

The Elevation Quadrant shall not be simulated nor provided as a space constraint.

3.7.1.11.17 Smoke Detectors

[6519]

The crew station shall be equipped with a smoke detector wired to the 110 VAC breaker facility power for permanent systems or the shelter power system. The detector shall sound an alarm and remove crew station power when smoke is detected. The smoke detector resets automatically when the level of smoke diminishes below a preset threshold.

3.7.1.11.18 Emergency Light

[9461]

The crew station shall be equipped with an emergency light. This light shall activate when the system smoke detector activates and/or if there is a loss of power.

3.7.1.11.19 Ammo Temperature Gauge

[9463]

The ammo temperature gauge shall be provided as a bracket with the gauge face as a decal. It shall be located within the crew station component interior dimensions tolerance specified in paragraph 3.7.1.1.

3.7.1.11.20 7.62 Ammunition Box

[9426]

The 7.62 Ammunition Box shall be provided in the tactical position, behind the gunner's seatback. The representation shall provide a properly scaled outer surface, but altered to provide a ready box upper door opening through which to view a "low ammo check" simulation, as shown in Figure 3.7.1.11.20-1.

[9430]

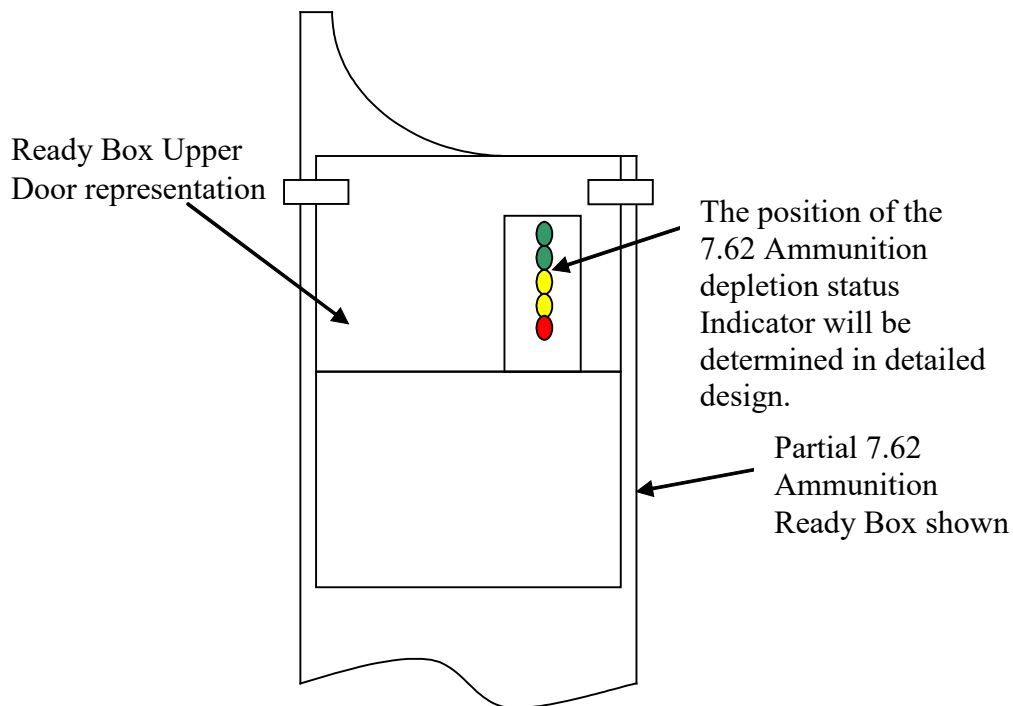


Figure 3.7.1.11.20-1. 7.62 Ammunition Box

[9427]

This low ammo check simulation shall consist of a vertical string of colored lights. The lights shall be configured as follows:

- Top green light- active indicates 401 to 500 rounds available.
- Second green light - top light active indicates 301 to 400 rounds available.
- Top yellow light - top light active indicates 201 to 300 rounds available.
- Second yellow light - top light active indicates 101 to 200 rounds available.
- Red light - only light active indicates 100 or less rounds available.

[10494]

When the red light is lit, the coaxial machine gun can be fired via the coaxial machine gun manual firing handle (section 3.7.1.4.1) or via all electrical triggers (section 3.7.1.7.3) once the Commander's Combat Override switch is in the ON position.

3.7.1.11.21 Turret Auxiliary Switch Panel (TASP)

[10477]

The Turret Auxiliary Switch Panel (TASP) shall be provided to simulate the power of the Nuclear Biological Chemical (NBC) heaters, utility lights, Commander's Panoramic Viewer Electronic Unit (CPV EU), and Commander's Panoramic Viewer (CPV) circuits and provide dimmer switching for the brightness of these indicator lights. The TASP layout is present in Figure 3.7.1.11.21-1. The TASP function descriptions follow:

1. NBC Heaters indicator light
2. Utility (UTIL) Light indicator light
3. Commander's Panoramic Viewer Electronic Unit (CPV EU) indicator light
4. Commander's Panoramic Viewer (CPV) indicator light
5. Dimmer Knob - Rotary switch that adjusts the brightness of the four TASP indicator lights; clockwise rotation increases the brightness and counterclockwise rotation decreases the brightness until the indicator lights are turned off.
6. On/Off Switch - 2-position toggle switch for turning on and off the indicator lights for the NBC Heaters, UTIL Light, CPV EU, and CPV; as well as turning power on and off to the CPV and MAST UP/DWN.

[10478]

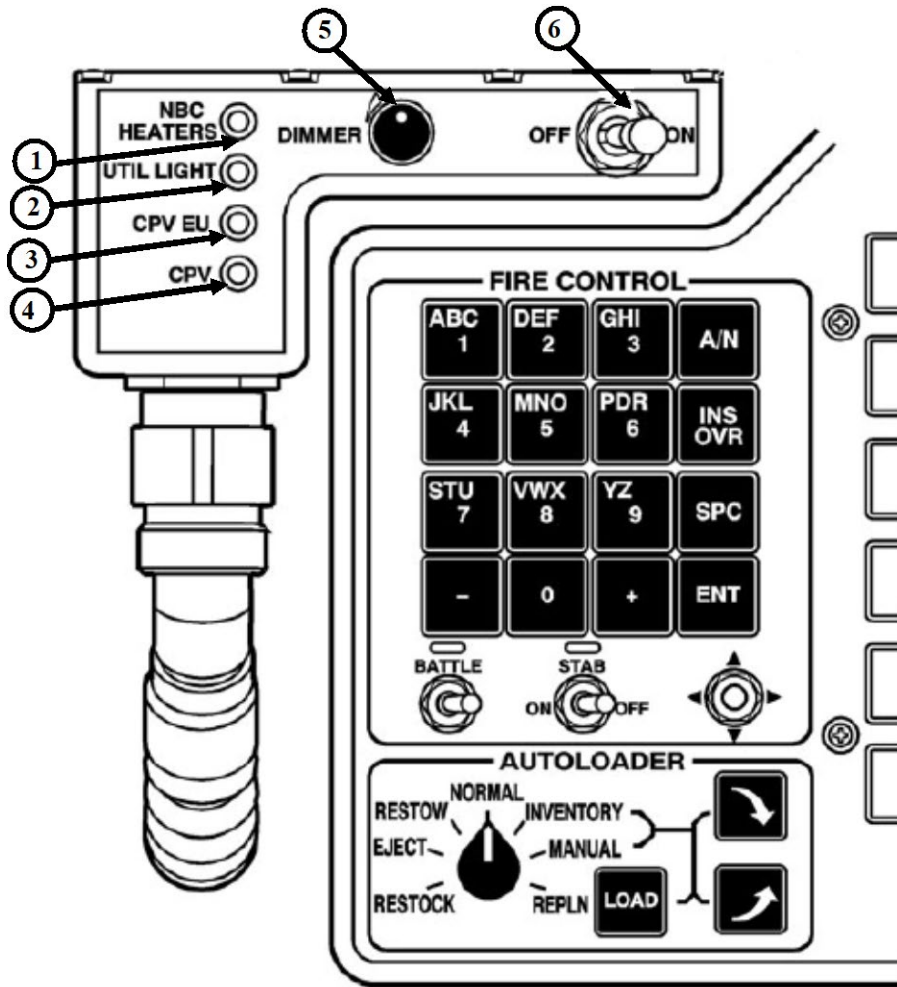


Figure 3.7.1.11.21-1. Turret Auxiliary Switch Panel (TASP)

3.7.1.12 SOUND GENERATION

3.7.1.12.1 Sound Generation Operation

[1677]

A sound generation system shall provide aural cues to the crew members inside the crew station that are heard inside the actual vehicles.

[1678]

Sounds shall be able to be presented independently of the communications system, if so required.

[1679]

The sounds shall be of such fidelity, quality, realism, and volume that crew members will experience the needed cues, stresses, and distractions of a combat situation.

[1680]

These sounds shall be synchronized with the actions causing the sounds.

[1681]

The intensity (loudness) at the crew station will be related to the distance from the simulated source of the sound.

[1682]

The sound shall not violate the noise limits of MIL-STD-1474.

[1683]

The sound system shall be capable of generating a minimum of eight sounds simultaneously.

[1684]

Where appropriate, sound generation channels shall be "shared" by several different sounds on a priority basis.

[1685]

The number of sound generation channels shall be expandable to allow for future needs that may require the capability to generate a larger number of sounds simultaneously.

3.7.1.12.2 Simulated Sound Effects

[9431]

The following sounds associated with the vehicle and gunnery operations shall be simulated and provided to the crew station, as a minimum, with the priority being the order in which the sounds are listed:

- a. Hit or kill on own vehicle
- b. Main gun firing
- c. Main gun autoloading sequence
- d. Coax machine gun firing
- e. Coax machine gun misfire "bolt going forward"
- f. Restow Ammo
- g. Enemy fire, to include artillery
- h. Friendly fire, to include artillery, Stryker MGS main gun, tank
- i. Smoke grenade firing
- j. Vehicle turning
- k. Vehicle moving (varying speed)
- l. Engine idle
- m. Tactical idle
- n. CBRN alert tone provided through crew and instructor headsets
- o. Turret Motor running (rate sensitive)
- p. "Alternate Path"
- q. Refill carousel from replenisher
- r. Carousel rotation

3.7.1.12.3 Storage

[1708]

The sound generation function shall have the capability to store all sound data and shall be expandable to allow for future increases in storage that would be necessary to generate a larger set of sound data.

3.7.1.12.4 Sound Quality

[1710]

Audio amplifiers shall be of a quality and power handling capability to recreate the required volume.

[1711]

Speakers shall be of a construction and placement so that the necessary training environment sounds and effects are achieved.

3.7.1.13 COMMUNICATIONS

[9453]

The crew station shall simulate the form and function of those components of the Full Function Crew Station (FFCS) Vehicle Intercommunication System (VIC-3) necessary for communication on the intra-vehicle and inter-vehicle networks. The VIC-3 control box shall be configured such that the Work selector switch controls transmission connectivity, which has select positions “INT” and “A” through “F”, shall provide the radio/intercom selections as follows: position “A” for the Platoon Network, position “C” for the Company Command Network, and positions "INT", "B", and "D" through "F" for the intercom only. Due to safety considerations, all Work switch selections provide for transmission on the intercom.

[10176]

The Monitor selector switch controls receive/listen connectivity, which has select positions “WK”, “A” through “F”, and “ALL”, shall provide radio/intercom selections as follows: position “WK” for connection to the network selected at the Work selector switch, position “A” to Platoon Network, position “C” to Company Command Network, position “ALL” to Platoon and Company Command Networks, and all other positions connect to the intercom only. Due to safety considerations, all Monitor switch selections provide for receiving/listening on the intercom.

[1714]

The system shall require the students to wear the Combat Vehicle Communications (CVC) helmet during training and to communicate through the helmet/headset.

[6531]

During system initialization, communication capabilities shall be established, as defined in Table 3.7.1.13-1, based on mode of training (crew, section or platoon) and on the assigned responsibilities (Platoon/Section Leader, Platoon Sergeant, Wingman).

[6039]

Table 3.7.1.13-1. Communication Capabilities

Section and Platoon Training ⁽¹⁾																								
	Monitor Switch Position-WK, B, D, E, or F						Monitor Switch Position-ALL or C						Monitor Switch Position-WK, B, D, E, or F						Monitor Switch Position-WK, B, D, E, or F					
	Work Switch Position-INT, B, D, E, OR F						Work Switch Position-A (Platoon Net)						Work Switch Position-A (Platoon Net)						Work Switch Position-C (Company Command Net)					
	Listens On			Talks On			Listens On			Talks On			Listens On			Talks On			Listens On			Talks On		
	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A ⁽¹⁾	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B
Platoon Leader																								
Cmdr	X			X			X	X ⁽²⁾	X	X	X		X	X ^(2, 3)		X	X		X		X ^(2, 3)	X		
Gunner	X			X			X	X ⁽²⁾	X	X	X		X	X ^(2, 3)		X	X		X		X ^(2, 3)	X		
Platoon Sergeant																								
Cmdr	X			X			X	X ⁽²⁾	X	X	X		X	X ^(2, 3)		X	X		X		X ^(2, 3)	X		
Gunner	X			X			X	X ⁽²⁾	X	X	X		X	X ^(2, 3)		X	X		X		X ^(2, 3)	X		
Wingmen																								
Cmdr	X			X			X	X ⁽²⁾		X	X		X	X ^(2, 3)		X	X		X			X		
Gunner	X			X			X	X ⁽²⁾		X	X		X	X ^(2, 3)		X	X		X			X		
Crew Training																								
	Monitor Switch Position-WK, B, D, E, or F						Monitor Switch Position-ALL or C						Monitor Switch Position-WK, B, D, E, or F						Monitor Switch Position-WK, B, D, E, or F					
	Work Switch Position-INT, B, D, E, OR F						Work Switch Position-A (Platoon Net)						Work Switch Position-A (Platoon Net)						Work Switch Position-C (Company Command Net)					
	Listens On			Talks On			Listens On			Talks On			Listens On			Talks On			Listens On			Talks On		
	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B	Inter-com	Radio A	Radio B
Cmdr	X			X			X			X			X			X			X			X		
Gunner	X			X			X			X			X			X			X			X		

⁽¹⁾ In trainer applications, for safety reasons, intercom communications will not be interrupted by VIS Work and Monitor switch operation.

⁽²⁾ During radio transmission, receipt of radio transmissions from other vehicles is blocked.

⁽³⁾ Listen Radio selection, if Monitor switch in WK position.

[6040]

Table 3.7.1.13-1. Communication Capabilities (continued)

Section and Platoon Training ⁽¹⁾						
	Monitor Switch Position-A (Platoon Net)					
	Work Switch Position-C (Company Command Net)					
	Listens On			Talks On		
	Intercom	Radio A	Radio B	Intercom	Radio A	Radio B
Platoon Leader						
Cmdr	X	X		X		X
Gunner	X	X		X		X
Platoon Sergeant						
Cmdr	X	X		X		X
Gunner	X	X		X		X
Wingmen						
Cmdr	X	X		X		X
Gunner	X	X		X		X
Crew Training						
	Monitor Switch Position-WK, B, D, E, or F					
	Work Switch Position-INT, B, D, E, OR F					
	Listens On			Talks On		
	Intercom	Radio A	Radio B	Intercom	Radio A	Radio B
Cmdr	X			X		
Gunner	X			X		
⁽¹⁾ In trainer applications, for safety reasons, intercom communications will not be interrupted by VIS Work and Monitor switch operation. ⁽²⁾ During radio transmission, receipt of radio transmissions from other vehicles is blocked.						

[9464]

As a minimum, communication shall be provided for the following modes:

- a. Crew-I/O Intercom Network: In Crew, Section and Platoon training, selection of the INT position on the crew station's VIC-3 control box Work selector switch and the WK position on the Monitor selector switch shall allow the observer, driver, commander and gunner in each trainer to listen only to each other and to their corresponding Instructor/Operator (I/O). For any VIC-3 control box position, activation of the intercom helmet switch shall allow the crew member to talk on the intercom network.
- b. Platoon Communication Network: This network shall use the position "A" on the crew station VIC-3 control box Work and Monitor selector switches. The Platoon Communication Network shall provide two-way voice communication capability between the platoon/section vehicle commanders. Selection of position "A" on the crew station VIC-3 control box Monitor selector switch shall allow the commander and gunner to listen to the intercom simultaneously with Platoon Communications Network radio. The Pre-brief After Action Review (PAAR) station logs all communication on the Platoon Communication Network as provided for in paragraph 3.7.6. Each I/O shall be able to monitor voice communications for the Platoon Communication Network. During a radio transmission, the crew member initiating the transmission shall be able to hear his own voice and intercom messages in the headset and the receipt of all voice radio messages shall be disabled. The Platoon Communication Network will be used as the communication link between the Tank Commanders and the CGF operator for Call for Fire tasks.

- c. Company Command Network: This network shall use position “C” on the crew station VIC-3 control box Work and Monitor selector switches. The Company Command Network shall provide two-way voice communications between the Platoon/Section Leader crew station, the Platoon Sergeant crew station, and the Instructor functioning as the Company Commander. Selection of position “C” on the vehicles’ VIC-3 control box Monitor selector switch shall allow the commander and gunner to listen to the intercom simultaneously with the Company Command Network radio. The PAAR logs all communication on the Company Command Network as provided for in paragraph 3.7.6. The Platoon Leader and Platoon Sergeant IOs, or the Section Leader I/O shall be able to monitor voice communication on the Company Command Net. During a radio transmission, the crew member initiating the transmission shall be able to hear his own voice and intercom messages in the headset and the receipt of all voice radio messages shall be disabled.

[8559]

- d. Crew - I/O Intercom/Radio Network: In crew mode training, selection of the “B”, “D”, “E” or “F” positions on the crew station’s VIC-3 control box Monitor selector switch shall allow the commander and gunner in each trainer to listen only to each other and to their corresponding I/O.

In Platoon or Section mode training, selection of the “ALL” position on the crew station VIC-3 control box Monitor selector switch shall allow the Platoon Leader and Platoon Sergeant, or Section Leader crew station to listen to the intercom, the Platoon Network, and the Company Command Network radio traffic. In Platoon or Section mode training, selection of the “ALL” position on the crew station VIC-3 control box shall allow Wingmen positions to listen to the intercom and the Platoon Network radio traffic. During a radio transmission, the crew member by selecting “A” position on the Work selector switch and initiating the transmission shall be able to hear his own voice and intercom messages.

- e. Instructor Note Taking Network: In Platoon or Section mode training, the note taking network shall provide capability for the instructor to record voice annotated notes during the exercise that shall be synchronized with the Plan View Display for use during After Action Review. The PAAR station logs all communication on the Instructor Note Taking Network as provided for in paragraph 3.7.6.
- f. Instructor Network: In Section or Platoon mode training, this communication network shall enable the I/Os to communicate with each other. Each I/O shall have the capability to talk on either the Instructor Network or the crew intercom network.

[8293]

The simulated intervehicle radio networks shall only need to provide “clear channel” quality of transmission. No reduced transmission quality (i.e., noise, loss of transmission, or garbled voice) is required.

[8294]

The intervehicle communications shall be accomplished via digital packets on the simulation network.

3.7.1.13.1 Intercom Placement

[2156]

Refer to 3.7.1.11.11 and 3.7.1.11.12.

3.7.1.13.2 Crew Station Communications Component

[9904]

The Stryker MGS AGTS shall use the FFCS Radio. The Stryker MGS AGTS shall simulate the form and function of the FFCS radio components necessary for communication on the networks described in 3.7.6.2.3. As a minimum, the following shall be provided:

- a. Intercom Box

3.7.1.13.3 Instructor Station Communication Components

[6539]

The instructor station shall have the following communication components.

3.7.1.13.3.1 Headset Station

[6543]

Three headset stations shall be mounted in an enclosure located on the IOS. This unit shall function as a communications control panel and contain earphone volume controls and jacks for interconnecting to the headset cables.

3.7.1.13.3.2 Headset

[6544]

A headset shall consist of two cushioned earphones, noise-canceling electric dynamic boom microphones, and a cord to interface with an extension cord/push-to-talk assembly.

3.7.1.13.3.3 Extension Cord With Talk Switch

[6545]

Extension cords shall be used to interface the headsets to the Instructor/Operator Station (IOS) communication enclosure. The headset jack shall plug into the switch assembly which can be momentary ON or pushed to lock in the ON position. The coiled cord shall extend to 15 feet.

3.7.2 IMAGE GENERATION AND DISPLAY SYSTEM

3.7.2.1 TOTAL VISUAL FIELD-OF-VIEW

[9892]

A visual field of view shall simulate the actual sights for each Stryker MGS as listed below. The mounting position and orientation shall be the same as in the actual vehicle. Ownvehicle obstructions in azimuth and elevation present in the actual Stryker MGS sights shall be simulated. FOV in degrees (horizontal x vertical) shall be:

	<u>Commander</u>	<u>Gunner</u>	<u>Driver</u>
a. Unity periscopes (vision blocks)			
(1) Minimum Instantaneous FOV (per periscope)	A: 26.6 x 8.5 (5 places) Eye @ 10" B: 18.5 x 6.7 Eye @ 10" C: 16.0 x 8.1 Eye @ 12"	25.4 x 7.7 Eye @ 10"	
b. CMS Day			
(1) 3x FOV	18.8 x 11.52	15.0 x 8.71*	
(2) 8x FOV	7.5 x 4.59	6.2 x 3.1*	
c. CMS Thermal (viewed on GDU and CDU Displays)			
(1) 3.3x FOV	12.3 x 7.53	12.3 x 5.7	
(2) 10x FOV	4.1 x 2.51	4.1 x 1.9	
(3) 20x FOV	2.05 x 1.255	2.0 x 0.927	
d. CPV Day			
(1) 3.3x FOV	10.8 x 10	N/A	
(2) 8x FOV	4.8 x 4.47	N/A	
e. CPV Thermal			
(1) 1.7x FOV	8.8 x 8.2	N/A	

f.	(2) 8.6x FOV Auxiliary Sight	1.8 x 1.7	N/A	
	(1) 8x FOV	5.6 x 5.28*	5.6 x 5.4*	
g.	Driver			30.75 x 9

*Note: Truncation of the circular FOV is permissible to optimize the horizontal and vertical resolution of the display and is defined by the horizontal and vertical FOV numbers for an otherwise circular sight.

Note: The tolerance for the FOVs herein specified shall be +/-2 percent.

[10186]

Directed CPV FOV shall be controlled within the following range:

Elevation travel limit: +29 deg +/-10%

Depression travel limit: -28 deg +/-10%

3.7.2.2 FIELD OF REGARD

[9893]

The image generator shall provide imagery for a total field of regard of 360 degrees horizontally and +/- 90 degrees vertically and is only limited by the programmed sight and periscope vertical fields of view defined in 3.7.2.1.

[10208]

As the sights pan around and up and down, the imagery shall be smooth and continuous.

3.7.2.3 RESERVED

3.7.2.4 TARGET DETECTION AND CLASSIFICATION

[9907]

The resolution of the system shall be sufficient to enable the detection and classification as specified for a standard tank 2.5 meters high full exposure view.

[10031]

The system resolution and the simulated sensing characteristics of the thermal sights shall be sufficient to enable the detection, recognition, and identification as specified for the same target in the thermal sights.

Ranges below are in meters and represent design points.

a.	Gunner and Commander's Unity Periscopes	
	Detection range - full, exposure	2000 m
b.	Gunner's CMS Day	
	Detection range, 1x - full exposure	2000 m
	Recognition range, 8x - full exposure	3600 m
	Identification range, 8x - full exposure	2200 m
c.	Gunner's Display Unit	
	Detection range, 3x - full exposure	4000 m
	Recognition range, 10x - full exposure	3000 m
	Identification range, 10x - full exposure	2000 m
d.	Gunner and Commander's Auxiliary Sight	
	Detection range, 8x - full exposure	5000 m
	Recognition range, 8x - full exposure	2800 m
	Identification range, 8x - full exposure	1600 m
e.	Commander's Panoramic Viewer Day	
	Detection range, 3.3x - full exposure	4000 m

	Recognition range, 8x - full exposure	3000 m
	Identification range, 8x - full exposure	2000 m
f.	Commander's Panoramic Viewer Thermal	
	Detection range, 1.7x - full exposure	2000 m
	Recognition range, 8.6x - full exposure	3000 m
	Identification range, 8.6x - full exposure	2000 m

3.7.2.5 IMAGE DISPLAY

[2242]

The image display subsystem converts the signals from the image generator into visual images representing the simulated environment. The image display subsystem consists of commercially available display components from suppliers with established product lines and support systems. All optics used in the sights and optical paths which are exposed to ambient environments shall be readily accessible to facilitate cleaning and adjustments.

3.7.2.5.1 Simulated Sight Characteristics (Optical and Thermal)

[9465]

The external appearance (from within the crew station) of the simulated sights shall have the form, fit and feel of the operational equipment.

- a. It shall be acceptable to simulate the FOV as a circle with a truncated top and bottom as a result of fitting the circular FOV to a standard display with a 4/3 or 5/4 aspect ratio. For day images, the full horizontal and vertical display resolution capability of the raster format shall be used regardless of the magnification selected. For thermal images viewed within the same sight, the image area of the raster format shall be appropriate for the thermal FOV and aspect ratio.
- b. The design eyepoint shall approximate that of the eyepoint on the actual sight.

3.7.2.5.1.1 Optical Sights

[9466]

Optical sights shall simulate the optical sight capabilities of the vehicle optics in providing capability to detect and classify targets within the simulated tactical environment at ranges indicated in paragraph 3.7.2.4.

3.7.2.5.1.1.1 Turret Periscopes

[9468]

Commander's and Gunner's periscopes shall simulate the tactical vehicle and shall be located around the commander's and gunner's "crew station" hatches. They shall enable the commander and gunner to observe surrounding virtual environment as utilized in the tactical vehicle.

[9469]

Seven periscopes shall be located at their replicated position around the commander's hatch and four periscopes shall be located around the gunner's hatch. The video imagery shall follow the criteria defined in the Image Sharing paragraph of the Visual Subsystem section. Refer to Section 3.7.2.8.2.

[9470]

The Stryker MGS ownvehicle model shall provide the obstructions that represent the physical obstructions to viewing through the periscopes and sights presented by the MGS turret.

3.7.2.5.1.1.2 CMS Day/Auxiliary Sight

[9872]

The gunner's compact modular sight day and auxiliary views shall be provided. 3X and 10X magnifications shall be provided as specified in the FOV table.

3.7.2.5.1.1.3 CDU

[9874]

The commander's display unit shall be provided. The CMS day, CMS thermal, CPV day, and CPV thermal will be displayed with the appropriate magnifications and FOV as specified in the FOV table.

3.7.2.5.1.1.4 Commander's and Gunner's Auxiliary Sights

[9876]

The commander's and gunner's auxiliary views shall be provided and displayed with the appropriate magnification and FOV as specified in the FOV table.

3.7.2.5.1.2 Thermal Displays

3.7.2.5.1.2.1 CMS Thermal

[9878]

The gunner's thermal view shall be provided and displayed with the appropriate magnifications and FOV specified in the FOV table.

3.7.2.5.2 Reticle Simulation

[2281]

All reticles, stadia lines, and symbols for the simulated sights shall be portrayed as they appear in the actual sights in color, size, magnification, function, and range, as limited by current technology.

[2282]

The reticles shall be inserted within the display plane.

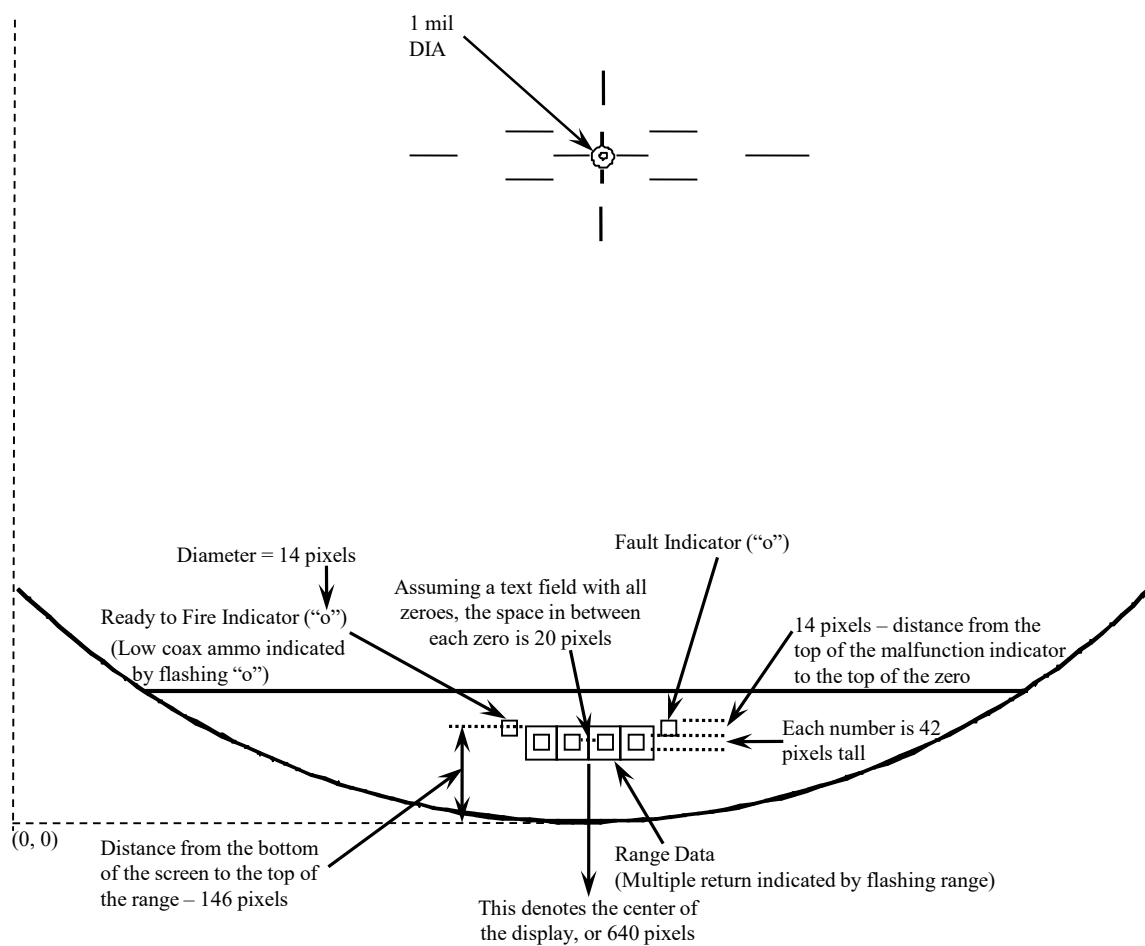
[10482]

The following reticles shall be included:

- a. Gunner's CMS DAY
 - (1) Wide and Narrow FOV reticles
 - (a) Size: (see Figures 3.7.2.5.2-1 and 3.7.2.5.2-2)
 - (b) Magnification: 3x and 8x
 - (c) Color: Brightness adjustable - Red to invisible to Black
 - (2) Symbology Multiple Return, Range Data (Displays four digits 0000-9995), Fault indications:
 - (a) Size: (see Figure 3.7.2.5.2-1)
 - (b) Color: Red
- b. CDU Gunner's DAY
 - (1) Wide and Narrow FOV reticles
 - (a) Size: (see Figures 3.7.2.5.2-3 and 3.7.2.5.2-4)
 - (b) Magnification: 3x and 8x
 - (c) Color: Adjustable - Green to invisible to Black
 - (2) Symbology Multiple Return, Range Data (Displays four digits 0000-9995), Fault indications:
 - (a) Size: (see Figure 3.7.2.5.2-3)
 - (b) Color: Green
- c. Gunner's CMS Thermal / GDU
 - (1) Narrow and Wide FOV Thermal system reticle
 - (a) Size: (see Figures 3.7.2.5.2-5 and 3.7.2.5.2-6)
 - (b) Magnification: 3.3x, 10x and 20x
 - (c) Color: Brightness adjustable - Black to Light Green
 - (2) Symbology Multiple Return, Range Data (Displays four digits 0000-9995), Fault indications:
 - (a) Size: (see Figure 3.7.2.5.2-5)
 - (b) Color: Brightness adjustable - Black to Light Green
- d. Gunner's CMS Thermal / CDU

- (1) Narrow and Wide FOV Thermal system reticle
 - (a) Size: (see Figures 3.7.2.5.2-7 and 3.7.2.5.2-8)
 - (b) Magnification: 3.3x, 10x and 20x
 - (c) Color: Brightness adjustable - Green to Black
- (2) Symbology Multiple Return, Range Data (Displays four digits 0000-9995), Fault indications:
 - (a) Size: (see Figure 3.7.2.5.2-7)
 - (b) Color: Brightness adjustable - Green to Black
- e. Commanders Panoramic Viewer Day
 - (1) Narrow and Wide FOV reticles
 - (a) Size: (see Figures 3.7.2.5.2-9 and 3.7.2.5.2-10)
 - (b) Magnification: 3.3x and 8x
 - (c) Color: Brightness adjustable - Green to Black
- f. Commanders Panoramic Viewer Thermal
 - (1) Narrow and Wide FOV reticles
 - (a) Size: (see Figures 3.7.2.5.2-11 and 3.7.2.5.2-12)
 - (b) Magnification: 1.7x and 8.6x
 - (c) Color: Brightness adjustable - Green to Black
- g. Auxiliary Sight
 - (a) Size: (see Figure 3.7.2.5.2-13 and 3.7.2.5.2-14)
 - (b) Magnification: 8x
 - (c) Color: Brightness adjustable - Black to Red
 - (d) Boresight range: +/- 10.0 mils (azimuth and elevation)
- [10079]
- h. Driver Compass
 - (a) Size: (See Figure 3.7.2.5.2.15)
 - (b) Color: Red

[10488]



Note: Drawing not to scale.

Figure 3.7.2.5.2-1. Gunner's (CMS) Day WFOV Reticle and Symbolology

[10489]

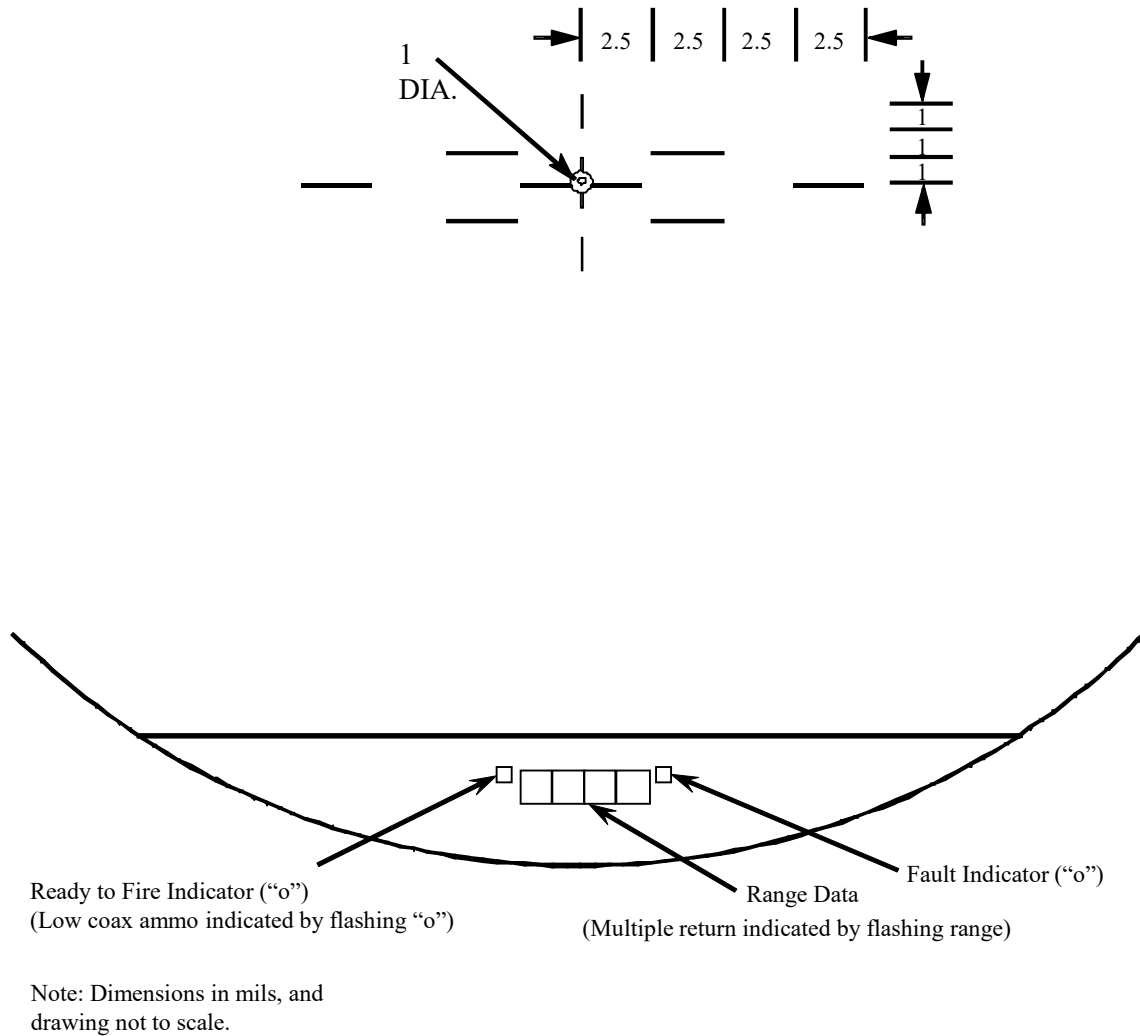


Figure 3.7.2.5.2-2. Gunner's (CMS) Day NFOV Reticle and Symbology

[10490]

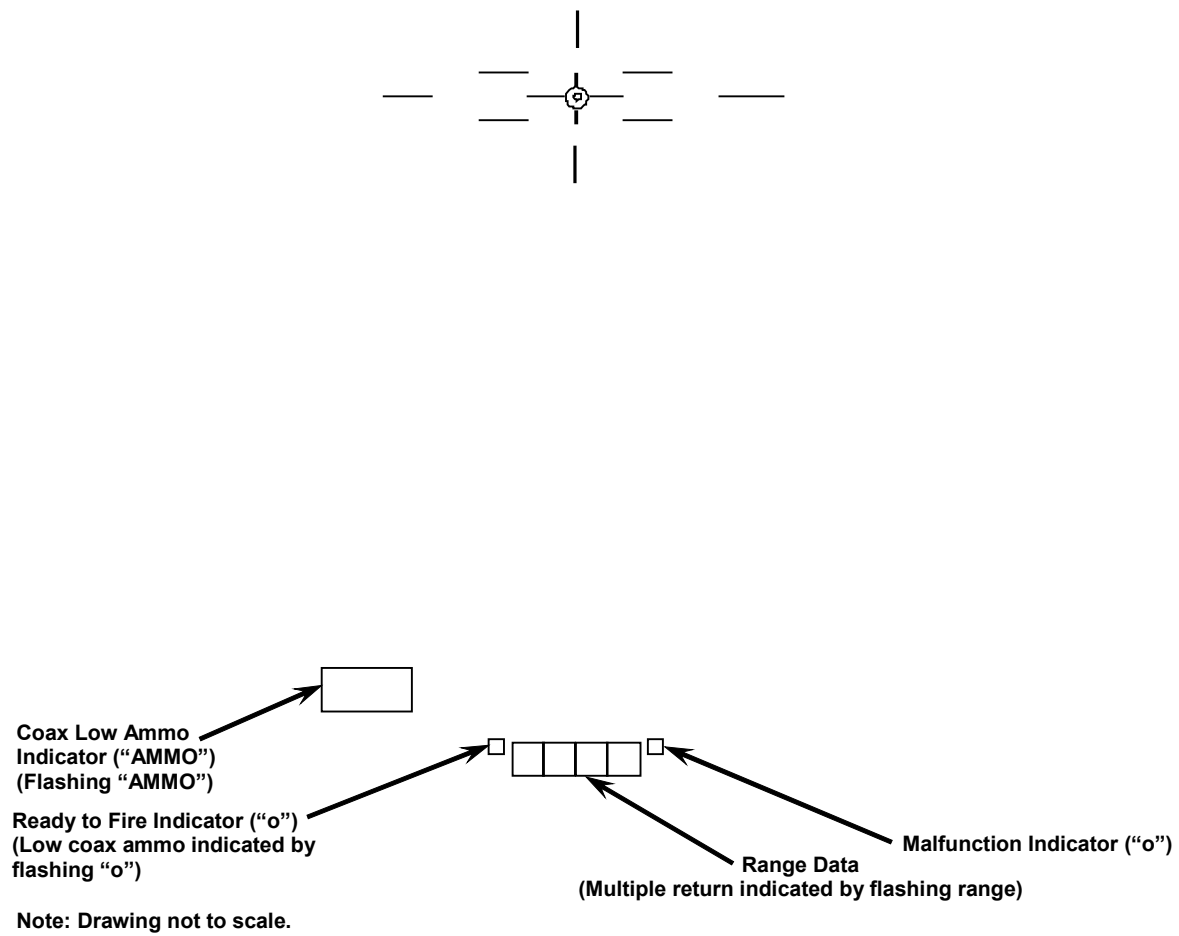


Figure 3.7.2.5.2-3. Gunner's (CDU) Day WFOV Reticle and Symbology

[10491]

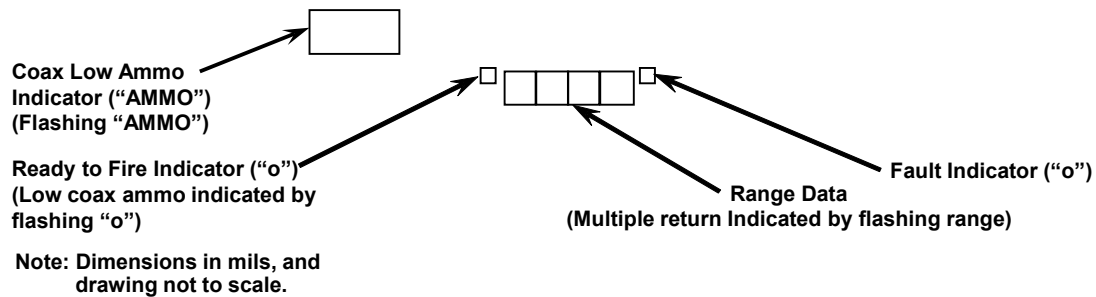
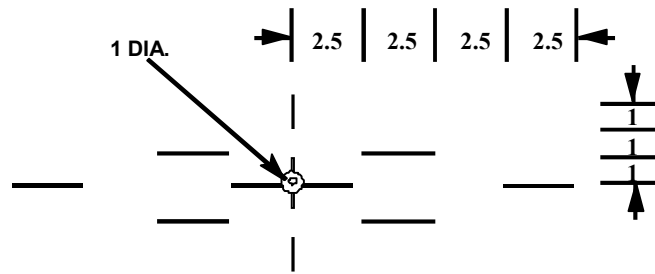


Figure 3.7.2.5.2-4. Gunner's (CDU) Day NFOV Reticle and Symbology

[10492]

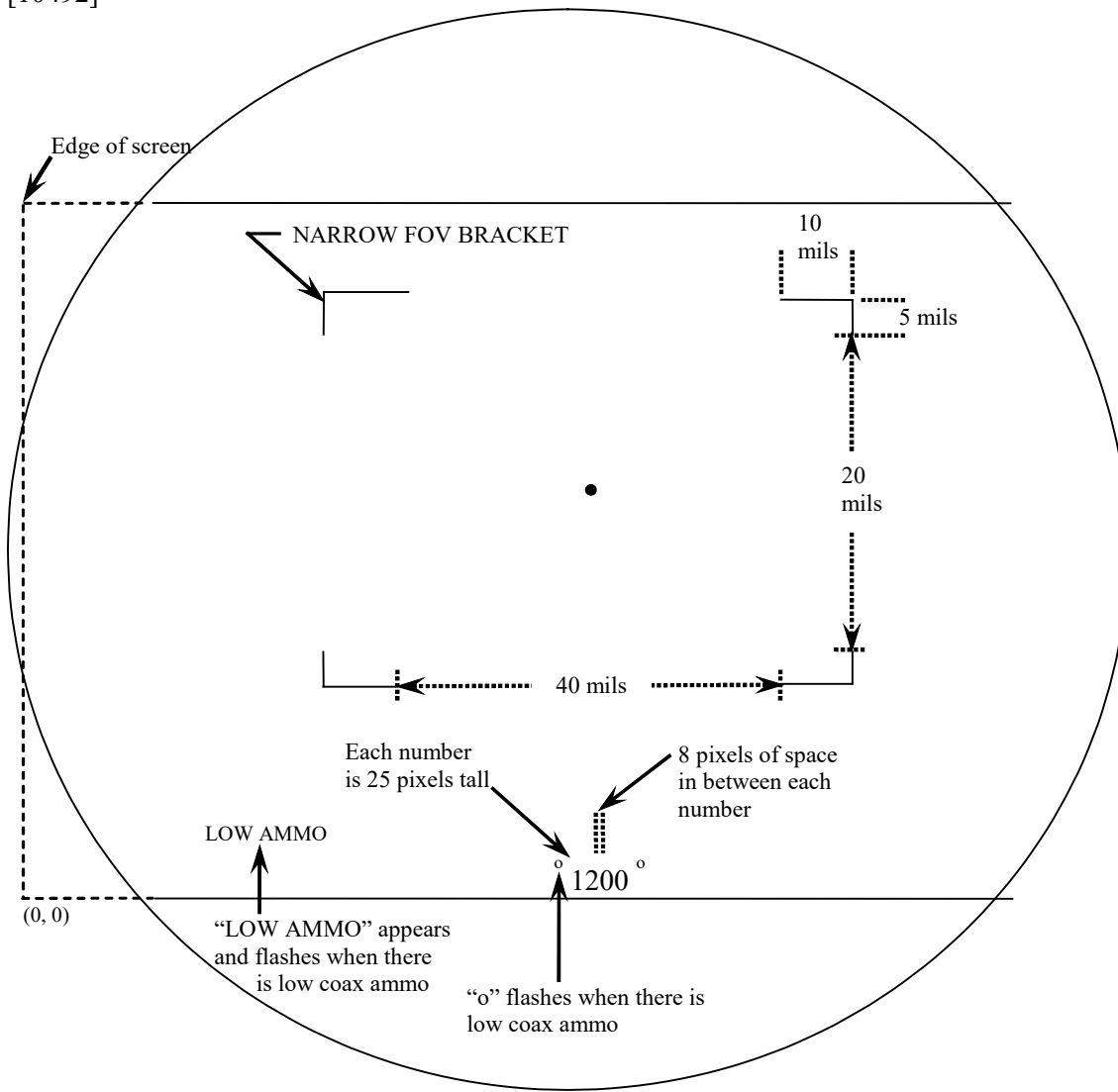


Figure 3.7.2.5.2-5. Gunner's (CMS) Thermal 3.3x Magnification

[10493]

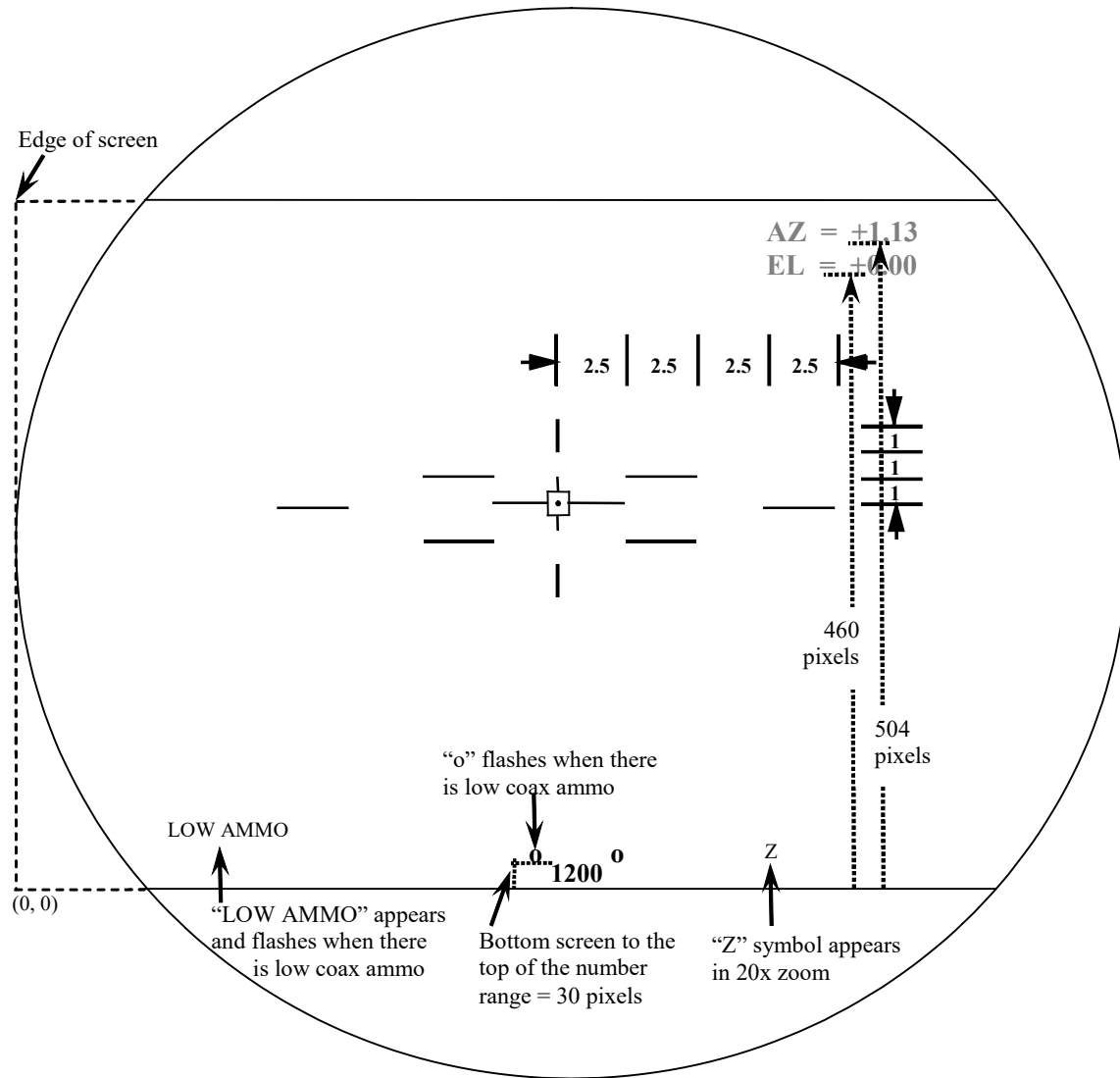


Figure 3.7.2.5.2-6. Gunner's (CMS) Thermal 10x & 20x Magnification Reticle and Symbology

[10503]

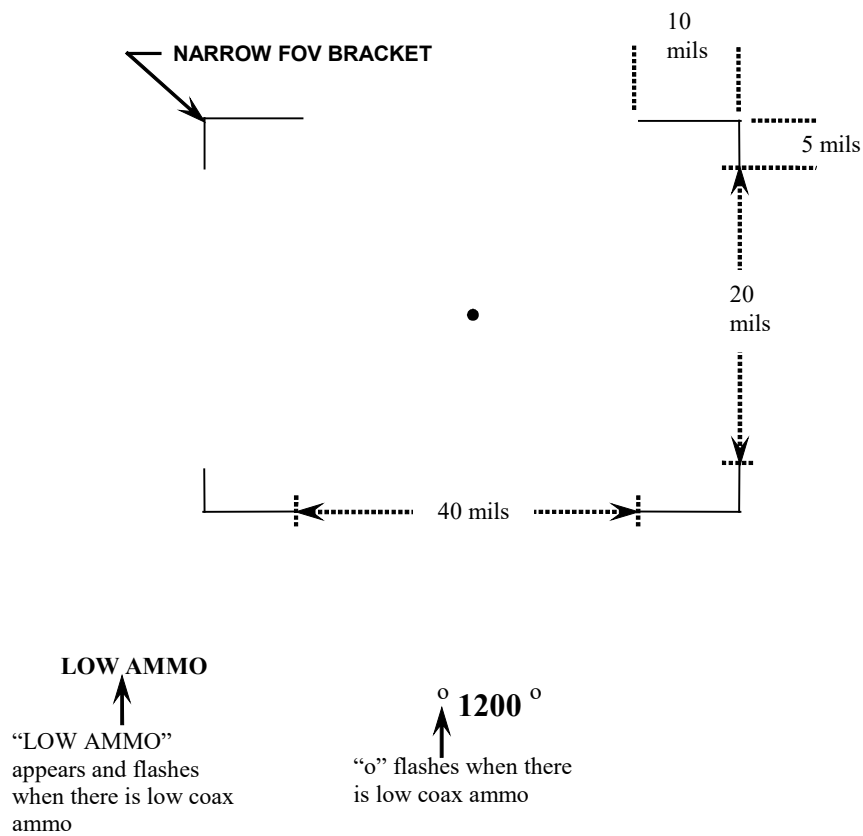


Figure 3.7.2.5.2-7. Gunner's (CDU) Thermal 3.3x Magnification

[10504]

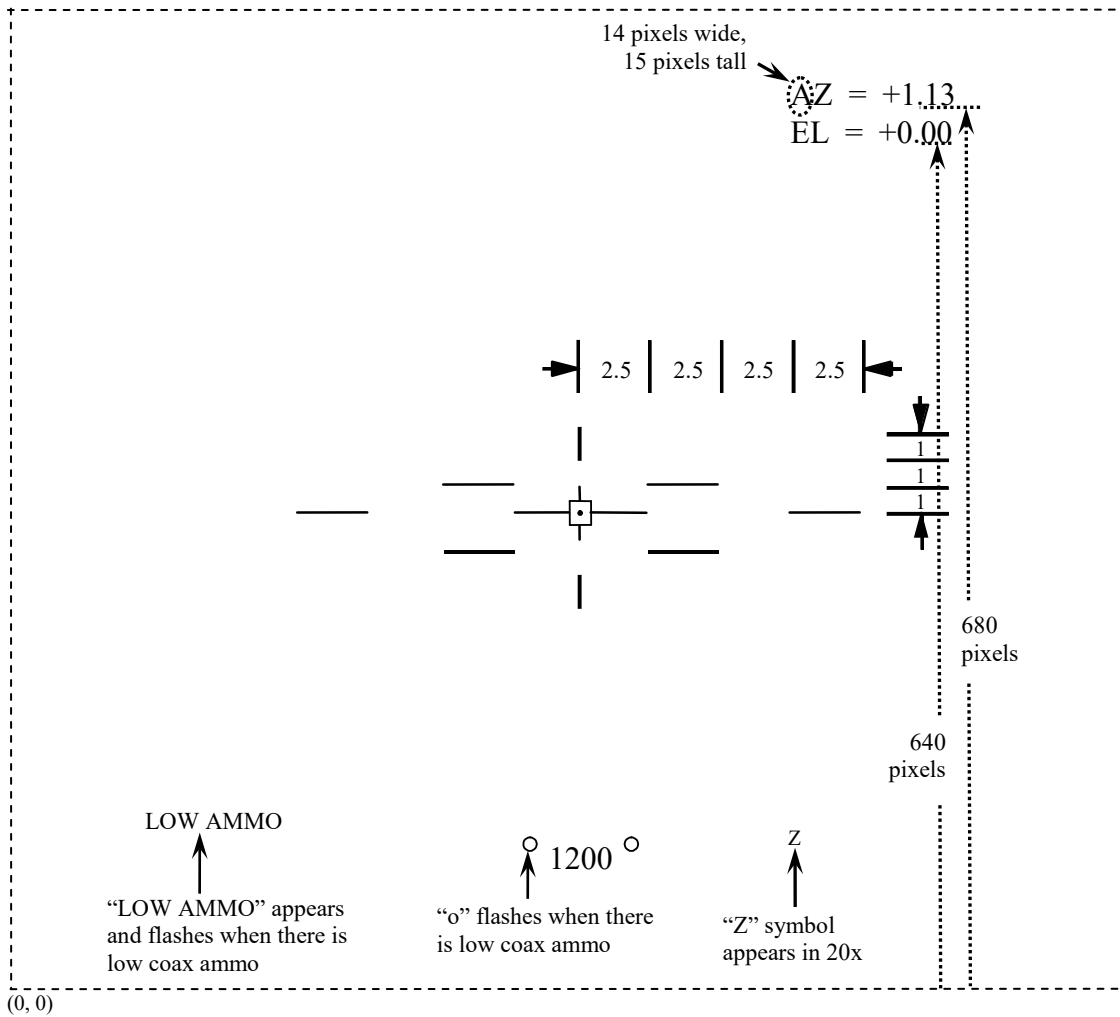
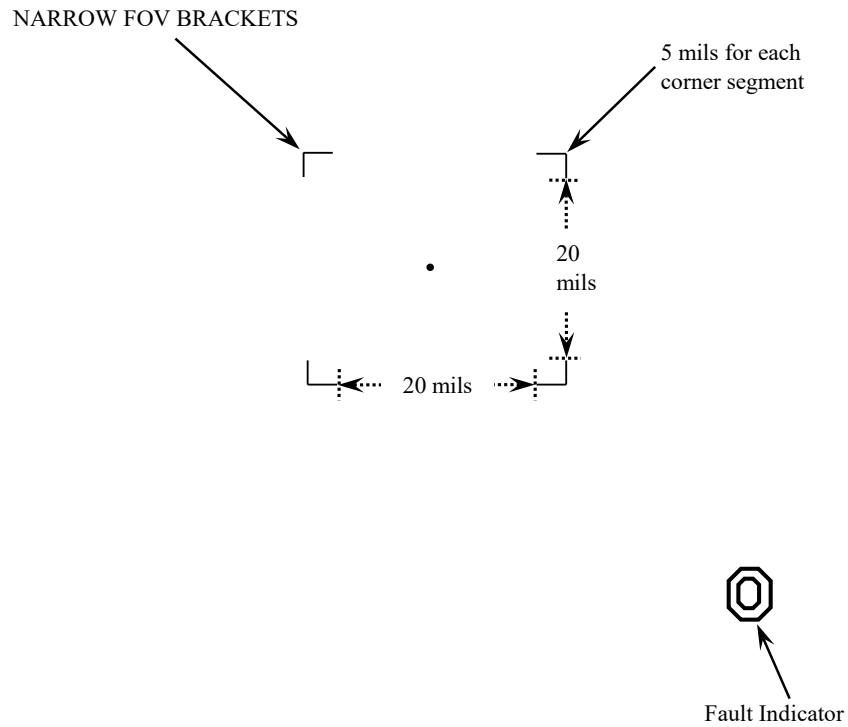


Figure 3.7.2.5.2-8. Gunner's (CDU) Thermal 10x & 20x Magnification Reticle and Symbolry

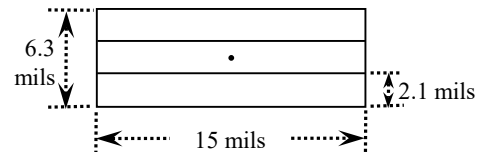
[10483]



Drawing not to scale

Figure 3.7.2.5.2-9. Commander's Panoramic Viewer Day WFOV Reticle Pattern

[10513]



Drawing not to scale

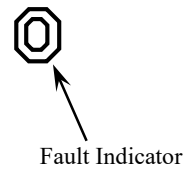
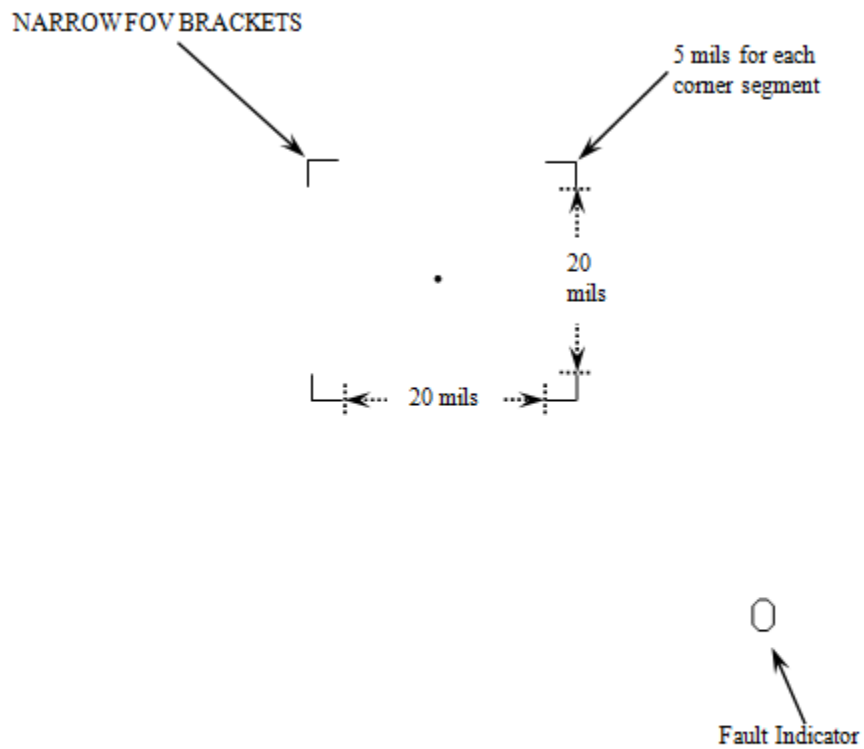


Figure 3.7.2.5.2-10. Commander's Panoramic Viewer Day NFOV Reticle Pattern

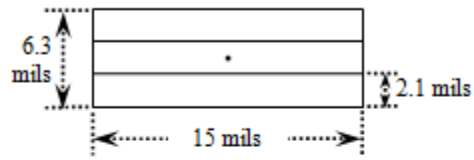
[10512]



Drawing not to scale

Figure 3.7.2.5.2-11. Commander's Panoramic Viewer Thermal WFOV Reticle Pattern

[10484]



Drawing not to scale

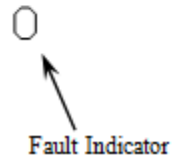


Figure 3.7.2.5.2-12. Commander's Panoramic Viewer Thermal NFOV Reticle Pattern

[9480]

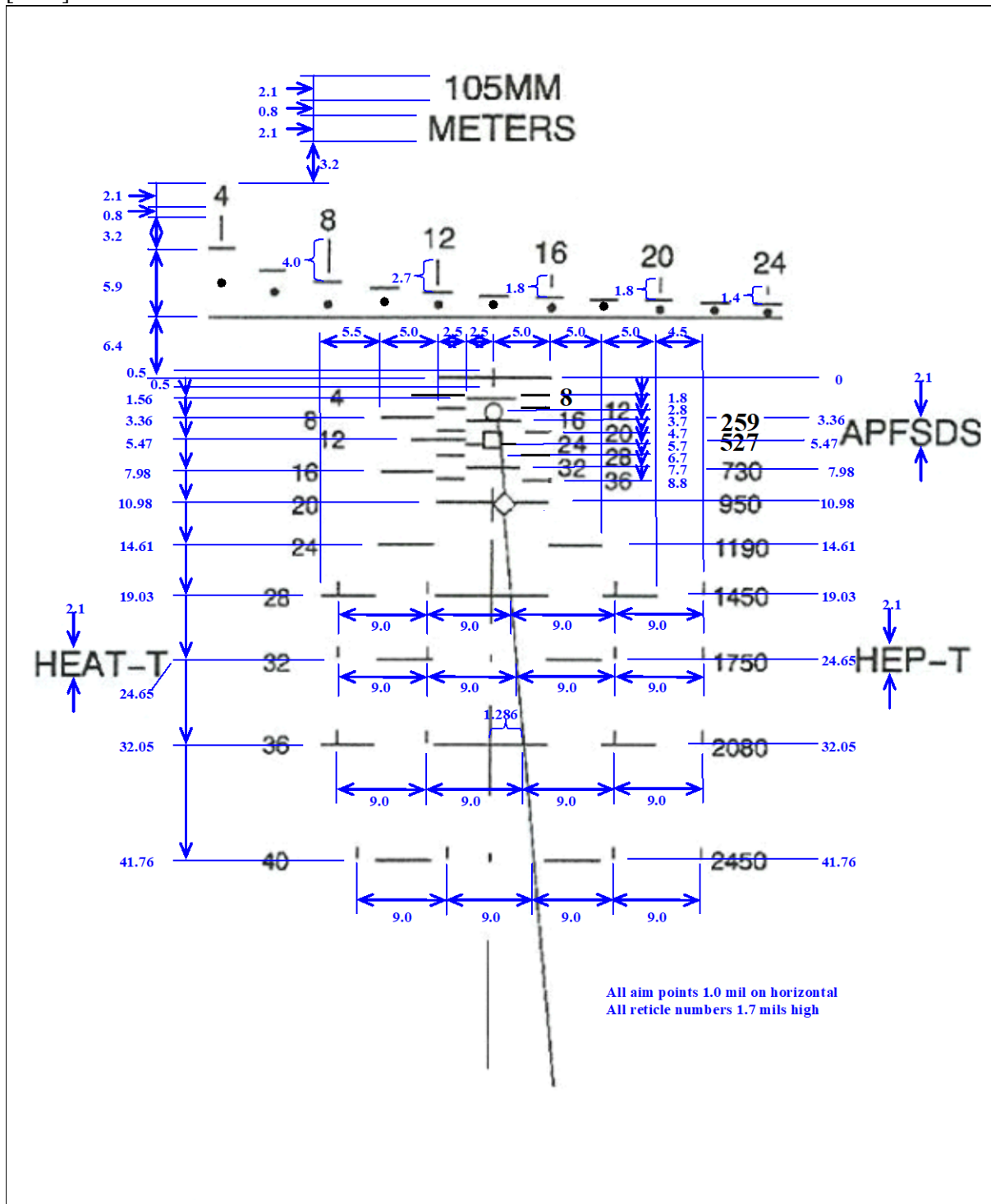
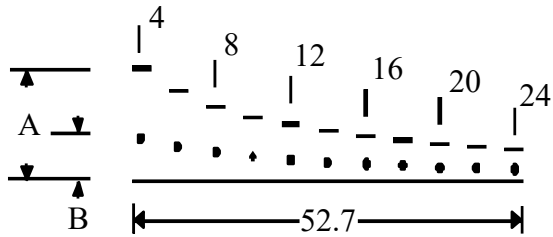


Figure 3.7.2.5.2-13. Auxiliary Sight (GAS & CAS) Reticle Pattern

[10084]



See table for corresponding dimensions of A and B in mils.

Note: The figure is not to scale. See Aux Reticle pattern figure for scale.

Stadia Detail		
Range ~ Meters	A	B
400	5.9	2.2
600	3.9	1.5
800	2.9	1.1
1000	2.3	0.9
1200	2.0	0.8
1400	1.7	0.7
1600	1.5	0.6
1800	1.3	0.5
2000	1.2	0.5
2200	1.1	0.4
2400	1.0	0.4

Figure 3.7.2.5.2-14. Auxiliary Sight Stadia Dimensions

[10043]

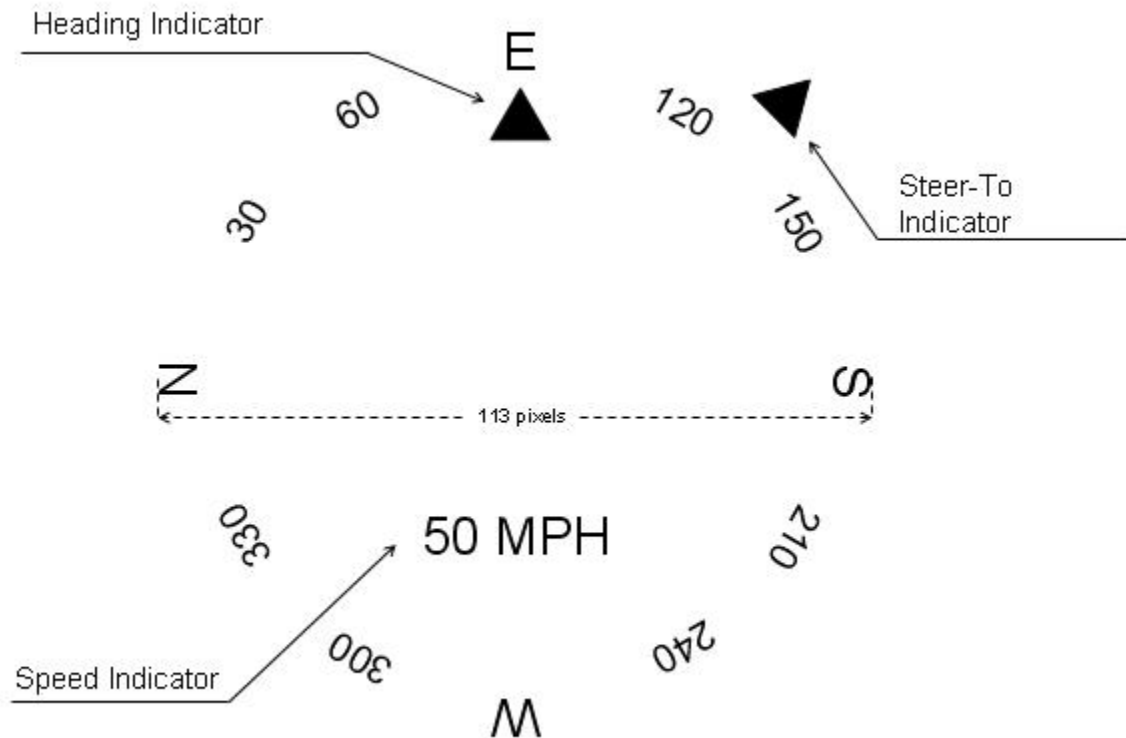


Figure 3.7.2.5.2-15. Driver Compass

[10045]

The Heading Indicator and Speed Indicator shall be stationary as the compass rotates to signify the ownvehicle heading.

[10046]

The Steer-To Indicator shall rotate to guide the driver to the next activation point during free movement mode only.

[10047]

The compass shall display direction in degrees.

[10048]

The Speed Indicator shall display the ownvehicle speed in MPH as a two digit unsigned number.

3.7.2.6 VISUAL ENVIRONMENT DESIGN

3.7.2.6.1 Reserved

3.7.2.6.1.1 Reserved

3.7.2.6.1.2 Compensation for System Limitations

[9881]

Terrain environment fidelity may be limited to current technology.

3.7.2.6.2 Visual and Thermal Viewer Databases

[2314]

The visual system includes a digital database of the training environment. The digital databases include all image data, polygon, and object definition data, and all other data required to describe, define, and control the visual and sensor scenes required by this specification. Real-time software which produces the scenes is not considered a part of the database. The same geometric definitions and object characteristics shall be used for the visual and thermal sensor databases to the extent that object occurrence, object appearance, object location, terrain shape, terrain elevation, surface materials and other environment characteristics are the same as discernible by the trainees using the simulated viewing devices.

[2315]

The fidelity of each supplied terrain database shall be sufficient to enable the complete visual and thermal sensor simulation system to meet all of the performance requirements of this specification.

3.7.2.6.2.1 Deliverable Database

[9882]

The visual system shall use the following existing databases containing the following areas:

- a. USMC MOUT - no less than 1 square kilometer geo-generic urban training area database, with a boundary of no less than 1 kilometer beyond the perimeter of the gaming area.
- b. Korea - a geo-typical representation of the 8 nm x 10 nm area selected for training; database shall be enhanced and generated from the Lot 1 Korea database source data.
- c. Arab MOUT - the MOUT databases shall be enhanced and generated from the corresponding Lot 1 database source data.
- d. 29 Palms - 400 sq. km desert training area database.

3.7.2.6.2.2 - 3.7.2.6.2.5 Reserved

3.7.2.6.2.6 Database Maps

[10071]

The FBCB2 functionality shall require correlated FBCB2 2D maps of each database.

[2328]

Copies of the 1:50 scale maps with military grid reference system (MGRS) shall be provided {2 hardcopies and 1 softcopy (PDF)} for each deliverable database.

3.7.2.6.3 General Database Requirements

[9883]

Resolution - terrain height/texture shall be sufficient to support realistic vehicle mounted training.

Mask Targets

Intervisibility Lines (IV)

Content - terrain databases features-

- Small Hills
- Large Hills (with slope from 0-70 percent)
- Foliage of various densities
- Open terrain
- Soils of various density and moisture content
- Woodland with light and medium density tree cover
- Obstacles such as rock outcrops, stumps, logs and ditches
- Bodies of water and drainage (i.e., rivers and ditches)
- Sealed primary roads, unsealed secondary roads and tracks
- Rural cultural features-
 - Small towns
 - Villages/farms
- Urban/built-up area (Building models)

Boundaries software expresses terrain boundaries by -

- Impenetrable forest boundary
- Mountainous terrain

Database boundaries shall consist of impenetrable boundaries to prevent moving models from falling off of the database when in free play mode.

3.7.2.6.3.1 Use of Texture

[2326]

Texture image data shall be used throughout the database to enhance the information content of scene elements and to add realism to their appearance. The primary purpose of image data is to accurately convey information about the environment and the gunnery situation.

[2327]

The image data shall provide the following:

- a. Indicate surface material and significant surface characteristics which can normally be detected visually or with the simulated imaging sensors.
- b. Depict subpolygon shape variations such as rocky ground.
- c. Reduce polygon content through the use of photographic imagery on simple polygon models.
- d. Represent complex arrays and patterns of natural cultural features in the distant scene.
- e. Geotypical image data which has the correct appearance for the surface material and geographical area being simulated.

3.7.2.6.3.2 Generic Regions

[2334]

Generic terrain may be used throughout the databases and if utilized, the generic terrain shall support the requirement for preplanned movement anywhere within the environment. Generic terrain may be used cyclically and scene details that modeled and stored one time may be used repeatedly. Such repetition shall not be immediately obvious to the viewer.

3.7.2.7 GENERAL USE MODELS

[9884]

The models shall support multiple textures for different training environments.

[9885]

Levels of detail shall be utilized to accomplish the variation with range and magnification, as applicable.

[9886]

Damaged and killed target representation of all hard target types shall be utilized.

[9278]

Platoon own vehicles shall be provided with no bumper number designators.

[9887]

Friendly and hostile vehicles shall be modeled with sufficient detail to permit detection, recognition, identification within the limits imposed by visual resolution.

[2340]

Target models shall be modeled to reflect their survivability characteristics. Targets are defined as soft targets or hard targets. Soft targets shall be killed when hit by low caliber ammunition and the hit-kill criteria is met. Hard targets shall only be killed when hit by main gun ammunition and the hit-kill criteria is met.

[2341]

Modeling emphasis of the vehicles shall be on overall shape and significant identifying details.

[2342]

Vehicle parts which can move independently of the vehicle such as gun tubes and which are relevant to the training problem shall be separately articulated in the models.

[10328]

Wheeled vehicles shall have simulated moving (i.e., forward and backward) and turning (i.e., directional) rolling wheels.

[10329]

Tracked vehicles shall have simulated moving (i.e., forward and backward) tracks.

[2343]

Friendly and hostile aircraft shall be modeled with sufficient detail for detection and classification within the limits imposed by visual resolution.

[2344]

Modeling emphasis of the aircraft shall be on overall shape and significant identifying details.

[10327]

Target models shall be a combination of GFI CM2 models and AGTS legacy models.

[10201]

All CM2 models shall use a minimum of 512 x 512 resolution textures, within the limits of GFI CM2 source resolution textures, with a goal of 1024 x 1024.

[9888]

Dynamic dust clouds shall be visible behind wheeled and tracked vehicles when traveling on non-paved, dry portions of the databases.

[9889]

Rifle and machine gun effects shall be simulated.

[10073]

The lifeform simulation software shall be applied to the following entities:

- 1) OPFOR (opposing force),
- 2) Civilian, and
- 3) Friendly

combined with the weapons and actions specified in Table 3.7.2.7.1-2.

3.7.2.7.1 Deliverable General Use Models

[9787]

The general use models shall be provided for general use in the training environments with sufficient detail for detection and classification within the limits imposed by visual resolution. Table 3.7.2.7.1-1 lists the target models, and Table 3.7.2.7.1-2 lists the life form models.

[2800]

Table 3.7.2.7.1-1. Target Models

TARGET NAME	Target Category and Friendly / Enemy		Model Description
	Target Category	Friendly / Enemy	
Aircraft			
SU-25	aircraft	Enemy	FWA Frogfoot Attack Aircraft
AV-8B	aircraft	Friendly	FWA Harrier (short take-off)
F/A-18E	aircraft	Friendly	US FWA Super Hornet
V-22	aircraft	Friendly	US Osprey (FWA/RWA)
Enemy PC's			
BMD-2	apc	Enemy	Amphibious Infantry Combat Vehicle (IFV)
BMP-1P	apc	Enemy	Ground, Vehicle Soviet, IFV
BMP-2	apc	Enemy	Ground, Vehicle Soviet, IFV
BMP-3	apc	Enemy	Ground, Vehicle Soviet, IFV
BTR-152	apc	Enemy	Soviet BTR-152 6X6 Armored Personnel Carrier
BTR-60PB	apc	Enemy	Ground, Vehicle Soviet, APC
BTR-70	apc	Enemy	Armored Personnel Carrier green/camo
BTR-80	apc	Enemy	Ground, Vehicle Soviet, APC
BTR-T	apc	Enemy	Ground, Russian Tracked APC
MT-LB	apc	Enemy	Amphibious Artillery Command and Reconnaissance Tracked Vehicle
OT-62B	apc	Enemy	Mechanized Infantry Combat Vehicle
PSZH	apc	Enemy	PSZH-IV Armor Vehicle
Type 85 APC	apc	Enemy	N. Korea Tracked APC (VTT 323)
Type 92 WZ551	apc	Enemy	Chinese Wheeled APC
ZSU-23-4	apc	Enemy	Ground, Vehicle Soviet anti-aircraft
Enemy Light PC's			
BRDM-2 w/ AT-5	light_apc	Enemy	Ground, Vehicle Soviet, BRDM-2 variant w/ AT-5 ATGM
BRDM-2	light_apc	Enemy	BRDM-2 Armored Reconnaissance Vehicle

[2801]

Table 3.7.2.7.1-1. Target Models (continued)

TARGET NAME	Target Category and Friendly / Enemy		Model Description
	Target Category	Friendly / Enemy	
Friendly PC's			
AAAV	apc	Friendly	Advanced Amphibious Assault Vehicle
AAVP7A1	apc	Friendly	Assault Amphibious Vehicle Personnel tracked
K-200	apc	Friendly	Ground, Korea, IFV
LAV-150m20	apc	Friendly	LAV-150/20mm Gun
LAV-150m50	apc	Friendly	LAV-150/50mm Gun
LAV-150m90	apc	Friendly	LAV-150/90mm Gun
LAV-25	apc	Friendly	Ground, Vehicle US, LAV-25
LAV-AG	apc	Friendly	Ground, Vehicle US, LAV-Assault Gun
LAV-AT	apc	Friendly	Ground, Vehicle US, LAV-AT LAV w/ TOW II ATGMs
LAV-C2	apc	Friendly	Ground, Vehicle US, LAV-Command and Control
LAV-M	apc	Friendly	Ground, Vehicle US, LAV-Mortar
M113A2	apc	Friendly	Ground, Vehicle US, Amphibious APC
M113A3	apc	Friendly	Ground, Vehicle US, Amphibious APC
M2A2	apc	Friendly	Ground, Vehicle US, Fighting vehicle
M2A3	apc	Friendly	Ground, Vehicle US, Fighting vehicle
M88A2	apc	Friendly	Ground, Vehicle US, Recovery Vehicle
M93A1	apc	Friendly	FOX M93A1 (NBCRS)
Marder 1A3	apc	Friendly	Ground, German Armored Infantry Fighting Vehicle
M1126 (STRYKER ICV)	apc	Friendly	Ground, Vehicle US, Stryker ICV with SLAT armor
M1127	apc	Friendly	Ground, Vehicle US, Stryker RV with slat armor
M1128	apc	Friendly	Ground, Vehicle US, Stryker MGS without slat armor
M1129 (STRYKER MC)	apc	Friendly	Stryker MC w/ slat
M1130 (STRYKER ICV)	apc	Friendly	Stryker ICV w/ slat

[2802]

Table 3.7.2.7.1-1. Target Models (continued)

TARGET NAME	Target Category and Friendly / Enemy		Model Description
	Target Category	Friendly / Enemy	
Friendly PC's (continued)			
M1131 (STRYKER FSV)	apc	Friendly	Stryker FS w/ slat
M1132 (STRYKER ESV)	apc	Friendly	Ground, Vehicle US, Stryker ESV with slat armor and mine roller
M1133 (STRYKER MEV)	apc	Friendly	Stryker Ambulance w/ SLAT
M1134 (STRYKER ATGM)	apc	Friendly	Stryker ATGM w/ SLAT
M1135 (STRYKER NBCRV)	apc	Friendly	Stryker NBCRV w/ SLAT
PANHARD VBL	apc	Friendly	Panhard VBL French Vehicle. New weapons system
Scorpion (FV101)	apc	Friendly	Scorpion Fire Support Vehicle
Civilian Vehicles			
Ambulance Late 70s Volkswagen type	civilian_vehicle	Friendly	Civilian Vehicle (White)
Car Fiat Sedan	civilian_vehicle	Friendly	Civilian Car (Silver)
Civilian Bus	civilian_vehicle	Friendly	Civilian Bus
Pickup Truck Nissan	civilian_vehicle	Friendly	Civilian Truck
Pickup truck Toyota Tacoma 1995 Extra Cab	civilian_vehicle	Friendly	Civilian Truck
Taxi Chevy Caprice old Yellow	civilian_vehicle	Friendly	Civilian Taxi cab
Truck FedEx (Ex-Fed)	civilian_vehicle	Friendly	Civilian Truck (Gray)
Toyota 4 Runner SUV	civilian_vehicle	Friendly	Civilian SUV
Toyota Tercel car	civilian_vehicle	Friendly	Civilian car
Friendly Motorcycle			
KLR 250-D8	civilian_vehicle	Friendly	Marine Corps Motorcycle
Enemy Anti-Tank			
AT-5	at_type	Enemy	Russian SPANDREL Ground Mount wire-guided Missile Launcher
Panels			
BORESIGHT PANEL	panel	Friendly	Boresight Panel
ST5	panel	Friendly	ST5 Panel
ZERO PANEL	panel	Friendly	Zero Panel
Emplacements			
Machine Gun Nest	DI_nest	Enemy	Machine Gun Nest

[2803]

Table 3.7.2.7.1-1. Target Models (continued)

TARGET NAME	Target Category and Friendly / Enemy		Model Description
	Target Category	Friendly / Enemy	
Enemy Helicopter			
KA-52	helicopter	Enemy	RWA Hokum
Mi-8T	helicopter	Enemy	RWA HIPC military transport
Mi-24P	helicopter	Enemy	Aircraft, Rotary Wing, Russian Hind
Friendly Helicopter			
AH-1W	helicopter	Friendly	RWA Super Cobra
AH-64D	helicopter	Friendly	Aircraft, Longbow Apache Helicopter
CH-47D	helicopter	Friendly	Cargo/Troop Helicopter CH-47 variant
CH-46E	helicopter	Friendly	RWA Sea Knight
CH-53D	helicopter	Friendly	RWA Stallion
OH-58D	helicopter	Friendly	Aircraft, Rotor Wing, Armed Scout Helicopter
MH-6	helicopter	Friendly	RWA Defender 500 / MH-6
UH-1N	helicopter	Friendly	UH-1N Iroquois (Huey) RWA
UH-60L	helicopter	Friendly	Utility Helicopter
Enemy Light Tank			
T-55	light_tank	Enemy	Ground, Main Battle Tank
T-62	light_tank	Enemy	Ground, Vehicle Russian, Tank
Type 63	light_tank	Enemy	Ground, Korea, Main battle tank
Enemy Heavy Tank			
T-64B	tank	Enemy	Main Battle Tank
T-72M	tank	Enemy	Ground, Vehicle Soviet, Tank with reactive armor
T-72BV	tank	Enemy	Ground, Vehicle Soviet, Tank, battle w/ reactive armor
T-80	tank	Enemy	Russian Main Battle Tank without reactive armor
T-80BV	tank	Enemy	Russian Main Battle Tank, with reactive armor
T-90A	tank	Enemy	Main Battle Tank
Type 98	tank	Enemy	Chinese Tank
BMP-T (TSCV)	tank	Enemy	Russian tank support combat vehicle

[2804]

Table 3.7.2.7.1-1. Target Models (continued)

TARGET NAME	Target Category and Friendly / Enemy		Model Description
	Target Category	Friendly / Enemy	
Friendly Tanks			
AMX-10RC	tank	Friendly	Ground, Recon amphibious Wheeled Vehicle
AMX-30	tank	Friendly	Ground, Main Battle Tank
CENTURION	tank	Friendly	British Tank
CHALLENGER 1	tank	Friendly	British Main Battle Tank
CHALLENGER 2	tank	Friendly	Main Battle Tank
CHIEFTAIN	tank	Friendly	Ground, Vehicle NATO, Tank
K-1	light tank	Friendly	Ground, Korea, K1A1 MBT
Leclerc	tank	Friendly	NATO Ground APC AMX-40
Leopard 1 A5	tank	Friendly	Ground, Battle Tank, Leopard 1 A5
Leopard 2 A6	tank	Friendly	Ground, Battle Tank, Leopard 2 A6
M1A1 SCWS	tank	Friendly	Ground, Vehicle US, Tank
M1A2 CROWS II	tank	Friendly	M1A2 tank with System Enhancement Package
M60A3	tank	Friendly	M60A3 combat tank, 105 mm (operational)
Merkava - III	tank	Friendly	Merkava MK3 MK4
Merkava - IV	tank	Friendly	Ground, Main Battle Tank
Towed Gun			
M109A6	towed_gun	Friendly	Paladin Self Propelled Howitzer
M198	towed_gun	Friendly	Towed Howitzer 155mm Artillery
Enemy Trucks Without Weapon			
GAZ-39371	truck_without_weapon	Enemy	GAZ-39371 Amphibious 4x4
GAZ-66	truck_without_weapon	Enemy	Cargo Transport 4W Canvas
Land Rover 4x4	truck_without_weapon	Enemy	Civilian Land Rover 4x4 (White)
Mercedes Tech Truck Mod	truck_without_weapon	Enemy	Mercedes Tech Truck modified
URAL-4326	truck_without_weapon	Enemy	KAMA 4326 Ural Truck

[2805]

Table 3.7.2.7.1-1. Target Models (continued)

TARGET NAME	Target Category and Friendly / Enemy		Model Description
	Target Category	Friendly / Enemy	
Friendly Trucks Without Weapons			
FH16	truck_without_weapon	Friendly	Volvo Cargo Truck
ILTIS Jeep	truck_without_weapon	Friendly	Bombardier ILTIS Jeep Canadian
Pinzgauer 712M	truck_without_weapon	Friendly	Soft topped 6x6 variant
Steyr	truck_without_weapon	Friendly	Ground, Truck
Enemy Trucks			
BM-21	truck	Enemy	MLRS
BM-27	truck	Enemy	Russian MRL
MIT5 Tech mortar	truck	Enemy	Mitsubishi Tech Truck w/ 60mm mortar
Pegasso Tech Truck	truck	Enemy	Pegasso Tech Truck modified
UAZ-69	truck	Enemy	UAZ-69 Jeep w/ Snapper on rear
UAZ-469	truck	Enemy	Soviet 4x4 light truck
ZIL-131	truck	Enemy	Russian Truck Six Axle truck transport cargo
Small Trucks			
Toyota Tech w/ 12.7mm	small_truck	Enemy	Civilian Truck (Tan)
Toyota Tech Recoilless Rifle	small_truck	Enemy	Civilian Truck
Toyota Truck w/ .50 cal on bed	small_truck	Enemy	Civilian Truck
Enemy Missile Launchers (ADA)			
SA-6 TEL	missile_launchers	Enemy	Mobile SAM
SA-8 TELAR	missile_launchers	Enemy	Russian single stage Surface to Air Missile
Friendly Trucks			
MTVR	truck	Friendly	Truck 7 ton (6x6) US
M998	truck	Friendly	Ground, Veh. US, Utility Truck
M1044 (HMMWV 50 CAL)	truck	Friendly	Ground, Veh. US, Armored carrier HMMWV w/ .50 cal
M1046 (HMMWV TOW)	truck	Friendly	HMMWV TOW Missile Carrier
MK-48 w/ MK-14	truck	Friendly	Logistics Vehicle System (LVS)
M35	truck	Friendly	Ground, Veh. US, Truck
M939	truck	Friendly	5 Ton Truck
M998 Avenger	truck	Friendly	HMMWV w/ Mobile SAM
M270	truck	Friendly	Ground, Veh. US, MLRS Multiple Launch Rocket System

[10398]

Table 3.7.2.7.1-2. Life Form Models

Life Form Group	Friendly / Enemy	Stances
Middle Eastern Civilians (w/o weapon) or animals	Friendly	Stand, Walk, Jog*, Run, Dead
European Civilians (w/o weapon) or animals	Friendly	Stand, Walk, Jog*, Run, Dead
Middle Eastern Insurgents (w/ weapon)	Enemy	Stand, Walk, Low Walk, Jog, Run, Kneel, Prone, Crawl, Dead
European Insurgents (w/ weapon)	Enemy	Stand, Walk, Low Walk, Jog, Run, Kneel, Prone, Crawl, Dead
Middle Eastern OPFOR (w/ weapon)	Enemy	Stand, Walk, Low Walk, Jog, Run, Kneel, Prone, Crawl, Dead
European OPFOR (w/ weapon)	Enemy	Stand, Walk, Low Walk, Jog, Run, Kneel, Prone, Crawl, Dead
BLUFOR (with or without weapon)	Friendly	Stand, Walk, Jog, Run, Kneel, Prone, Dead

Note: * Stance does not apply to animals.

[10399]

Insurgent and OPFOR human life forms shall have the capability of carrying the following weapons:

- AK-47
- RPK-74
- RPG
- Pistol

[10400]

BLUFOR human life forms shall have the capability of carrying the following weapons:

- M16A2
- M4
- M240

[10401]

Armed human life forms shall be capable of being emplaced in windows, rooftops, and balconies of buildings in the databases that support such capabilities.

[10402]

Each human life form carrying a weapon shall be capable of aiming and firing the weapon.

[10403]

The system shall be capable of providing variety of life form appearances and mannerisms.

Each life form within a Life Form Group shall be capable of being randomly replaced by another life form within the same Life Form Group.

[10404]

Human life form movement animation (e.g., walk, run) shall be synchronized with the speed at which the life form moves across the terrain.

[10405]

Four different stand, walk, run, and die animations shall be supported on human life forms* in order to provide life form animation variety.

*Note: This requirement shall not apply to BLUFOR life forms.

[10406]

Different human life form animations for stand, walk, run, and die shall vary across life forms* so that displayed life forms shall have a variety of animated motions.

*Note: This requirement shall not apply to BLUFOR life forms.

[10407]

Rate of animation transitions shall be varied such that human life forms* shall change between postures at slightly different time durations.

*Note: This requirement shall not apply to BLUFOR life forms.

3.7.2.7.2 Target Hit Plates

[10408]

Target hit plates shall define the volumes of the target that when hit by an ammunition round, results in some damage to the target.

[10409]

Target damage shall be classified as either:

- a. Mobility hit (M-Hit)
- b. Catastrophic kill (K-Kill)

[10410]

A target may have hit plates that define multiple volumes which have been assigned either mobility hit or catastrophic kill classifications. The type of hit shall be determined based on ammunition type, range, and the classification of hit volume intersected by the trajectory of the ammunition round.

3.7.2.7.3 Reserved

3.7.2.7.4 Special Models

[9799]

The following special models and special effects shall be utilized to support the training environment:

- a. Relocatable Models
 - Relocatable Breachable Walls
 - Damageable Bunkers
 - Decals for Wall Breaching and Room Clearing
 - Shipping Label for Wall Breaching and Room Clearing
 - MGS Battle Position
 - Bunkers-Des (4 states)
 - Bunkers-Euro (4 states)
 - Destroyed Car Piles
 - Pile of Tires
 - Jersey Walls
 - Tree Logs
 - Jacks
- b. Fixed Damageable Features
 - Buildings (Decal)

- Fixed Wall (Wall Breaching exercises)
- Fixed Wall (for Room Clearing exercises)
- c. Ammunition Effects
 - Ownvehicle Ammo Impact Effects
 - Sabot Hit
 - Sabot Miss
 - HEAT Hit
 - HEAT Miss
 - HEAT building/wall hole
 - HEP Hit
 - HEP Miss
 - HEP building/wall hole
 - Hit effects on buildings
 - Hit effects on walls
 - Canister Splash Effect
 - Catastrophic Explosion
 - Near Miss Explosion
 - Artillery Fire
 - 3-Dimensional Craters
 - Munition Water Splash
 - Coax Hit
 - Coax Miss
 - Wall breaching damage effect
 - Muzzle flash (Main Gun)
 - Machine Gun Effect on Building
 - Ownvehicle Smoke Grenade
 - Dynamic Target Smoke Grenade
 - Muzzle flash
- d. Other Special Effects & Models
 - Mortar/Flare Illumination
 - Dynamic Tactical Smoke
 - Dynamic Dust Clouds/Trails
 - Smoke from target
 - Enhanced Large explosion
 - Enhanced Medium explosion
 - Enhanced Small explosion
 - Tactical Fire
 - 2-Dimensional Vehicle Tracks
- e. Atmospheric, Meteorological and Water Models & Effects
 - Sky
 - Water Motion
 - Lake Ripples
 - River Ripples with Directional Flow
 - 3-Dimensional Ocean Waves
 - Ownvehicle Splash

[10363]

Machine Gun Effect on Buildings:

A Machine Gun impact effect shall be applied on database buildings.

[10364]

Machine Gun impact effect shall vary according to munition type.

[10365]

Machine Gun impact effects shall be provided for the following type of machine gun:

Coax

[10366]

The Machine Gun effect on building special effect shall be displayed as a pockmark at the location of the simulated round impact.

[10367]

The size of the pockmark shall approximate the type of round impacting the structure.

[10368]

Machine gun impact effects shall be persistent and shall remain visible from one situation to the next.

[10369]

The system shall be capable of displaying up to 200 machine gun effects on buildings.

[10370]

Once the maximum number of machine gun effects is reached, the first effects generated shall be removed as new ones are applied.

[10371]

3-Dimensional Craters:

The 3-Dimensional crater model shall be capable of being generated on the terrain surface only. The 3-Dimensional crater model shall not be required on manmade structures (including bridges and buildings) or water.

[10372]

The OV model shall react to the terrain elevation change as a result of the 3-Dimensional crater model.

[10373]

3-Dimensional craters shall provide a real-time deformation to ground elevation on the terrain surface.

[10374]

3-Dimensional craters shall adjust contour to allow for placement on sloped and non-planer surfaces.

[10375]

The system shall provide at least four different sizes of 3-Dimensional craters.

[10376]

3-Dimensional craters shall be generated as a result of the following types of weapon fire:

- Ownvehicle main gun rounds - HEAT, HEP (not Canister or Sabot rounds),
- Friendly artillery fire,
- Enemy near miss, or
- Friendly vehicle fire.

[10377]

2-Dimensional Vehicle Tracks:

The 2-Dimensional vehicle tracks special effect shall be applicable to the following vehicles:

Wheeled ground vehicles

Tracked ground vehicles

[10378]

2-Dimensional vehicle tracks shall be supported for ownvehicle and for other wheeled and tracked vehicles in the scenario.

[10379]

The 2-Dimensional vehicle tracks special effect shall be capable of generating at least two different vehicle track widths to simulate different types of ground vehicles (e.g., wheeled vs. tracked).

[10380]

The 2-Dimensional vehicle tracks shall be generated as a pair of tracks except for two-wheeled vehicles with in-line wheels (e.g., motorcycle) where a single track shall be generated.

[10381]

2-Dimensional vehicle tracks for wheeled vehicles shall be generated for rear wheels only.

[10382]

There shall be at least two different types of 2-D track textures (one for woodland and one for desert regions).

[10383]

2-Dimensional vehicle tracks shall be generated based on the type of surface material. The 2-Dimensional vehicle tracks special effect shall not be required on paved surfaces or water.

[10384]

2-Dimensional vehicle track texture shall have the same appearance regardless of underlying terrain.

[10385]

The 2-Dimensional vehicle tracks special effect shall provide a real-time appearance of tracks on the terrain database.

[10386]

When vehicle tracks intersect, there shall be no distinguishable appearance for the order of vehicle passage.

[10387]

The 2-Dimensional vehicle tracks shall be displayed during a situation and throughout the exercise unless Playback is initiated. Once Playback is initiated, all existing 2D vehicle tracks shall be cleared from the scene. When Playback is ended and an exercise is resumed, 2D tracks shall be generated from this point forward and no previously generated 2D tracks shall be displayed.

[10388]

The 2-Dimensional vehicle tracks shall be viewable on the PAAR; however, when moving from one time position to another time position, all existing 2D vehicle tracks shall be cleared from the scene.

[10389]

Water motion:

The Water Motion special effect shall consist of simulating the following visual effects:

Ripples and Light Reflections in Lakes

Ripples with Directional Flow and Light Reflections in Rivers and Streams

3-Dimensional Waves and Light Reflections in Oceans

[10390]

Water motion for rivers and streams shall have a directional movement appearance (i.e., moving downstream).

[10391]

The downstream direction of moving water shall be continuous from the start to the end of each individual stream or river (i.e., water direction will not switch back on itself).

[10392]

The Water Motion special effect shall also consist of simulating the following additional visual effects:

Ownvehicle Splash Effects

Munition Splash Effects

[10393]

The Ownvehicle Water Splash special effect shall be generated upon simulated entry of the ownvehicle into a body of water.

[10394]

The Ownvehicle Water Splash special effect shall be visible from other section or platoon members.

[10395]

The Ownvehicle Water Splash special effect shall not be visible through the ownvehicle sights.

[10396]

Munition Splash special effect shall consist of at least three types of splashes. These shall include water impacts from the following types of ammunition rounds:

Main Gun

Canister

Machine Gun (Coax)

3.7.2.7.4.1 Bunker Busting Effects

[9969]

Special Bunker models shall be placed in the appropriate database(s) in defensive tactical positions for Bunker Busting Special Purpose exercises. This relocatable model shall be available for all databases.

[9970]

These special Bunker models shall be controlled by the host computer to be in one of 4 states: no visible bunker, undamaged bunker, damaged bunker, or destroyed bunker state.

[10050]

In crew exercises, the bunker model visual representations shall be removed from the exercise during the transition to the following situation, regardless of the bunker model states.

[10196]

In section or platoon exercises, the destroyed bunker model visual representations shall be removed from the scene when the addition of a new target would cause the number of active targets to exceed the maximum allowed.

3.7.2.7.4.2 Wall Breaching Effects

[10051]

The Arab MOUT, USMC MOUT, and Korean databases shall be capable of supporting wall breaching exercises using either the relocatable model or fixed walls on buildings. 29 Palms database shall be capable of supporting wall breaching exercises based on the relocatable wall model.

[10052]

Buildings intended for wall breaching shall be marked with a "relocatable shipping label" in the database. In a current exercise, they shall only be activated when a "wall breaching" target is placed inside and active.

[8334]

Marking labels to support wall breaching and room clearing shall be relocatable models. The system shall allow the labels to be emplaced to any building and database that support these capabilities.

[9971]

In Wall Breaching Special Purpose exercises, decals that represent HEP and HEAT round holes in buildings or walls shall be positioned based on the simulated trajectory of the main gun hit on the modeled feature, other ammunition shall have no effect.

[10053]

HEAT holes shall be sized differently than HEP holes and shall have no effect on the wall breaching.

[10054]

Holes shall be represented by decals placed on the wall surface.

[9972]

After a third hit on a designated building or wall, a 4' x 4' wall breach decal shall be conditionally placed on the building or wall fired on. The 4' x 4' wall breach decal emplacement shall be based on the host computer detecting that the criteria for the 3' x 5' wall breach has been met; when three HEP holes are calculated to be within a 3' x 5' area.

[10062]

Active Wall Breaching buildings cannot be damaged and/or destroyed relative to damageable building or wall criteria.

3.7.2.7.4.3 Room Clearing Effects

[10064]

Room Clearing effects shall be enabled following placement of a Room Clearing target in a building.

[10065]

In Room Clearing engagements, decals that represent HEP and HEAT round holes in building walls shall be positioned based on the simulated trajectory of the main gun hit on the modeled feature; other ammunition shall have no effect. Holes shall be simulated by using decals placed on the wall surface.

[10066]

When a HEP round strikes an active building, the point of impact shall be marked by a room clearing decal/hole, and the Room Clearing target inside shall be killed. HEAT round strikes shall generate no such room clearing effects beyond placement of a HEAT round hole decal.

[10067]

Active Room Clearing buildings cannot be damaged and/or destroyed relative to damageable building or wall criteria.

3.7.2.8 IMAGE GENERATION

3.7.2.8.1 Image Generation System Throughput

[8852]

The SAGE shall be integrated as the PC IG visual solution.

[10074]

AGTS host software shall communicate with the Image Generator (IG) in accordance with the Common Image Generator Interface (CIGI) version 3.3 or higher.

[9800]

Polygon capacity shall be sufficient to satisfy the image update rate specification under all specified scene conditions in each view for the databases described in paragraph 3.7.2.6.2.1. The polygon capacity shall be met regardless of the displayed image geometrical orientation, distribution of polygons within the displayed image, number and distribution of moving models and the worst case combination of special processing and display features invoked.

[9802]

Pixel fill shall be sufficient to satisfy the image update rate specification under all specified scene conditions in each view. This pixel capacity shall be satisfied regardless of the displayed image geometrical orientation, distribution of polygons within the displayed image, number and distribution of moving models and the worst case combination of special processing display features invoked, and/or polygon complexity attributes (i.e., texture, anti-aliasing and shading).

[2837]

System and channel capacity throughput of the image generator shall be adequate to support the polygon capacity for all effective operating conditions (that is, there shall be no computational, memory, data transfer, or other limitations anywhere in the image generator or the database design which would limit the ability of the system to display the potentially visible database and moving model polygons).

Potentially visible polygons are defined as the front facing, three or more sided surfaces that are either directly visible or would be visible if not occulted by an intervening scene element.

[9805]

The IG System shall interface to the trainer display devices and provide image contrast, brightness, color, synchronization, image position, and maintenance access and functionality.

3.7.2.8.2 Image Generator Sharing

[9806]

IG channels shall be shared between the Gunner's Day sight and the Gunner's AUX sight. Both sights shall be monitored with in-use sensors in order to properly switch the gunner's sight video and monitor his sight use for scoring purposes.

[9807]

IG channels shall be shared between the Commander's selectable Commander's Display Unit views (CMS Thermal / CMS Day / CPV Day / CPV Thermal). The Commander's Auxiliary Sight shall be monitored via an in-use sensor for scoring purposes.

[9808]

There shall be enough IG channels to provide the video scenes to all the periscope and active sight displays concurrently.

[9809]

The Commander's CMS Thermal CDU display shall duplicate the image seen by the gunner's Thermal display. Independent contrast and brightness control shall be provided at the CDU.

[9810]

The Commander's CMS Day CDU display shall duplicate the image seen by the gunner's Day display. Independent contrast and brightness control shall be provided at the CDU.

[9811]

It shall be possible for the commander to view his CDU display, AUX display, or any of his periscopes while his gunner views his CMS Day, CMS Thermal, Auxiliary sight, or periscopes.

[9812]

When simulating a fully operational vehicle, all active sights shall always be available and respond to all magnification selections. The time delay between changing a sight control selection and the corresponding response in the first image field of that display shall be no more than 225 msec.

[9813]

The driver's view shall be provided.

3.7.2.8.3 Real-Time Visual Effects

[2845]

The visual subsystem shall have the capability to simulate environmental conditions and illumination conditions as defined in the following paragraphs.

3.7.2.8.3.1 Atmospheric and Meteorological Effects

[9814]

Simulation of atmospheric and meteorological effects shall be provided.

[2848]

The attenuation of light by the atmosphere due to effects such as haze and fog will be simulated.

[2849]

The horizon line shall be appropriately faded by the visibility effects.

[2854]

Atmospheric and meteorological effects shall be controlled by the selection of training exercises.

3.7.2.8.3.1.1 Ambient Visibility (Haze)

[9815]

Visibility conditions shall be provided by appropriate change of maximum visibility distance to effectively simulate the specified condition.

[2856]

The haze/fog reduced visibility computations shall assure that there are no discrete changes in visibility during real-time execution which are discernible to the student.

[2857]

Visibility shall be programmable from 1 meter to 20 km.

[2858]

Control of visibility and ceiling shall allow complete control of meteorological conditions that can range from fog conditions to clear day conditions.

[9816]

Fog density shall be adjustable from 0 to 4000 meters in 100 meter increments.

3.7.2.8.3.1.2 Cloud Simulation

[9817]

Cloud layer effects shall be simulated.

3.7.2.8.3.1.3 Snow Simulation

[8350]

The visibility attenuation of snow shall be simulated.

3.7.2.8.3.1.4 Rain Simulation

[9819]

The visibility attenuation of rain shall be simulated.

3.7.2.8.3.2 Illumination

[2866]

The illumination of the visual scene by both natural and artificial sources shall be simulated.

[2867]

The total illumination shall be a combination of directional and diffuse illumination.

[2868]

Natural illumination shall contain sufficient directionality to reveal the shape and orientation of objects.

[9820]

Illumination sources shall be attenuated and scaled to give real world distance viewing effects.

[9821]

Static illumination shall be controlled by selection of training exercises.

3.7.2.8.3.2.1 Time of Day

[9822]

Three levels of natural illumination shall be provided to simulate time of day.

[9823]

The levels of illumination shall represent day, dawn/dusk and night.

[2873]

Appropriate adjustments in contrast, color, and intensity of objects shall occur in the displayed image to depict the selected time of day.

[9824]

The intensity and position of the illumination source in each of the levels of illumination shall be constant for the selected time of day.

[10202]

Database features shall have per pixel time of day lighting.

3.7.2.8.3.2.2 Flare Illumination

[2876]

Flare illumination shall be provided when initiated by the instructor.

[2877]

Flare illumination shall last for 45 seconds and gradually return to current time of day brightness, during the last 10 seconds.

3.7.2.8.3.3 Visual Simulation of Motion

[2879]

Visual simulation of ownvehicle motion and visual scene element shall be as follows:

3.7.2.8.3.3.1 Visual Simulation of Ownvehicle Dynamics

[9825]

The visual representation of the ownvehicle visual scene shall include ownvehicle motion, location, elevation, orientation, and hull kinematics.

[2882]

Visual simulation shall provide ownvehicle position and angular accuracy equal to the complete range of motion capability of the vehicle and about all axes without any degradation in scene content or scene quality unless otherwise specified herein.

3.7.2.8.3.3.2 Optical Sights Scene Movement

[9826]

Hull attitude shall be presented in the sights and periscopes as pitch, cant, or a combination of both depending upon the turret LOS angle from the hull centerline.

[2885]

During ownvehicle movement, additional random sight movement shall be included to simulate the effects of terrain roughness.

[2886]

The amount of terrain roughness included in each sight shall be a function of the degree of stabilization.

3.7.2.8.3.3.2.1 Periscopes Stabilized

[2892]

When the stabilization is activated and ownvehicle is moving, the view as seen through the periscopes shall be limited to a 0.3 mils random amplitude movement in azimuth and 5.0 mils in elevation (to account for terrain roughness).

[2893]

The visual scene as viewed through the periscopes shall remain within 0.3 mils in azimuth as ownvehicle turns but shall move up or down not more than 5.0 mils in elevation in addition to the input from the suspension model.

3.7.2.8.3.3.2.2 GAS and CAS Stabilized/Non-stabilized

[9827]

The GAS and CAS always follow the movement of the main gun regardless of the mode of operation. When the simulated main gun moves, the GAS and CAS shall exhibit the corresponding sight movement.

3.7.2.8.3.2.3 Gunner's and Commander's Sight Assemblies Stabilized

[9828]

If the STAB switch is ON on the CCP, the turret is in power drive, and a palm switch is closed, the gunner's CMS Day sight and thermal displays and the commander's panoramic viewer day and thermal displays shall be limited to no random movement in azimuth and elevation.

[9829]

The line of sight shall remain within 0.3 mils in azimuth and 0.4 mils in elevation of its originally designated inertial attitude when the ownvehicle turns, climbs, or descends (i.e., as the hull changes its attitude in azimuth or elevation, the gunner's CMS daysight and thermal displays, and the commander's panoramic viewer day and thermal displays shall remain fixed to within 0.3 mils in azimuth and 0.4 mils in elevation of its original attitude).

3.7.2.8.3.2.4 Gunner's and Commander's Sight Assemblies Non-stabilized

[2902]

The gunner's and commander's sight assemblies are non-stabilized under each of the following conditions:

1. In manual drive
2. The STAB switch is set to OFF
3. A STAB malfunction is active
4. The STAB switch is set to ON, the turret is in power drive, and neither palm switch is closed.

[9830]

Under any of these conditions, the gunner's CMS daysight and thermal displays and the commander's panoramic viewer and thermal displays shall be limited to random movement in azimuth and elevation of 5.0 mils with a frequency of 0.92 Hz when ownvehicle is moving to account for terrain roughness.

[2908]

The terrain roughness shall be added to the input of the suspension model as the ownvehicle traverses the database.

[2909]

The turret shall move the same amplitude as the hull when turning, climbing and descending a hill.

3.7.2.8.3.3 Moving Targets

[9831]

The visual system shall be capable of displaying a maximum of 128 moving entities simultaneously within the visibility limits.

[9832]

Moving entities shall have independent, host-controllable movement in 6 Degrees-of-Freedom (6-DOF).

[2913]

All moving models shall be properly occluded by terrain for all conditions when inside of the visible Line-of-Sight (LOS).

[9833]

Ground based moving entities shall not abruptly appear (pop up) in any sight, at any position, but should appear by moving from behind natural or man-made cover, even if their ultimate motion for the exercise is stationary. DI entities shall be exceptions to this requirement, since they may abruptly appear in the scenario.

[9834]

Similarly, moving targets shall not abruptly disappear from sights during the exercise.

[2916]

Targets for the unsuccessful engagement shall be made to return to a covered position. Bunkers and DI targets shall be exceptions to this requirement, since they can be removed abruptly.

[2917]

Killed targets shall be removed from the scene when the addition of a new target would cause the number of active targets to exceed the maximum allowed.

[2918]

Immobilized targets shall be removed from the scene at the start of each new situation.

[9835]

Ground vehicles shall follow the contour of the terrain.

[9836]

Air vehicles shall follow flight paths defined during exercise generation.

3.7.2.8.3.4 Animation and Special Effects

[9837]

The training requirement for simultaneous special effects, excluding tracers, shall not exceed 48 per crewstation. Special effects priority processing shall ensure that training essential special effects remain active in the event that system limits are reached.

3.7.2.8.3.4.1 Ownsection/Ownplatoon Weapons Fire and Weapons Impact Effects

[2924]

Visible effects of weapons employment by ownvehicle and ownsection/ownplatoon vehicles shall be depicted in the training exercise scenes.

[2925]

These shall include tracers indicating projectile flight, projectile impact and detonation when applicable.

[9838]

These shall include muzzle flash, smoke, tracers, projectile flight, projectile impact and detonation when applicable.

[2926]

When a fired weapon impacts an environmental polygon or target within the FOV and visibility limits, the corresponding weapons impact effect shall be visually depicted, within the active model limitations of the current image generator processing.

[2927]

Terrain and targets shall be properly obscured by weapons effects and by dirt and dust when rounds are short.

[2928]

Weapon effects shall occur at the intersection of the weapon trajectory with a simulated visual feature.

[9839]

The proper weapons fire and weapons impact effect shall be visually displayed for the following ownplatoon weapons:

- a. 105 mm main gun
- b. 7.62 mm coaxial machine gun

3.7.2.8.3.4.1.1 Main Gun Obscuration

[2933]

When the main gun is fired all day sights of the firing vehicle shall be obscured within 0.1 seconds.

[2934]

The original visibility conditions shall begin to be restored within 0.5 seconds of firing and shall be completely restored 2 seconds after firing.

[2935]

The thermal sight shall be obscured in all magnification settings.

3.7.2.8.3.4.1.2 Firing from Defilade

[9840]

Stryker MGS shall fire from defilade position without restrictions.

[2938]

In defilade position, all sights shall be unmasked.

3.7.2.8.3.4.1.3 Hit on Panel Target

[2941]

Main gun and machine gun hits on the boresight / zero panel target shall be simulated.

[2942]

The holes shall remain present throughout the exercise, except for those unused once the maximum limit is reached.

[2943]

The system shall be capable of displaying a maximum of 48 holes on the panel target.

[9841]

Boresight / zero panel target models are defined in the Stryker MGS Gunnery Manual.

3.7.2.8.3.4.1.4 Tracer Simulation

[2946]

The visual system shall display simulated weapon system tracers for ownvehicle weapons listed below.

[2947]

The tracer simulation shall be appropriate for the weapon being fired as well as realistically representing the rate of fire.

[9842]

Tracers for SABOT M900, HEAT M456A2, and HEP M393A3 are the same size and shall burnout at the ranges specified in Table 3.7.1.5-1.

[8896]

The coax tracer simulation shall be smaller than the main gun and shall burn out at 900 meters.

[9843]

The proper tracer trajectory shall be simulated.

[9899]

The proper tracer occultation shall be visually displayed for the following:

- a. 105 mm gun (SABOT M900, HEAT M456A2, HEP M393A3)
- b. 7.62 mm machine gun

3.7.2.8.3.4.2 Target Weapons Fire Effects

[2956]

The image generator shall provide the imagery for all weapons fire effects originating from friendly and hostile targets (tanks, artillery, machine gun and rifle fire) within the visual simulation range.

3.7.2.8.3.4.2.1 Reserved

3.7.2.8.3.4.2.2 Vehicle Fire

[10349]

The requirements in this paragraph relate to crew training target acquisition battlefield condition of "friendly fire".

[2960]

The image generator shall provide the imagery for animated weapons fire from friendly vehicles.

[9845]

Friendly fire shall consist of an effect in the vicinity of the enemy target that is nearest to the ownvehicle and where line of sight exists between the target and ownvehicle.

[9846]

An explosion, with appropriate impact in the target area shall be simulated.

[2963]

Friendly fire, when required for the exercise, shall be activated eleven seconds after activation of the enemy target and shall continue at five-second intervals.

[2964]

Friendly fire shall only occur in crew exercises.

3.7.2.8.3.4.2.3 Artillery Fire

3.7.2.8.3.4.2.3.1 Enemy Artillery Fire

[9847]

Enemy Peripheral Artillery Fire

The image generator shall provide imagery for animated enemy peripheral artillery fire by three explosions that occur toward the horizon and visible in day sights.

[10456]

The enemy peripheral artillery fire explosion effects shall fade back to normal within 0.67 seconds.

[2968]

Individual enemy peripheral artillery fire explosions shall be separated by 0.5 to 1.5 seconds.

[2969]

Enemy peripheral artillery fire shall commence 10 to 13 seconds (randomly) after activation of the first target in each situation.

[2970]

Enemy peripheral artillery fire shall repeat every 10 to 13 seconds (randomly) until the end of the situation.

[9848]

Enemy peripheral artillery fire animation shall be available in exercises where enemy artillery fire is a potential battlefield distraction, but subject to the probabilities assigned for this effect to occur.

[10463]

Enemy Incoming Artillery Fire

Enemy incoming artillery fire shall be available in exercises with defensive situations, but subject to the probabilities assigned for this effect to occur.

[10464]

The image generator shall not provide imagery for animated enemy incoming artillery fire explosion effects.

[10465]

Enemy incoming artillery fire shall consist of aural cues for a volley of 1 to 3 (random) explosions.

[10466]

Individual enemy incoming artillery fire explosion aural cues shall be separated by 0.5 to 1.5 seconds.

[10467]

Enemy incoming artillery fire aural cues shall commence 10 to 13 seconds (randomly) after activation of the first target in the situation and continue until completion of the volley.

3.7.2.8.3.4.2.3.2 Friendly Artillery Fire

[9169]

Friendly artillery fire shall be provided in section and platoon mode.

[9849]

At the request of the Platoon or Section members and approval of the lead instructor operator, friendly artillery fire shall be initiated by invoking the Friendly Artillery function at the lead instructor's IOS.

[2974]

Ten seconds after initiation of the Friendly Artillery function, a volley of four animated artillery round explosions shall impact in the active target area.

[2975]

Rounds shall impact 25 to 50 meters from the targets when the Friendly Artillery function is invoked.

[2977]

Subsequent volleys of rounds shall occur at 15 +/-1 second intervals when the Friendly Artillery function is invoked.

[2978]

Individual rounds shall impact within 0.25 +/-0.1 seconds of each other within each volley when the Friendly Artillery function is invoked.

3.7.2.8.3.4.2.4 Enemy Machine Gun and Rifle Fire

[2980]

Enemy machine gun and rifle weapon fire shall be animated with a small flash.

[10361]

The enemy weapon firing rate shall be randomly selected within the range of weapon firing rates specified below:

<u>Weapon</u>	<u>Weapon Firing Rate</u>
Machine Gun	0.25 – 0.6 sec
Pistol / Hand Gun / Rifle	1 – 2 sec

3.7.2.8.3.4.2.5 Smoke Effects

[2984]

The image generator shall provide the imagery for hostile smoke grenades, friendly artillery smoke and ownvehicle smoke grenades.

[9850]

Two separately controlled ownvehicle smoke grenade salvo explosions shall be simulated with a smoke formation that grows rapidly into a cloud.

[2986]

The explosion shall be located approximately 50 feet from the ownvehicle.

[9851]

Ownvehicle smoke grenade obscuration shall be visible only in the day sights and periscopes of the vehicle that fired the grenade.

[9852]

If an ownvehicle fires at and misses a stationary enemy target, target vehicles capable of smoke grenades shall activate smoke grenades 50% of the time, during daylight visibility only. Advanced Gunnery Skill Level 1 exercises and auxiliary sight engagements are exempt from this requirement. Also, enemy smoke grenades shall not be activated during CMS, CMS Daysight or Thermal Sight failures.

[2989]

A target vehicle shall only fire one salvo during an exercise.

[9853]

The target vehicle smoke shall appear in all ownvehicles' day sights and periscopes as a ring of smoke that circles the target vehicle which is located at the center of the smoke.

[2991]

The cloud shall have a radius of approximately 50 feet.

[9171]

Friendly artillery smoke shall obscure objects between section and platoon vehicle sights and the hostile target with the smoke positioned in the vicinity of the enemy target(s).

[2993]

All smoke shall persist for 2 minutes.

[2994]

Smoke shall gradually disappear during the last 30 seconds with the original visibility condition being restored.

[2995]

It shall be possible to drive through and around the smoke.

[2996]

Placement of the smoke model within the database shall not be constrained.

[2998]

All Smoke Effects shall use the enhanced dynamic implementation.

3.7.2.8.3.4.3 Ownvehicle Kill/Hit

[9910]

Ownvehicle kill shall be simulated by a complete blackout of all sight displays. The blackout period shall be five seconds except for conditions specified in paragraphs 20.4.1.9.1 and 20.4.1.9 where the blackout shall extend until the end of the situation.

[9172]

The exercise shall continue through the blackout period but all crew station inputs shall be ignored in crew, section, and platoon exercises.

[9854]

Ownvehicle hit shall be simulated by a loud explosion, a bright flash of red orange light in all active daysights and periscopes. Similarly, a bright flash of green light shall be seen through the thermal sight system if that sight is active and in the White Hot setting. An induced malfunction shall occur as defined in paragraph 3.7.3.5.1.10.

[9855]

A hit or killed ownvehicle shall be represented with the appropriate model and visible to other section or platoon members in section and platoon exercises.

3.7.2.8.3.5 Thermal Image Generation

[3005]

Thermal images shall be generated by one or more of the channels of the visual system image generation system.

[3006]

The thermal images shall be generated about the instantaneous optical line-of-sight of the thermal receiver optics simulation.

[3007]

The generated FOV shall at all times correspond to the FOV of the operational system at the selected magnification. The thermal simulation may be a simplified representation of the thermal imagery which provides a generally correct appearance for all objects, but not necessarily a temperature record.

[9857]

The displayed intensity shall be a function of material type and temperature history. (Continuous temperature variations of objects during real-time operation are not required.)

[3009]

The effect of atmospheric attenuation shall be computed in real-time.

[3010]

The simulated thermal image shall add thermal noise to the thermal imagery video to produce a realistic appearance.

[3012]

The dynamic range of the imagery shall require operator manipulation of sensitivity and contrast to approximate the relationship between control settings, environmental conditions, and the displayed imagery.

[3013]

Both white-hot and black-hot modes shall be simulated.

[9858]

Auto gain shall be simulated.

3.7.2.8.4 Visual Image Quality

[9860]

The PC Image Generator is made up of Commercial Off-The-Shelf (COTS) equipment which is selected based on comparative performance and life cycle cost. The visual system shall provide adequate image quality to meet the system training requirements.

3.7.2.8.4.1 Luminance

[9861]

The system Luminance performance shall be as limited by current technology. Currently available Commercial Off-The-Shelf (COTS) hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.1.1 Luminance Variation

[9862]

The system Luminance Variation performance shall be as limited by current technology. Currently available Commercial Off-The-Shelf hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.2 Contrast

[9863]

The system Contrast performance shall be as limited by current technology. Currently available Commercial Off-The-Shelf hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.3 Color

3.7.2.8.4.3.1 Color and Intensity Processing

[9864]

The system Color and Intensity Processing performance shall be as limited by current technology. Luminance and chrominance information processing shall be accomplished with sufficient resolution and accuracy to ensure stable, continuous, color at the display with no discernible abrupt transitions and mach banding except as demanded by the phenomena being simulated. Currently available Commercial Off-The-Shelf hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.3.2 Color Registration

[9865]

The system Color Registration performance shall be as limited by current technology. Currently available Commercial Off-The-Shelf hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.4 Image Perspective and Geometric Accuracy

[9866]

The system Image Perspective and Geometric Accuracy performance shall be as limited by current technology. Currently available Commercial Off-The-Shelf hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.4.1 Total Geometric Accuracy

[9867]

The system Total Geometric Accuracy performance shall be as limited by current technology. Currently available Commercial Off-The-Shelf hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.4.2 Relative Geometric Errors

[9868]

The system Relative Geometric Errors shall be as limited by current technology. Currently available Commercial Off-The-Shelf hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.5 Image Stability

[9869]

The system Image Stability performance shall be as limited by current technology. Currently available Commercial Off-The-Shelf hardware is used within the trainer system to ensure that this application performance is met.

3.7.2.8.4.6 Video Rates

[3042]

Visual system refresh shall be no less than 60 Hz.

[3043]

The system shall employ non-interlace video with a frame rate of not less than 30 Hz.

3.7.2.8.4.7 Update Rate

[3045]

The position and attitude data for the viewpoint and all moving models shall be updated and a complete scene shall be computed and displayed at a rate not less than 30 Hz.

[3046]

During an overload of the visual scene, a temporary reduction in the update of not less than 15 Hz shall be allowed.

[3047]

As a design goal, during periods of target engagement, the update rate will not be reduced.

[3048]

For scene content management, temporary reductions will be allowed not to exceed 3 seconds, occurring not more than once per minute.

[3049]

The update rate shall return to normal when the overload condition is removed.

3.7.2.8.4.8 Smear

[3055]

Smearing of the displayed image due to image motion shall be minimized in order to provide effective viewing for effective gunnery training transfer.

3.7.2.8.4.9 Flicker

[3057]

There shall be no detectable flicker in the displayed image.

3.7.2.8.4.10 Stepping

[3059]

Stepping or other discrete image motion shall not be discernible in any display.

3.7.2.8.5 Image Quantity (System Capacity)

3.7.2.8.5.1 Scene Content Management

[3064]

Scene content management will optimize the training value of the system by ensuring a maximum of needed visual cueing information for current operating conditions and ensuring minimum scene discontinuities and other distracting image processing artifacts which could inhibit user psychological acceptance of the scene.

3.7.2.8.5.1.1 Scene Management Mechanisms, Level-of-Detail (LOD) and Blending

[3066]

LOD changes shall be made based on feature type priority and display size of the feature.

[3067]

All feature insertions, deletions, and LOD changes shall be gradually transitioned in order to ensure scene continuity and minimize noticeable insertions or deletions of scene elements.

[3068]

Insertion and deletion of objects via scene load management shall be gradual.

3.7.2.8.5.1.2 Terrain Integrity

[3070]

Terrain integrity shall be maintained to the range necessary to ensure significant terrain features are present to perform the training tasks required of each sight.

[3071]

Terrain integrity shall be maintained to permit accurate weapon impact determination.

3.7.3 INSTRUCTIONAL SUBSYSTEM

3.7.3.1 RESERVED

3.7.3.2 CREW TRAINING

[9147]

The improved Crew Training Program (iCTP), which supercedes the legacy Stryker Crew Training Program (CTP), is specified in Appendix II.

3.7.3.2.1 - 3.7.3.2.3 Reserved

3.7.3.2.4 Crew Exercise Data

[3413]

An exercise shall consist of a minimum of five to a maximum of 10 independently scored situations with similar tactical and environmental conditions.

[3414]

Each exercise shall consist of preprogrammed data which shall satisfy the following conditions:

3.7.3.2.4.1 Crew Training Exercise Number

[3416]

Each exercise shall be provided a unique file number.

3.7.3.2.4.2 Crew Training Exercise Preview

[3418]

The exercise description shall provide information to describe the training content, including as a minimum, ownvehicle motion, target motion and initial range and malfunction status.

3.7.3.2.4.3 Crew Training Exercise Instructions

[3420]

A text briefing shall be provided which can be read by the instructor to the crew explaining the purpose of the exercise, exercise conditions and standards, and ownvehicle malfunction status (if an announced malfunction).

3.7.3.2.4.4 Reserved

3.7.3.2.4.5 Crew Training Target Positions, Paths, Activation Times, and Type

[3426]

Target position, path, activation times and type shall be provided for each exercise.

3.7.3.2.4.6 Crew Training Exercise Constraints

[9548]

The following constraints shall apply to exercise design:

- a. A minimum of 5 target situations and a maximum of 10 target situations.
- b. A maximum of 400 targets per crew exercise, including human target models.
- c. The next situation shall begin no earlier than five seconds and no later than 90 seconds after the completion of the last target situation.
- d. Initial Gunnery Skills (Proficiency, Basic and Practice) and Basic Gunnery Skills exercises shall have target delay times in accordance with those found in Crew Table VI, TC 3-20.31.
- e. Default and Advanced Gunnery Skills exercises shall activate the initial target and fully expose it within 3.5 seconds of its activation.
- f. No target shall appear to float above the terrain, except for helicopters.
- g. No vehicular target (except for mobility killed targets) shall abruptly appear or disappear when viewed through a high power sight.
- h. Hostile targets shall not be placed within 10 mils of a friendly target.
- i. No more than one target per situation shall be outside of battlerange. Note: does not pertain to urban environment.

3.7.3.2.5 Crew Training - Performance Monitoring

[3438]

In addition to data available from the commander and gunner sights video monitors and direct observation by the instructor, runtime training execution displays and controls shall be provided at the IOS.

[10336]

Runtime training execution displays and controls shall include the following fields as shown in the Figure 3.7.3.2.5-1:

- Exercise, Crew & Vehicle Data
- Performance Monitoring Data
- Messages
- Turret Indicator
- Exercise Toolbar
- Status Bar

Note: Figure 3.7.3.2.5-1 is a sample GUI layout.

[10337]

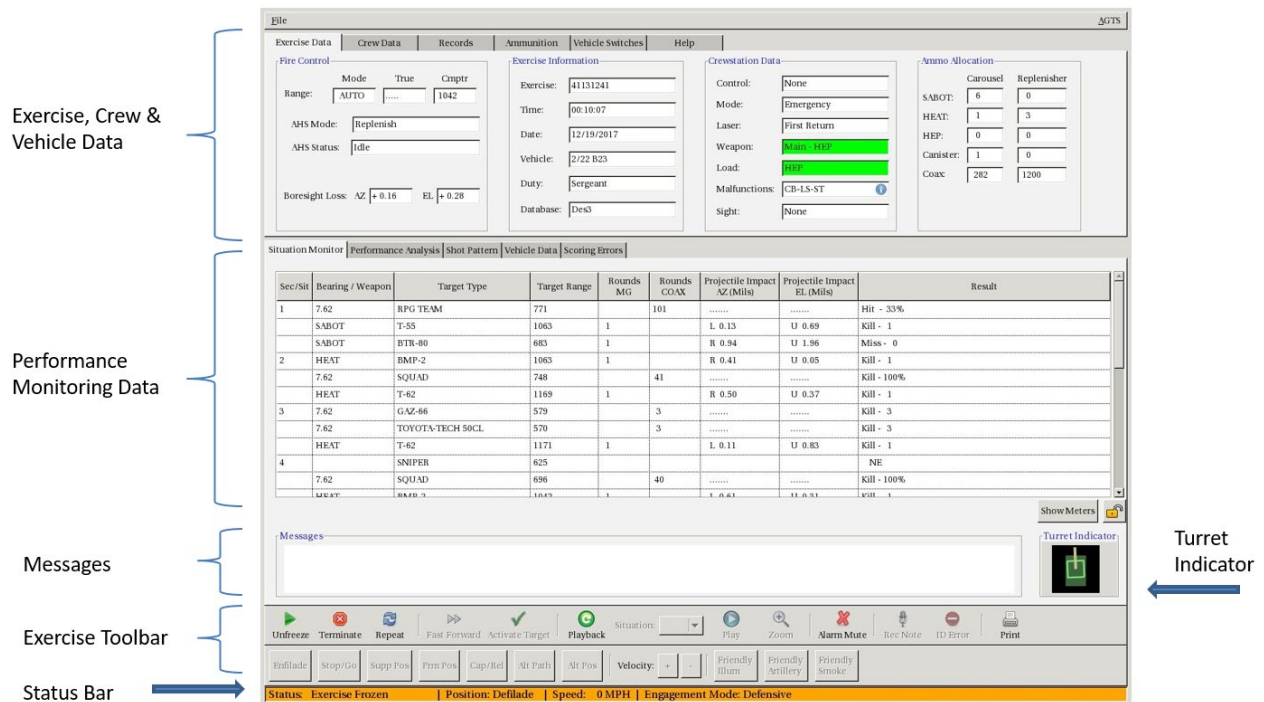


Figure 3.7.3.2.5-1. Runtime Training Execution Displays and Controls Layout

[10338]

The Exercise, Crew & Vehicle Data shall include the following selections:

- Exercise Data – consisting of fire control data, exercise information, crewstation data and ammo allocation
- Crew Data – consisting of exercise information and student information
- Records – provides next recommended exercise and exercise history
- Ammunition – consisting of ammunition information, ammunition to transfer, member to supply, transfer readiness checklist, and ammo transfer controls
- Vehicle Switches – consisting of current switch settings at the gunner or commander stations
- Help – consisting of category and description

[10339]

The Performance Monitoring Data shall include the following selections:

- Situation Monitor – including current target data & hit/miss info
- Performance Analysis – see paragraph 3.7.3.2.5.2 for PFA and 3.7.3.2.5.2.7 for QPFA
- Shot Pattern - see paragraph 3.7.3.2.5.4
- Vehicle Data – including boresight angles, zero angles, ammo subdesignation, slewing data, MG bore data, miscellaneous data, & meteorological data
- Scoring Errors – provides textual description of scoring errors including those identified on Performance Analysis tab

[10340]

The Messages display shall provide textual information to the I/O including exercise status & alternate path available.

[10341]

The Turret Indicator shall provide a graphical representation of the following:

- Ownvehicle Hull
- Orientation of Main Gun relative to OV Hull
- Orientation of Pan Viewer relative to OV Hull

[10342]

The Exercise Toolbar shall provide the exercise controls appropriate for the level of training as specified in the following:

- Crew Training Exercise Control – see paragraph 3.7.3.4.3.6;
- Section/Platoon Training Exercise Control - see paragraph 3.7.3.4.4.6.

[10343]

The Status Bar shall provide the following data:

- Exercise Status
- Ownvehicle Position
- Ownvehicle Speed
- Engagement Mode

3.7.3.2.5.1 Crew Training - Situation Monitor

[10352]

The Situation Monitor data shall be available for all exercises except the Crew Preparation & Boresight/Zero Special Purpose exercise.

[9269]

The Situation Monitor data shall be provided at the IOS when a situation is in progress or whenever playback is used.

[3441]

The Situation Monitor data shall be available after the crew briefing is completed and the simulator is released from freeze at the start of an exercise.

[3442]

The Situation Monitor data shall be updated at no less than a 1 Hz rate.

[10344]

The Situation Monitor data shall consist of the data on the following tabs of the Runtime Training Execution Displays & Controls (paragraph 3.7.3.2.5), when running in crew mode:

- Exercise Data tab
- Situation Monitor tab.

[10353]

Data for upcoming targets shall be listed for each target in terms of seconds before target appears, target bearing and target type. When the target becomes active, projectile impact and results data fields shall become active. Bearing data shall be replaced with weapon definition at the time of target deactivation.

[3443]

The Situation Monitor data shall be available to print when the system is in the freeze mode.

3.7.3.2.5.2 Crew Training - Performance Analysis

[10358]

The Performance Analysis (PFA) data shall be available for all exercises except the following:

- Crew Station Preparation Special Purpose exercises,
- Digital Gunnery Special Purpose exercises,
- Practice GTLF Special Purpose exercises,
- Pre-Live Fire Basic Gunnery exercises,
- GTLF Gunnery Basic Gunnery exercises.

[10345]

The Performance Analysis data shall consist of data on the following tabs of the Runtime Training Execution Displays & Controls (paragraph 3.7.3.2.5), when running in crew mode:

- Crew Data tab
- Performance Analysis tab.

[3477]

The Performance Analysis data shall be updated at the conclusion of each situation.

[3476]

The Performance Analysis data shall be available to print during an exercise freeze.

3.7.3.2.5.3 Crew Training - Session Summary

[3515]

At the conclusion of a training session, a Session Summary shall be available.

[3516]

The Session Summary shall summarize crew performance in target acquisition, reticle aim, and systems management for the complete session.

[3517]

The Session Summary shall also provide a progress recommendation for each skill area when selected by computer recommendation.

[3518]

The Session Summary shall be available for printing at the IOS.

3.7.3.2.5.4 Crew Training - Shot Pattern

[10359]

The Shot Pattern shall be available for exercises where the main gun is fired.

[10360]

The Shot Pattern shall not be available for the following exercises:

- Crew Station Preparation & Boresight/Zero Special Purpose exercises;
- Acquisition/Manipulation Special Purpose exercises;

- Canister/Coax Gunnery Special Purpose exercises, except where non-Canister main gun rounds are fired;

- Digital Gunnery Special Purpose exercises.

[9551]

Ammo type (SABOT, HEAT or HEP) and target number shall be indicated. Canister round shall not be displayed.

[3523]

The Shot Pattern shall also reflect the reticle lay error for each of the round indicators.

[8980]

At the conclusion of each situation in an exercise and when the exercise has been frozen, the instructor shall have the option to print the Shot Pattern.

3.7.3.2.5.5 Crew Training System Digital Messages and Overlays

[9151]

The Instructor shall have the capability to create digital messages to support any of the crew or section/platoon exercises.

[9152]

Digital text messages shall be monitored and displayed at the IOS FBCB2 display.

[9153]

The Instructor shall be able to interact with his crew on the FBCB2 network.

3.7.3.2.5.6 Boresight Situation Monitor

[9271]

The Boresight Situation Monitor data shall be available at the IOS when the Crew Station Preparation exercise is running.

[3529]

The Boresight Situation Monitor data shall be available after the crew briefing is completed and the simulator is released from freeze at the start of the Crew Station Preparation exercise.

[10354]

The Boresight Situation Monitor data shall be available at the crew IOS when the Crew Station Preparation exercise is running or any time playback is used.

[10355]

The Boresight Situation Monitor data shall consist of the data on the following tabs of the Runtime Training Execution Displays & Controls (paragraph 3.7.3.2.5), when running the Crew Station Preparation Special Purpose exercise:

- Exercise Data tab
- Situation Monitor tab.

[10356]

The Boresight Situation Monitor data shall be updated at no less than a 1 Hz rate.

3.7.3.2.5.7 Gate to Live Fire and Basic Pre-Live Fire PFA

[10357]

The Qualification Performance Analysis (QPFA) data shall be available for the following exercises:

- Practice GTLF Special Purpose exercises,
- Pre-Live Fire Basic Gunnery exercises,
- GTLF Gunnery Basic Gunnery exercises.

[10346]

The Qualification Performance Analysis data shall consist of data on the following tabs of the Runtime Training Execution Displays & Controls (paragraph 3.7.3.2.5), when running in crew mode:

- Crew Data tab
- Performance Analysis tab.

[8984]

The crew Qualification Performance Analysis data shall be available for display during Basic Gunnery skills training.

[3557]

The Qualification Performance Analysis data shall be updated at the conclusion of each situation.

[3558]

The Qualification Performance Analysis data shall be available to print during an exercise freeze.

3.7.3.2.5.8 Crew Basic Gunnery & Gate-to-Live Fire Situation Monitor

[3593]

The Crew Basic Gunnery and Gate-to-Live-Fire Situation monitor shall be the same as defined in paragraph 3.7.3.2.5.1.

3.7.3.2.5.9 Crew Training Intercom

[3595]

The intercom system shall provide direct instructor to student and student to student communication as defined in paragraph 3.7.1.13.

3.7.3.2.5.10 Common Crew Score Sheet

[10790]

The Common Crew Score Sheet shall be provided for the following types of exercises:

- Basic Pre-Live Fire
- Gate-to-Live Fire (Tank Table VI)
- Practice Gate-to-Live Fire
- Initial Gunnery (Tank Table III)
- Initial Gunnery (Tank Table IV)
- Initial Gunnery (Tank Table V)

[10791]

The Common Crew Score Sheet data shall be available upon completion of relevant exercises.

[10792]

Selection of the Common Crew Score Sheet data for display at the IOS and hard copy printing shall be available in response to display prompts.

[10793]

The Common Crew Score Sheet (shown in Figure 3.7.3.2.5.10-1) shall provide the following Header Information:

1. Engagement Number - Two character/digit Table and Task Number
2. O/V Posture - Posture at time of engagement: OFFENSE or DEFENSE
3. Instructor Name (All Caps based on format entered by I/O)
4. Date the engagement was executed - Current Date (format is YYYYMMDD)
5. Crew Unit Name - X/XX (Battalion ID)
6. Crew Bumper number - XXX (PLT and Bumper ID)
- 7a. Conditions of the task for the engagement
- 7b. Degraded conditions for the engagement

8 - 10. Target 1 - 3

- 8-10a. Target Type - initial presentation: (TRK, TNK, TRPS, RPG, PC, SNPR, BNKR).
8-10b. Target Range - Distance to target (rounded up) in 100's of meters at target activation
8-10c. Target Posture - Frontal Stationary (STA), Flank Stationary (FLK), Moving (MOV),
Evasive (EVA)
8-10d. Ammunition Type - (Type of ammunition authorized to fire at the target - SABOT, HEAT, HEP, CAN, 7.62)
8-10e. Rounds Authorized - total of authorized rounds based on target type
8-10f. Rounds Expended - total number of authorized rounds fired
8-10g. Firer required to engage the target: (MGS GNR or MGS VC)
11a-g. Target 4 - Not Used

[10794]

COMMON CREW SCORE SHEET											
For use of this form see TC 3-20.31; the proponent agency is TRADOC											
1. ENGAGEMENT 65		2. OWN VEHICLE POSTURE DEFENSE		3. VEHICLE CREW EVALUATOR SFC / VCE		4. DATE 20140625		5. UNIT 1/11		6. BUMPER NUMBER A12	
7a. CONDITIONS (CHECK ALL THAT APPLY)		<input type="checkbox"/> DAY <input type="checkbox"/> SHORT-RANGE MAIN GUN		<input type="checkbox"/> SHORT-RANGE MACHINE GUN		<input type="checkbox"/> VEHICLE COMMANDER		7b. DEGRADED CONDITIONS (CHECK ALL THAT APPLY)		<input type="checkbox"/> MANUAL <input type="checkbox"/> GAS/AUX	
<input checked="" type="checkbox"/> NIGHT <input type="checkbox"/> LONG-RANGE MAIN GUN		<input type="checkbox"/> LONG-RANGE MACHINE GUN		<input type="checkbox"/> CBRN				<input type="checkbox"/> LRF <input type="checkbox"/> THERMAL			
8. TARGET 1 (Most Dangerous)			9. TARGET 2 (Least Dangerous)			10. TARGET 3			11. TARGET 4		
a. TYPE	b. RANGE	c. POSTURE	a. TYPE	b. RANGE	c. POSTURE	a. TYPE	b. RANGE	c. POSTURE	a. TYPE	b. RANGE	c. POSTURE
PC	1000	STA	TRPS	500	FLK	PC	1400	MOV			
d. AMMO TYPE	e. AUTHORIZED	f. EXPENDED	d. AMMO TYPE	e. AUTHORIZED	f. EXPENDED	d. AMMO TYPE	e. AUTHORIZED	f. EXPENDED	d. AMMO TYPE	e. AUTHORIZED	f. EXPENDED
HEAT	2	1	COAX	50	15	HEAT	2	1			
g. FIRER	MGS GNR		g. FIRER	MGS GNR		g. FIRER	MGS GNR		g. FIRER		

Figure 3.7.3.2.5.10-1. Sample of Header Information

[10795]

The Common Crew Score Sheet shall provide the following Engagement Information:

(shown in Figure 3.7.3.2.5.10-2)

12a. Location above the timeline - Driver Up, Driver Back, Open, Target, Doubtful, Over, Short, Not Engaged, No Kill.

12b. Evaluators underneath the timeline - Initial Defilade, Sector Clear, Delay Defilade, Delay TGT Lock

(shown in Figure 3.7.3.2.5.10-3)

13 - 15. Target 1-3

13-15a. Kill Time - seconds the target is killed in 12a IAW Common Gunnery Score Sheet

13-15b. Engagement Modifier - Points from Page 2 Block 8-10f

13-15c. Defilade - authorized defilade target time from block 12

13-15d. Delay/Break - BREAK not used. 15d is delay target time.

13-15e. Engagement Time - subtract b, c, d from a.

13-15f. Points - In mapping underneath 12b, find engagement time from 13-15e and select number of points from below that number.

16. Target 4 - NOT USED

17. Malfunction - NOT USED

18. Penalty Codes/Remarks - penalty code per Common Crew Roll-up Sheet, page 2, during the engagement

19a. Total Points - sum of points block 13f through block 15f

19b. Number of targets

19c. Base Score - Integer result from dividing the total points from block 19a by the total number of targets presented shown in block 19b.

[10873]

The host shall evaluate the following crew cut item and shall automatically recommend Auto Zero (AO) when the following condition is met:

- Firing the main gun at troops, except for canister as directed by the tower

The I/O shall be provided the option to accept or reject the recommended crew cut item.

All other displayed Auto Zero crew cut items will be evaluated and entered by the I/O, with the results displayed in the Common Crew Score Sheet 20b field.

- Failure to adhere to the conditions of the task for given engagement.
- Failure to button up or mask during a CBRN engagement.
- Using components of the fire control system that are announced as degraded in the conditions of the task.
- VC not firing his engagement.

[10876]

The host shall evaluate the following crew cut item and shall automatically recommend a 30-point Safety deduction when the condition is met:

- Attempting to fire the main gun while it is being loaded.

The I/O shall be provided the option to accept or reject the recommended Safety deduction.

Any other displayed 30-point Safety crew cut items will be evaluated and entered by the I/O, with the results displayed in the Common Crew Score Sheet 20c.

- Firing or attempting to fire before the command of execution.
- Gunner leaving the main gun armed or arming the main gun between engagements without receiving a fire command.
- Failure of VC to announce DESIGNATE when designating a target using the commander's independent sight.

[10877]

All displayed 5-point crew cut items will be evaluated and entered by the I/O, with the results displayed in the Common Crew Score Sheet 20d.

- VC fails to announce element of fire command that is not provided by the fire control system.
- Failure of VC to use required modifier terms.
- Gunner fails to identify the target prior to command of execution.
- Gunner fails to announce range to target after announcing IDENTIFIED.
- VC or gunner fails to give sensing (as required).
- Firing or attempting to fire before announcing ON THE WAY.
- Incorrect crew response to a fire command.
- Failure of VC to use FIRE AND ADJUST and DESIGNATE (as required).
- Failure to announce ammunition that is loaded during change of ammunition.
- Gunner fails to announce AMMUNITION / WEAPON INDEXED.
- Incorrect engagement techniques.

3.7.3.2.5.10.1 Common Crew Score Sheet

3.7.3.2.5.10.1.1 Score Sheet Timeline – Colors

3.7.3.2.5.10.1.1.1 Score Sheet Colors – Above the Timeline

[10995]

The Common Crew Score Sheet shall display following colors on the timeline (12a-12b):

[10996]

For the first target engaged, the lines, time markers, and labels shall be displayed in the color red.

[10997]

For the second target engaged, the lines, time markers, and labels shall be displayed in the color blue.

[10998]

For the third target engaged, the lines, time markers, and labels shall be displayed in the color green.

3.7.3.2.5.10.1.1.2 Score Sheet Colors – Below the Timeline

[11000]

Initial defilade line below the timeline shall be displayed in the color green.

[11001]

Delay defilade line below the timeline shall be displayed in the color green.

[11002]

Sector clear line shall be displayed in the color black.

3.7.3.2.5.10.1.1.3 Score Sheet Colors – Calculations

[11004]

The color of the target engagement data in the Common Gunnery Score Sheet boxes 13a-f, 14a-f, and 15a-f shall be consistent with the color determination defined in paragraph 3.7.3.2.5.10.1.1.1 Score Sheet Colors – Above the Timeline.

3.7.3.2.5.10.2 Score Sheet Timeline - Labels

[11006]

Targets on the timeline shall use the following labels on the timeline (12a-12b):

- DU = Driver Up
- DB = Driver Back
- OP = Open and target number
- T = Target and target number
- D = Doubtful and target number
- O = Over and target number
- S = Short and target number
- NE = Not Engaged
- NK = No Kill

3.7.3.2.5.11 Common Crew Roll-Up Sheet

[10799]

The Common Crew Roll-up Sheet shall be available for the following exercises:

- Basic Pre-Live Fire
- Gate-to-Live Fire (Tank Table VI)
- Practice Gate-to-Live Fire
- Initial Gunnery (Tank Table III)
- Initial Gunnery (Tank Table IV)
- Initial Gunnery (Tank Table V)

[10800]

The Common Crew Roll-Up Sheet shall be available upon completion of relevant exercises. The Roll-up Sheet shall be saved for GTLF exercises:

- Basic Pre-Live Fire
- Gate-to-Live Fire (Tank Table VI)
- Practice Gate-to-Live Fire
- Initial Gunnery (Tank Table III)
- Initial Gunnery (Tank Table IV)
- Initial Gunnery (Tank Table V)

[10801]

The Common Crew Roll-Up Sheet shall summarize crew performance scoring data for the performed exercise.

[10802]

The Common Crew Roll-Up Sheet (shown in Figure 3.7.3.2.5.11-1) shall provide the following information:

Header Information:

1. Crew Bumper number - XX (PLT and Bumper ID)
2. MGS
3. Crew Unit Name - X/XX (Battalion ID)
4. Date the engagement was executed - Current Date (format is YYYYMMDD)
- 5a. All caps based on format entered by I/O for Commander
- 5b. All caps based on format entered by I/O for Gunner
- 5c. All caps based on format entered by I/O for Driver
- 5d. Not Used - Always blank

[10803]

The Common Crew Roll-Up Sheet (shown in Figure 3.7.3.2.5.11-1) shall provide the following information:

Blocks 6a - 17:

- 6a. Blank
- 6b. Blank
- 6c. Blank
- 6d. Blank
7. Three (3) engagements for Practice and Five (5) engagements for BPLF
- 7a. D or N
- 7b. 60 - 69 (For GTLF, BPLF, Practice exercises), 30 - 39 (For Initial Gunnery Table III), 40-49 (For Initial Gunnery Table IV), and 50-59 (For Initial Gunnery Table V)
- 7c. 0-100
- 7e. Either YES or NO box marked with an X
- 8a-e. Not applicable to AGTS. Always blank.
9. Remarks - Engagement Notes from the end of every situation or explanation comments on Immediate Disqualification (DQ).

- 10-12a. Labels for totals for exercises run in day and night.
- 10b. Sum of points earned for engagements run in day
- 10c. Sum of 5-point penalties against the crew for engagements run in day
- 10d. Cumulative count of 10a and 10b points over cumulative count of Qualified ("YES") day run exercises
- 11b. Sum of points earned for engagements run in night
- 11c. Sum of 5-point penalties against the crew for engagements run in night
- 11d. Cumulative count of 11a and 11b points over cumulative count of Qualified ("YES") night run exercises
- 10-11 e-i. Not applicable to AGTS. Always blank.
- 12b. Cumulative count of 10d and 11d points over cumulative count of 10d and 11d Qualified ("YES") run exercises
- 12c-g. Not applicable to AGTS. Always blank.
- 13. Rating will only be selected for GTLF exercises. No rating for BPLF and Practice.
 - ◇ 9 out of 10 engagements and at least 900 for Distinguished
 - ◇ 8 out of 10 engagements and over 800 for Superior
 - ◇ 7 out of 10 engagements and over 700 for Qualified
 - ◇ Less than 7 engagements or less than 700 for Unqualified
 - ◇ REFIRE (Q2) does not apply to AGTS
- 14. Not Used - Always blank.
- 15. Printed name of instructor. No signature.
- 16. Not Used - Always blank.
- 17. Printed name of instructor. No signature.

[10804]

COMMON CREW ROLL-UP										
For use of this form see TC 3-20.31; the proponent agency is TRADOC										
1. BUMPER NUMBER		2. VEHICLE PLATFORM			3. UNIT			4. DATE		
5a. VEHICLE COMMANDER RANK AND NAME		b. GUNNER RANK AND NAME			c. DRIVER RANK AND NAME			d. LOADER RANK AND NAME		
6a. SIMULATOR TYPE		b. VIRTUAL GATE-TO-LIVE-FIRE LEVEL			c. VIRTUAL GATE-TO-LIVE-FIRE DATE			d. VIRTUAL GATE-TO-LIVE SCORE		
7. SCORING DATA					8. MALFUNCTIONS					9. REMARKS
a. DAY/NIGHT	b. ENGAGEMENT NUMBER	c. ENGAGEMENT SCORE	d. VALUE OF 5-PT PENALTIES ALLOWED	e. QUALIFIED YES/NO	a. BREECH UP (BU)	b. CASE BASE (CB)	c. MISFIRE (MF)	d. STOPPAGE (ST)	e. THERMAL FAILURE (TF)	
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
				<input type="checkbox"/> YES <input type="checkbox"/> NO						
10a.	b.	c.	d. POINTS/ QUALIFIED	e.	f.	g.	h.	i.		
DAY RUN TOTAL										
11a.	b.	c.	d. POINTS/ QUALIFIED	e.	f.	g.	h.	i.		
NIGHT RUN TOTAL										
12a.	b. POINTS/ QUALIFIED			c.	d.	e.	f.	g.		
OVERALL TOTAL										
13. RATING (Check one) <input type="checkbox"/> DISTINGUISHED <input type="checkbox"/> SUPERIOR <input type="checkbox"/> QUALIFIED <input type="checkbox"/> UNQUALIFIED <input type="checkbox"/> REFIRE (Q2)										
14. VEHICLE COMMANDER SIGNATURE (DAY)					15. VEHICLE CREW EVALUATOR PRINTED NAME/SIGNATURE (DAY)					
16. VEHICLE COMMANDER SIGNATURE (NIGHT)					17. VEHICLE CREW EVALUATOR PRINTED NAME/SIGNATURE (NIGHT)					

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Figure 3.7.3.2.5.11-1. Sample of Common Crew Roll-Up Sheet

3.7.3.2.6 Crew Training Program Scoring Criteria

3.7.3.2.6.1 Scoring Criteria for Initial Gunnery Skills

[10935]

Scoring Criteria for Initial Gunnery Skills is defined in paragraphs 3.7.3.2.5.10 Common Crew Score Sheet and 3.7.3.2.5.11 Common Crew Roll-up Sheet.

3.7.3.2.6.2 Scoring Criteria for Default and Advanced Gunnery Skills

[3598]

Crew and Commander scoring criteria in Default and Advanced Gunnery Skill levels shall consist of a student score (measured state) for each situation to form a computer recommendation.

[3599]

If the exercise is not completed, the computer shall recommend the same exercise as the next recommendation.

[3600]

Each situation shall be scored in target acquisition, reticle aim and system management.

3.7.3.2.6.2.1 Default and Advanced Gunnery Skills Target Acquisition Criterion

[3602]

The target acquisition measured state shall be the lowest score received of the following two groups.

3.7.3.2.6.2.1.1 Default and Advanced Gunnery Skills Target Acquisition Time Criteria

[8411]

Defense-Target acquisition time shall begin when the first target is fully exposed and shall end when ownvehicle reaches the position where ownvehicle stops along the ramp, except the defilade position.

[8412]

If ownvehicle opens fire or is stopped anywhere along the ramp, except the defilade position, at activation time of the first target of a situation, the target acquisition time shall be based on the offensive scoring criteria.

[3606]

Target acquisition time evaluation for defense exercises shall be as defined in Table 3.7.3.2.6.2.1.1-1.

[8985]

Table 3.7.3.2.6.2.1.1-1. Defensive Situation Target Acquisition Time Grading

ACQUISITION TIME	GRADE
0-10 SECONDS	A
>10-20 SECONDS	B
>20-25 SECONDS	C
>25 SECONDS	F

[3624]

Offense-Target acquisition time shall be one-half of the time beginning when the first target is fully exposed and ending when ownvehicle fires the first round or burst at the last engaged target of the situation.

[3625]

All enemy targets must be engaged for the target acquisition time to be calculated.

[3626]

Target acquisition time for any situation with only friendly targets shall be set to 'B'.

[3627]

Target acquisition time evaluation for offensive exercises shall be as defined in Table 3.7.3.2.6.2.1.1-2.

[8986]

Table 3.7.3.2.6.2.1.1-2. Offensive Situation Target Acquisition Time Grading

ACQUISITION TIME NUMBER OF TARGETS PER SITUATION			GRADE
1	2	3	
0-5	0-11	0-17	A
>5-7.5	>11-13.5	>17-19.5	B
>7.5-10	>13.5-16	>19.5-22	C
>10	>16	>22	F

3.7.3.2.6.2.1.2 Default and Advanced Gunnery Skills Target Acquisition ID/Class Errors

[9554]

Target identification / classification errors shall be counted if:

- a. One error shall be scored if any round is fired with reticle on a non-target. Non-target is defined as reticle aiming point greater than 20 mils from the target center of mass of a point target or greater than 100 mils from the target center of mass of an area target.
- b. One classification and one identification error shall be scored if a round is fired at a friendly target. Firing at a friendly is defined as reticle aiming point less than or equal to 10 mils from the target from the outside edge (left/right) of the target.
- c. Two errors shall be scored if no round is fired between time of target activation and target deactivation. No error shall be scored if the target is friendly.
- d. Target classification errors shall be counted if the target that is fired upon does not constitute the highest threat value. The target classification shall be as shown in table 3.7.3.2.6.2.1.2-1. Multiple levels (priority of engagement) of target classification shall exist corresponding to a ranking from most dangerous target (level 1) to least dangerous target. Each target in a situation shall be ranked according to the priority of engagement levels and compared to the other targets in the situation. Classification shall be based on the following target variables: type, range, movement, and orientation.
- e. Target identification/classification errors shall be scored for targets which activate simultaneously at the beginning of a situation. At time of first target kill, additional target classification errors shall be scored for the remaining targets including any delayed targets that have activated during the time required to kill the first target. At each subsequent target kill, additional target classification errors shall be scored for the remaining targets including any delayed targets that have activated during the time required to kill.
- f. An ID Error GUI button shall be provided for the Instructor to log target identification/classification errors that I/O detects due to the commander's verbal communication during engagements.

[9555]

Table 3.7.3.2.6.2.1.2-1. Target Classification

Enemy Target Type	Lethality Combinations			Lethality Classification
	Motion (Stopped, Moving)	Orientation (Front, Rear, Flank)	Range* (Near, Far)	
Tank	Stopped	Flank	Far	1
Tank	Stopped	Front	Far	1
Tank	Moving	Flank	Far	1
Tank	Moving	Front	Far	1
Tank	Stopped	Flank	Near	1
Tank	Stopped	Front	Near	1
Tank	Moving	Flank	Near	1
Tank	Moving	Front	Near	1
Helicopter	Stopped	Flank	Far	1
Helicopter	Stopped	Front	Far	1
Helicopter	Moving	Flank	Far	1
Helicopter	Moving	Front	Far	1
Helicopter	Stopped	Flank	Near	1
Helicopter	Stopped	Front	Near	1
Helicopter	Moving	Flank	Near	1
Helicopter	Moving	Front	Near	1
RPG (OPFOR/Insurgent)	Stopped	Flank	Near	1
RPG (OPFOR/Insurgent)	Stopped	Front	Near	1
Aircraft	Moving	Flank	Far	1
Aircraft	Moving	Front	Far	1
Aircraft	Moving	Flank	Near	1
Aircraft	Moving	Front	Near	1
Light Tank	Stopped	Front	Near	2
Light Tank	Moving	Front	Near	2
Light Tank	Stopped	Front	Far	3
Light Tank	Moving	Front	Far	3
Light Tank	Stopped	Flank	Near	3
Light Tank	Moving	Flank	Near	3
AT Type	Stopped	Front	Near	3
AT Type	Moving	Front	Near	3
APC	Stopped	Front	Far	3
APC	Stopped	Front	Near	3
APC	Moving	Front	Near	3
Light Tank	Stopped	Flank	Far	4
Light Tank	Moving	Flank	Far	4
Light APC	Stopped	Front	Far	4
Light APC	Moving	Front	Far	4
Light APC	Stopped	Front	Near	4
Light APC	Moving	Front	Near	4
AT Type	Stopped	Flank	Near	4
AT Type	Moving	Flank	Near	4
APC	Moving	Front	Far	4
APC	Stopped	Flank	Near	4
APC	Moving	Flank	Near	4

Note: * Far > 1000 m, Near ≤ 1000 m

[9556]

Table 3.7.3.2.6.2.1.2-1. Target Classification (continued)

Enemy Target Type	Lethality Combinations			Lethality Classification
	Motion (Stopped, Moving)	Orientation (Front, Rear, Flank)	Range* (Near, Far)	
Truck/Small Truck	Stopped	Flank	Near	5
Truck/Small Truck	Stopped	Rear	Near	5
Light APC	Stopped	Flank	Far	5
Light APC	Moving	Flank	Far	5
Light APC	Stopped	Flank	Near	5
Light APC	Moving	Flank	Near	5
RPG (OPFOR/Insurgent)	Moving	Flank	Near	5
RPG (OPFOR/Insurgent)	Moving	Front	Near	5
RPG (OPFOR/Insurgent)	Moving	Rear	Near	5
RPG (OPFOR/Insurgent)	Stopped	Rear	Near	5
AT Type	Moving	Flank	Far	5
AT Type	Moving	Front	Far	5
APC	Stopped	Flank	Far	5
APC	Moving	Flank	Far	5
Truck/Small Truck	Stopped	Flank	Far	6
Truck/Small Truck	Stopped	Rear	Far	6
Bunker	Stopped	Front	Near	6
Aircraft	Moving	Rear	Near	6
Tank	Stopped	Rear	Near	7
Tank	Moving	Rear	Near	7
Machine Gun Nest	Stopped	Flank	Near	7
Machine Gun Nest	Stopped	Front	Near	7
Light Tank	Stopped	Rear	Near	7
Bunker	Stopped	Flank	Near	7
Tank	Stopped	Rear	Far	8
Tank	Moving	Rear	Far	8
Sniper	Stopped	Flank	Far	8
Sniper	Stopped	Front	Far	8
Missile launcher	Stopped	Flank	Near	8
Missile launcher	Stopped	Front	Near	8
Light Tank	Stopped	Rear	Far	8
Light Tank	Moving	Rear	Near	8
Truck/Small Truck	Stopped	Front	Near	9
Helicopter	Stopped	Rear	Near	9
Helicopter	Moving	Rear	Near	9
Truck/Small Truck	Stopped	Front	Far	10
Sniper	Stopped	Flank	Near	10
Sniper	Stopped	Front	Near	10
Missile launcher	Moving	Flank	Far	10
Missile launcher	Moving	Front	Far	10

Note: * Far > 1000 m, Near ≤ 1000 m

[9557]

Table 3.7.3.2.6.2.1.2-1. Target Classification (continued)

Enemy Target Type	Lethality Combinations			Lethality Classification
	Motion (Stopped, Moving)	Orientation (Front, Rear, Flank)	Range* (Near, Far)	
Light Tank	Moving	Rear	Far	10
Bunker	Stopped	Front	Far	10
AT Type	Stopped	Rear	Near	10
Helicopter	Stopped	Rear	Far	11
Missile launcher	Stopped	Flank	Far	12
Missile launcher	Stopped	Front	Far	12
Machine Gun Nest	Stopped	Flank	Far	12
Machine Gun Nest	Stopped	Front	Far	12
Helicopter	Moving	Rear	Far	12
APC	Stopped	Rear	Near	12
Sniper	Stopped	Rear	Near	14
RPG (OPFOR/Insurgent)	Stopped	Flank	Far	14
AT Type	Moving	Rear	Near	14
APC	Moving	Rear	Near	14
Missile launcher	Stopped	Rear	Near	15
Light APC	Stopped	Rear	Far	15
APC	Stopped	Rear	Far	15
Light APC	Stopped	Rear	Near	16
AK-47 (OPFOR/Insurgent)	Moving	Rear	Near	16
AT Type	Stopped	Rear	Far	16
AT Type	Moving	Rear	Far	16
APC	Moving	Rear	Far	16
Light APC	Moving	Rear	Near	17
RPG (OPFOR/Insurgent)	Stopped	Rear	Far	17
RPG (OPFOR/Insurgent)	Moving	Flank	Far	17
RPG (OPFOR/Insurgent)	Moving	Front	Far	17
RPG (OPFOR/Insurgent)	Moving	Rear	Far	17
Machine Gun Nest	Stopped	Rear	Near	18
Light APC	Moving	Rear	Far	18
RPG (OPFOR/Insurgent)	Stopped	Front	Far	18
Truck/Small Truck	Moving	Flank	Far	19
Truck/Small Truck	Moving	Front	Far	19
Truck/Small Truck	Moving	Rear	Far	19
Truck/Small Truck	Moving	Flank	Near	19
Truck/Small Truck	Moving	Front	Near	19
Truck/Small Truck	Moving	Rear	Near	19
Sniper	Stopped	Rear	Far	20

Note: * Far > 1000 m, Near ≤ 1000 m

[8415]

Table 3.7.3.2.6.2.1.2-1. Target Classification (continued)

Enemy Target Type	Lethality Combinations			Lethality Classification
	Motion (Stopped, Moving)	Orientation (Front, Rear, Flank)	Range* (Near, Far)	
Missile launcher	Stopped	Rear	Far	22
Missile launcher	Moving	Rear	Far	22
Missile launcher	Moving	Flank	Near	22
Missile launcher	Moving	Front	Near	22
RPK-74 (OPFOR/Insurgent)	Stopped	Flank	Near	23
RPK-74 (OPFOR/Insurgent)	Stopped	Front	Near	23
RPK-74 (OPFOR/Insurgent)	Moving	Flank	Near	23
RPK-74 (OPFOR/Insurgent)	Moving	Front	Near	23
AK-47 (OPFOR/Insurgent)	Stopped	Flank	Near	23
AK-47 (OPFOR/Insurgent)	Stopped	Front	Near	23
AK-47 (OPFOR/Insurgent)	Moving	Flank	Near	23
AK-47 (OPFOR/Insurgent)	Moving	Front	Near	23
AK-47 (OPFOR/Insurgent)	Stopped	Rear	Near	23
AT Type	Stopped	Flank	Far	23
AT Type	Stopped	Front	Far	23
Aircraft	Stopped	Flank	Far	25
Aircraft	Stopped	Front	Far	25
Aircraft	Stopped	Rear	Far	25
Aircraft	Moving	Rear	Far	25
Aircraft	Stopped	Flank	Near	25
Aircraft	Stopped	Front	Near	25
Aircraft	Stopped	Rear	Near	25
Sniper	Moving	Flank	Far	26
Sniper	Moving	Front	Far	26
Sniper	Moving	Rear	Far	26
Sniper	Moving	Flank	Near	26
Sniper	Moving	Front	Near	26
Sniper	Moving	Rear	Near	26
Missile launcher	Moving	Rear	Near	26
Machine Gun Nest	Stopped	Rear	Far	26

Note: * Far > 1000 m, Near ≤ 1000 m

[8416]

Table 3.7.3.2.6.2.1.2-1. Target Classification (continued)

Enemy Target Type	Lethality Combinations			Lethality Classification
	Motion (Stopped, Moving)	Orientation (Front, Rear, Flank)	Range* (Near, Far)	
RPK-74 (OPFOR/Insurgent)	Stopped	Flank	Far	26
RPK-74 (OPFOR/Insurgent)	Stopped	Front	Far	26
RPK-74 (OPFOR/Insurgent)	Moving	Flank	Far	26
RPK-74 (OPFOR/Insurgent)	Moving	Front	Far	26
RPK-74 (OPFOR/Insurgent)	Stopped	Rear	Far	26
RPK-74 (OPFOR/Insurgent)	Moving	Rear	Far	26
RPK-74 (OPFOR/Insurgent)	Stopped	Rear	Near	26
RPK-74 (OPFOR/Insurgent)	Moving	Rear	Near	26
Pistol (OPFOR/Insurgent)	Stopped	Flank	Far	26
Pistol (OPFOR/Insurgent)	Stopped	Front	Far	26
Pistol (OPFOR/Insurgent)	Stopped	Rear	Far	26
Pistol (OPFOR/Insurgent)	Moving	Flank	Far	26
Pistol (OPFOR/Insurgent)	Moving	Front	Far	26
Pistol (OPFOR/Insurgent)	Moving	Rear	Far	26
Pistol (OPFOR/Insurgent)	Stopped	Flank	Near	26
Pistol (OPFOR/Insurgent)	Stopped	Front	Near	26
Pistol (OPFOR/Insurgent)	Stopped	Rear	Near	26
Pistol (OPFOR/Insurgent)	Moving	Flank	Near	26
Pistol (OPFOR/Insurgent)	Moving	Front	Near	26
Pistol (OPFOR/Insurgent)	Moving	Rear	Near	26
AK-47 (OPFOR/Insurgent)	Stopped	Flank	Far	26
AK-47 (OPFOR/Insurgent)	Stopped	Front	Far	26
AK-47 (OPFOR/Insurgent)	Stopped	Rear	Far	26
AK-47 (OPFOR/Insurgent)	Moving	Flank	Far	26
AK-47 (OPFOR/Insurgent)	Moving	Front	Far	26

Note: * Far > 1000 m, Near ≤ 1000 m

[8417]

Table 3.7.3.2.6.2.1.2-1. Target Classification (continued)

Enemy Target Type	Lethality Combinations			Lethality Classification
	Motion (Stopped, Moving)	Orientation (Front, Rear, Flank)	Range* (Near, Far)	
AK-47 (OPFOR/Insurgent)	Moving	Rear	Far	26
Bunker	Stopped	Flank	Far	26
Bunker	Stopped	Rear	Far	26
Bunker	Stopped	Rear	Near	26
Truck without Weapon	Stopped	Flank	Far	27
Truck without Weapon	Stopped	Front	Far	27
Truck without Weapon	Stopped	Rear	Far	27
Truck without Weapon	Moving	Flank	Far	27
Truck without Weapon	Moving	Front	Far	27
Truck without Weapon	Moving	Rear	Far	27
Truck without Weapon	Stopped	Flank	Near	27
Truck without Weapon	Stopped	Front	Near	27
Truck without Weapon	Stopped	Rear	Near	27
Truck without Weapon	Moving	Flank	Near	27
Truck without Weapon	Moving	Front	Near	27
Truck without Weapon	Moving	Rear	Near	27
Civilian Vehicle	Stopped	Flank	Far	27
Civilian Vehicle	Stopped	Front	Far	27
Civilian Vehicle	Stopped	Rear	Far	27
Civilian Vehicle	Moving	Flank	Far	27
Civilian Vehicle	Moving	Front	Far	27
Civilian Vehicle	Moving	Rear	Far	27
Civilian Vehicle	Stopped	Flank	Near	27
Civilian Vehicle	Stopped	Front	Near	27
Civilian Vehicle	Stopped	Rear	Near	27
Civilian Vehicle	Moving	Flank	Near	27
Civilian Vehicle	Moving	Front	Near	27
Civilian Vehicle	Moving	Rear	Near	27

Note: * Far > 1000 m, Near ≤ 1000 m

[3873]

The target identification/classification evaluation shall be as defined in Table 3.7.3.2.6.2.1.2-2.

[6047]

Table 3.7.3.2.6.2.1.2-2. Target Identification / Classification Evaluation Grading

ID Errors	Classification Errors	Grade
0	0	A
0	1	C
1	0	C
1	1	F
0	>1	F
>1	0	F
>1	>1	F

3.7.3.2.6.2.2 Default and Advanced Gunnery Skills Reticle Aiming Criterion

[8989]

The reticle aim measured state shall be based on the lower (worst) score received among three criteria: time to fire first round or burst, time to kill, and reticle aim error.

3.7.3.2.6.2.2.1 Reticle Aiming Time of First Round or Burst Criteria

[8419]

The time to first round or burst shall begin when the initial target in a situation is fully exposed during offensive exercises or when the initial target is active in a situation and the ownvehicle stops anywhere along the ramp, except the defilade position, during defensive exercises.

[9558]

If the ownvehicle opens fire or is stopped anywhere, except the defilade position, at the time of target activation, offensive criteria shall be applied.

[3913]

The time shall end when the first round or burst is fired in the situation.

[3914]

The time to first round/burst evaluation shall be as defined in Table 3.7.3.2.6.2.2.1-1.

[8990]

Table 3.7.3.2.6.2.2.1-1. Time to First Round Burst Grading

Defensive Situations	Offensive Situations	Evaluation	Grade
0-4 seconds	0-8 seconds	4	A
>4-8 seconds	>8-13 seconds	3	B
>8-13 seconds	>13-18 seconds	2	C
>13 seconds	>18 seconds	1	F

[3942]

For each offensive situation following the situation in which the pre-programmed malfunctions (announced) includes a stabilization failure, five seconds shall be added to the times given in Table 3.7.3.2.6.2.2.1-1.

[3943]

For defensive situations, if the ownvehicle fires on an active target prior to reaching full enfilade, time to fire first round or burst shall be set to zero seconds.

[9560]

For any situation in which a round is fired within 10 mils of a friendly target, Time to First Round Burst grade shall be set to F.

3.7.3.2.6.2.2.2 Default and Advanced Gunnery Skills Target Kill Criteria

[3945]

Point targets shall be killed based on the ammunition type and the number of rounds impacting the target K-Kill. A single main gun round of appropriate ammunition for the target must impact within the K-Kill plate to score as a target kill.

[3946]

Ammunition types that defeat each target type shall be as defined in Table 3.7.3.2.6.2.2.2-1.

[9561]

Table 3.7.3.2.6.2.2.2-1. Default and Advanced Gunnery Skills Target Kill Criteria

Target Type	SABOT		HEAT		HEP		CANISTER		COAX	
	M-Kill	K-Kill	M-Kill	K-Kill	M-Kill	K-Kill	M-Kill	K-Kill	M-Kill	K-Kill
Aircraft / Helicopter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Civilian Vehicle / Truck	Yes	Yes	Yes	Yes	Yes	Yes	Yes (1)	Yes (1)	No	Yes (2)
Sniper	Yes	Yes	Yes	Yes	Yes	Yes	Yes (1)	Yes (1)	No	Yes (4)
RPG Team / Fire Team / Squad	Yes	Yes	Yes	Yes	Yes	Yes	Yes (1)	Yes (1)	No	Yes (5)
Machine Gun Nest	Yes	Yes	Yes	Yes	Yes	Yes	Yes (1)	Yes (1)	No	Yes (6)
APC / Light APC / Towed Gun / AT Type / Missile Launcher	Yes	Yes	Yes	Yes	Yes	Yes	Yes (3)	Yes (3)	No	No
Light Tank	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Tank	No	No	No	No	No	No	No	No	No	No
Bunkers	N/A	N/A	N/A	Yes	N/A	Yes	N/A	No	N/A	No
Wall Breach / Room Clearing	N/A	No	N/A	No	N/A	Yes	N/A	No	N/A	No

Notes: M-Kill denotes Mobility Kill, K-Kill denotes Catastrophic Kill

* BMP's shall be scored as in the "All Tanks" target category for Canister Ammo.

- (1) If Target is <300 m.
- (2) 3 impacts to the cab to achieve a kill.
- (3) Only if target is less than 250m (excluding BMP's).
- (4) 1 impact to achieve a kill
- (5) At least 50% of DIs in the grouping must be hit to achieve an area target kill
- (6) At least 5 impacts to achieve a kill

[9996]

For CANISTER ammunition, individual "DI" point targets shall be killed by computing the proximity of the firing effect point of impact to the center-mass of the individual member or single DI target. The point of impact shall be determined by using the CANISTER round center line ballistic point of impact. The distance from the point of impact to the DI point target location is the "Radial Distance" in meters used in Table 3.7.3.2.6.2.2.2-2. This radial distance, along with the "Range" from the ownvehicle to the target, shall look up the probability of kill from a user provided "lethality" table for DI point targets, Table 3.7.3.2.6.2.2.2-2.

[9997]

Table 3.7.3.2.6.2.2.2-2. Default and Advanced Gunnery Skills CANISTER Area/DI Target Kill Criteria

Range	Radial Distance - m				
	<2.5	2.5 to <7.5	7.5 to <12.5	12.5 to <17.5	17.5 to <22.5
0-49	0.99	0.99	0.99	0.99	0.99
50-149	0.99	0.18	0	0	0
150-249	0.99	0.94	0.13	0	0
250-349	0.99	0.92	0.50	0.04	0
350-449	0.83	0.81	0.56	0.12	0.04
450-549	0.62	0.45	0.31	0.07	0.02
550-649	0.46	0.27	0.15	0.02	0.01

[9998]

Troops, RPGs, Fire Team, Squad, and Sniper shall be modeled utilizing Dismounted Infantry (DI) representations.

[9999]

For CANISTER ammunitions fired at grouped DI targets, this look-up process shall be repeated for each member DI point target of the area target, and the probability of kill values shall be accumulated. If the accumulated probability of kill exceeds 50 percent (0.50), the area target shall be scored as killed.

[10000]

Additionally, troop targets are graded on the basis of percentage coverage of the member DI point targets. Percentage coverage grading shall be as defined in Table 3.7.3.2.6.2.2.2-3.

[9562]

Percentage coverage for an area target shall be based on the number of troops killed.

[8993]

A troop target shall be killed when struck by one or more rounds of CANISTER or COAX ammunition. Percentage coverage grading shall be as defined in Table 3.7.3.2.6.2.2.2-3. The percentage coverage is evaluated at the minimum time for the situation at which a 'C' Time to Kill grade can be received (see Tables 3.7.3.2.6.2.2.2-1, -2, and -3). When engaging COAX targets, the grade received shall be reduced by one letter grade if more than 100 COAX rounds are fired at a target.

[9563]

Table 3.7.3.2.6.2.2.2-3. Default and Advanced Gunnery Skills Area Target Kill Criteria

Troop & Rpg Team Targets Killed (Percent Coverage)	Evaluation	Grade
100-80%	4	A
<80-50%	3	B
<50-30%	2	C
<30%	1	F

[10184]

For single DI targets, percent coverage is not applicable.

[10001]

For CANISTER ammunition, point targets shall be killed by computing the proximity of the firing effect point of impact to the center-mass of the point target. This radial distance shall look up the probability of kill from the user provided "lethality" table for APC type point targets, Table 3.7.3.2.6.2.2.2-4.

[10002]

Table 3.7.3.2.6.2.2.2-4. Default and Advanced Gunnery Skills CANISTER APC Target Kill Criteria

Range	Radial Distance - m				
	<2.5	2.5 to <7.5	7.5 to <12.5	12.5 to <17.5	17.5 to <22.5
0-49	0.99 (75%M, 25%K)*	0.50 (75%M, 25%K)*	0	0	0
50-149	0.50 (90%M, 10%K)*	0.25 (90%M, 10%K)*	0	0	0
150-249	0.25 (100%M)*	0	0	0	0
250-349	0	0	0	0	0
350-449	0	0	0	0	0
450-549	0	0	0	0	0
550-649	0	0	0	0	0

*Note: The percentages in parentheses are the mobility (M)/catastrophic kill (K) percentages after a kill is determined from the table probability lookup.

[10003]

The radial distance shall look up the probability of kill from the user provided “lethality” table for Helicopter type point targets, Table 3.7.3.2.6.2.2.2-5.

[10004]

Table 3.7.3.2.6.2.2.2-5. Default and Advanced Gunnery Skills CANISTER HELO Target Kill Criteria

Range	Radial Distance – m				
	<2.5m	2.5 to <7.5	7.5 to <12.5	12.5 to <17.5	17.5 to <22.5
0-49	0.99	0.99	0.50	0	0
50-149	0.99	0.99	0.25	0.25	0
150-249	0.99	0.75	0.25	0.25	0
250-349	0.75	0.50	0.25	0	0
350-449	0	0	0	0	0
450-549	0	0	0	0	0
550-649	0	0	0	0	0

[10005]

The radial distance shall look up the probability of kill from the user provided “lethality” table for Trucks or Civilian Vehicles type point targets, Table 3.7.3.2.6.2.2.2-6.

[10006]

Table 3.7.3.2.6.2.2.2-6. Default and Advanced Gunnery Skills CANISTER Trucks/Civilian Vehicles Target Kill Criteria

Range	Radial Distance – m				
	<2.5	2.5 to <7.5	7.5 to <12.5	12.5 to <17.5	17.5 to <22.5
0-49	0.99	0.99	0.25	0	0
50-149	0.99	0.75	0.25	0	0
150-249	0.75	0.50	0	0	0
250-349	0.50	0.25	0	0	0
350-449	0	0	0	0	0
450-549	0	0	0	0	0
550-649	0	0	0	0	0

[10007]

The radial distance shall look up the probability of kill from the user provided “lethality” table for Tank type point targets, Table 3.7.3.2.6.2.2.2-7. As indicated by this “null” contents table, the Canister round shall not kill or mobility kill a tank type target. For the purpose Canister probability scoring, the BMP type targets shall be grouped in this category.

[10008]

Table 3.7.3.2.6.2.2.2-7. Default and Advanced Gunnery Skills CANISTER Tank Target Kill Criteria

Range	Radial Distance - m				
	<2.5	2.5 to <7.5	7.5 to <12.5	12.5 to <17.5	17.5 to <22.5
0-49	0	0	0	0	0
50-149	0	0	0	0	0
150-249	0	0	0	0	0
250-349	0	0	0	0	0
350-449	0	0	0	0	0
450-549	0	0	0	0	0
550-649	0	0	0	0	0

[10185]

During wall breaching, the target kill criteria shall be: score 3 rounds to breach an A, 4 rounds to breach a B, 5 rounds to breach a C, and greater than 5 rounds to breach an F.

3.7.3.2.6.2.2.3 Default and Advanced Gunnery Skills Reticle Aiming Time to Kill Criteria

[8994]

Time to kill is calculated based on the type of situation, either defensive (stationary ownvehicle) or offensive (moving ownvehicle), whether the situation includes area targets and the reticle aim status conditions of the exercise. Based on the reticle aim status condition, separate criteria is given for offensive situations with stabilization failures, and any situations with laser rangefinder failure and targets outside battlesight ranges. These special criteria for reticle aim status conditions shall not apply to Advanced Gunnery Skills level II.

[9564]

Time to kill for defensive situations shall begin when the ownvehicle stops, except in the defilade position, for the first time in a situation after a target is active and ends when the target is killed. Time to kill of hostile vehicles not engaged or hit and not killed shall be set to “F.”

[9565]

If the ownvehicle opens fire or is stopped anywhere along the ramp, except in the defilade position, at time of initial target activation, time to kill for offensive situations criteria shall be applied.

[9566]

Grading for Time to Kill for defensive situations shall be as defined in Table 3.7.3.2.6.2.2.3-1.

[9567]

Table 3.7.3.2.6.2.2.3-1. Defensive Situation Time to Kill by Number of Targets

1	2	3	Evaluation	Grade
0-5 sec	0-17 sec	0-29 sec	4	A
>5-10 sec	>17-22 sec	>29-34 sec	3	B
>10-15 sec	>22-27 sec	>34-39 sec	2	C
>15 sec	>27 sec	>39 sec	1	F

[4041]

Grading for defensive situations with a near miss from direct vehicle or missile fire when the ownvehicle moves to an alternate position shall be as defined in Table 3.7.3.2.6.2.2.3-2.

[9568]

Table 3.7.3.2.6.2.2.3-2. Defensive Situation Time to Kill by Number of Targets With Enemy Near Miss Fired

1	2	3	Evaluation	Grade
0-5 sec	0-17 sec	0-44 sec	4	A
>5-10 sec	>17-22 sec	>44-49 sec	3	B
>10-15 sec	>22-27 sec	>49-54 sec	2	C
>15 sec	>27 sec	>54 sec	1	F

[4075]

Time to kill for offensive situations without stabilization failures begin when the first target in a situation is fully exposed and ends when all targets in a situation are killed. Time to kill for hostile targets not engaged or hit and not killed shall be set to "F." Grading for Time to Kill in offensive situations shall be as defined in Table 3.7.3.2.6.2.2.3-3.

[9569]

Table 3.7.3.2.6.2.2.3-3. Offensive Situation Time to Kill by Number of Targets

1	2	3	Evaluation	Grade
0-10 sec	0-22 sec	0-34 sec	4	A
>10-15 sec	>22-27 sec	>34-39 sec	3	B
>15-20 sec	>27-32 sec	>39-44 sec	2	C
>20 sec	>32 sec	>44 sec	1	F

[9570]

The following conditions and exceptions shall apply to Time to Kill:

- For each offensive situation following the situation in which the pre-programmed malfunction (announced) includes a stabilization failure, five seconds shall be added to the times in 3.7.3.2.6.2.2.3-3.
- For each offensive or defensive situation following the situation in which the pre-programmed malfunction (announced) includes a laser rangefinder failure, five seconds shall be added to the times in tables 3.7.3.2.6.2.2.3-1 through 3.7.3.2.6.2.2.3-3 if one or more targets are outside battlesight range. Within battlesight range is within (+) or (-) 200 meters of the battlesight range as announced by the Instructor/Operator as read from the crew instructions for that exercise.
- For each offensive or defensive situation in which area targets occur, 5 seconds shall be added to times in tables 3.7.3.2.6.2.2.3-1 through 3.7.3.2.6.2.2.3-3 in addition to times given for any of the failures listed.
- For each situation in which a friendly target occurs and no round is fired within 10 mils of that target (left or right), Time to Kill for that target is set to B.

3.7.3.2.6.2.2.4 Default and Advanced Gunnery Skills Reticle Aim Error Criteria

[4116]

Reticle Aim Error is evaluated only for main gun rounds. If the target is killed by the first round, the scoring shall be as defined in table 3.7.3.2.6.2.2.4-1 and subsequent rounds fired do not change the score. Reticle aim error shall be the lowest grade of all targets in a situation.

[4117]

If a second round is fired after a first round miss occurred, the scoring defined in table 3.7.3.2.6.2.2.4-1 shall apply and subsequent rounds beyond the second round shall not impact scoring of reticle aim error.

[6054]

Table 3.7.3.2.6.2.2.4-1. First and Second Round Fired Reticle Aim Error

Main Gun Round Reticle Aim Error	Evaluation	Grade
First round fired target hit, K-kill achieved	4	A
First round M-hit or target missed, second round K-kill achieved	3	B
Both rounds M-hit or target missed, or no second round fired after first round M-hit or miss	1	F

3.7.3.2.6.2.2.5 Default and Advanced Gunnery Skills Outside Battlesight Range Reticle Aim Error

[8999]

For each situation following the situation in which the pre-programmed malfunctions (announced) include a laser rangefinder failure, each target outside battlesight range shall be scored as defined in table 3.7.3.2.6.2.2.5-1. Targets which are outside of battlesight range are outside (+) or (-) meters of the battlesight range as announced by the Instructor / Operator when read from crew instructions.

[9571]

Table 3.7.3.2.6.2.2.5-1. Outside Battlesight Range Reticle Aim Error

First or Second Round Reticle Aim Error	Evaluation	Grade
First round fired target hit, K-kill achieved; or first round M-hit or target missed with second round K-kill achieved	4	A
Both rounds M-hit or target missed, or no second round fired after first round M-hit or miss	1	F

[4152]

If the target is killed (K-kill) with round 1, subsequent rounds fired shall not have an impact on the score.

3.7.3.2.6.2.2.6 Default and Advanced Gunnery Skills Fire on Friendly Target Reticle Aim Error

[9572]

For any situation in which a round is fired within 10 mils of a friendly target volume to the left or right, Reticle Aim Error grade shall be set to F.

[9573]

For any situation in which a friendly target occurs and no round is fired within 10 mils of that target volume left or right, Reticle Aim Error grade for that target is set to B.

3.7.3.2.6.2.3 Default and Advanced Gunnery Skills System Management Criteria

[4161]

The system management scoring shall be based on the lowest of the grades received between three criteria: pre-fire, time of fire and procedure errors.

[4162]

The evaluation shall be graded as defined in Table 3.7.3.2.6.2.3-1.

[6056]

Table 3.7.3.2.6.2.3-1. System Management Error Grading

Number of Errors	Evaluation	Grade
0	4	A
1	3	B
2	2	C
>2	1	F

3.7.3.2.6.2.3.1 Default and Advanced Gunnery Skills System Management Prefiring Errors

[4186]

Prior to the firing of any simulated weapons, the laser rangefinder activation shall be evaluated.

[4187]

Additionally, between main gun rounds, a check shall be made to determine if relasing has occurred. However, there shall be no lasing error on subsequent rounds of CANISTER for targets less than 150 meters and the engagement remains on the same target.

[9578]

A prefiring error shall be assessed if the CMS Day Sight is not in high magnification (Narrow FOV) while lasing.

[4188]

Prefiring switch errors shall not be counted if the LRF malfunction is active. The total number of prefiring errors shall be summed and graded as defined in table 3.7.3.2.6.2.3-1.

3.7.3.2.6.2.3.2 Default and Advanced Gunnery Skills System Management Time of Fire Errors

[4190]

Ammunition and reticle switch status are checked per each main gun round fired for each target in the situation. The total number of time of firing errors shall be summed and graded as defined in table 3.7.3.2.6.2.3-1.

3.7.3.2.6.2.3.2.1 Default and Advanced Gunnery Skills System Management Time of Fire Errors - Ammunition

[4192]

An ammunition time of fire switch error shall be scored based on the target and ammo selection criteria in 3.7.3.2.6.2.3.2.1-1. No ammunition errors are scored for the first round fired at a point target. Civilian vehicles are friendly targets, and friendly target firings are not assessed as wrong ammo errors.

[9574]

Table 3.7.3.2.6.2.3.2.1-1. Ammo Time Of Fire Errors

Enemy Target Type	SABOT		HEAT		HEP		CANISTER		COAX
	Frontal	Non-Frontal	Frontal	Non-Frontal	Frontal	Non-Frontal	Frontal	Non-Frontal	
Aircraft/Helicopter	OK	OK	Error	Error	Error	Error	OK*	OK*	Error
Civilian Vehicle / Truck	Error	Error	OK	OK	OK	OK	OK*	OK*	OK
Sniper	Error	Error	Error	Error	OK	OK	OK*	OK*	OK
RPG Team / Fire Team / Squad	Error	Error	Error	Error	OK	OK	OK*	OK*	OK
Machine Gun Nest	Error	Error	Error	Error	OK	OK	OK*	OK*	OK
APC / Light APC / Towed Gun / AT Type / Missile Launcher	OK (2)	OK (2)	OK	OK	OK (1)	OK (1)	OK**	OK**	Error
Light Tank	OK	OK	Error	OK	OK (1)	OK (1)	Error***	Error***	Error
Tank	Error	Error	Error	Error	Error	Error	Error***	Error***	Error
Bunker	Error	Error	OK	OK	OK	OK	Error	Error	Error
Wall Breaching / Room Clearing	Error	Error	Error	Error	OK	OK	Error	Error	Error

Notes: Frontal, Non-Frontal denotes target orientation.

* Only if target is less than 300 meters.

** Only if target is less than 250 meters (excluding BMP's).

*** For canister scoring, a BMP-1, BMP-2, BMP-3 shall be grouped in the tank category.

(1) OK if no SABOT or HEAT available.

(2) OK if no HEAT available.

3.7.3.2.6.2.3.2.2 Default and Advanced Gunnery Skills System Management Time of Fire Errors - Reticles

[9575]

A reticle time of fire switch error shall be scored if:

- At the time of main gun or coax weapon fire, the sight in use is at low power (except when using the Auxiliary sights or in a MOUT-type exercise).

3.7.3.2.6.2.3.2.3 Default and Advanced Gunnery Skills System Management Time of Fire Errors - Ammo Mismatch

[10189]

An ammo mismatch time of fire switch error shall be scored if:

- The ammo selector does not match the ammo fired.

3.7.3.2.6.2.3.3 Default and Advanced Gunnery Skills System Management Procedure Errors

[9576]

Procedure switch errors checks are made for muzzle reference sensor (MRS) update errors, defilade procedure errors, and ownvehicle hit errors. The total number of procedure errors shall be summed and graded as shown in table 3.7.3.2.6.2.3-1.

3.7.3.2.6.2.3.3.1 System Management Procedure Errors - MRS Update

[9577]

For each exercise, if an MRS update has not been performed after firing the sixth round, one procedure error shall be scored for each situation until such time as an MRS update is performed. An exception shall be those situations where pre-programmed stabilization or CMS/CDU malfunctions are active.

3.7.3.2.6.2.3.3.2 Reserved

3.7.3.2.6.2.3.3.3 Default and Advanced Gunnery System Management Procedure Errors - Ownvehicle Hit

[4240]

One procedure error shall be scored for each ownvehicle hit in each situation.

3.7.3.2.6.2.3.3.4 Default and Advanced Gunnery System Management Procedure Errors - Fail Thermal for Tgt Smoke

[9580]

A procedure error shall be scored for each situation in which the gunner fails to utilize the CMS Thermal when a target pops smoke.

3.7.3.2.6.2.3.3.5 Default and Advanced Gunnery System Management Procedure Errors - CANISTER Error

[10010]

A System Management Evaluation procedure error, identified by the symbol "P", shall be assessed if the CANISTER is used against an area target and any of the following engagement errors are detected:

- a. No follow-up Coax weapon is used if the initial CANISTER round(s) did not achieve at least 50% area coverage.

[10206]

- b. Reserved

[10207]

- c. Reserved

[10034]

- d. At least one Canister round is not fired at a grouped area target consisting of 10 DIs that are at a range less than 300 meters. See Note below.

[10035]

Note: Item d above includes the following conditions:

- Assuming there are sufficient Canister rounds available in the ready/semi-ready racks, including Canister loaded in the main gun, to support the minimum of the Canister firings.
- The evaluated range of the grouped area target shall be determined at 100% coverage or at target deactivation, whichever happens first. The centroid location of the grouped area target shall be used to determine the evaluated range from the ownvehicle for the entire group.

[10036]

A Canister round fired at a grouped area target from the defilade position shall count toward the minimum number of Canister firings specified in items a. through d. above. A Canister round fired at a grouped area target from anywhere along the ramp shall count toward the minimum number of Canister firings specified in items a. through d. above.

[10011]

If the percent coverage of the CANISTER round(s) was 100%, there shall be no error assessed if nothing else is fired at the target.

[10012]

If the percent coverage of the CANISTER round(s) was not 100% and subsequent ammunition or weapons were used on the target and 100% coverage was still not reached, no error shall be assessed.

3.7.3.2.6.3 Scoring Criteria for Basic Gunnery Skills Exercises

[10951]

Scoring Criteria for Basic Gunnery Skills is defined in paragraphs 3.7.3.2.5.10 Common Crew Score Sheet and 3.7.3.2.5.11 Common Crew Roll-up Sheet.

3.7.3.2.6.4 Scoring Criteria for Special Purpose Exercises

[4253]

Scoring criteria for Special Purpose Skills shall be as defined for Advanced Gunnery skills except as noted below:

3.7.3.2.6.4.1 Scoring Criteria for Orientation / Familiarization Exercises

[4255]

No scoring criteria is required for Orientation / Familiarization Exercises.

3.7.3.2.6.4.2 Scoring Criteria for Crew Station Preparation Exercises

[9581]

Crew Station Preparation scoring will be performed by the I/O. The scoring is pass / fail scoring and is based on performance of boresight, zero, and CCF determination procedures.

3.7.3.2.6.4.3 Scoring Criteria for Acquisition / Manipulation Exercises

3.7.3.2.6.4.3.1 Acquisition / Manipulation Exercise Target Acquisition Criteria

[4260]

Acquisition / Manipulation Exercise Target Acquisition Criteria shall be as defined in section 3.7.3.2.6.2.1.

3.7.3.2.6.4.3.1.1 Acquisition / Manipulation Exercise Acquisition Time

[4262]

Acquisition time for Acquisition Manipulation defensive exercises shall be as defined in paragraph 3.7.3.2.6.2.1.1.

[4263]

For offensive exercises, target acquisition time shall begin when the target is fully exposed and is recorded as one-half the time to ownvehicle activation of designated trigger.

[4264]

Target acquisition time evaluation for offensive exercises shall be as defined in Table 3.7.3.2.6.4.3.1.1-1.

[6058]

Table 3.7.3.2.6.4.3.1.1-1. Acquisition / Manipulation Exercise Acquisition Time Evaluation

Acquisition Time	Grade
0-4	A
>4-6.5	B
>6.5-9	C
>9	F

3.7.3.2.6.4.3.1.2 Acquisition / Manipulation Exercise Identification Errors

[4283]

Target identification errors shall be scored for both offense and defense situations.

[9582]

Identification errors shall be scored based on the following:

- a. One error shall be scored if the designated trigger for the exercise is activated with reticle on a non-target. Non target is defined as greater than 20 mils from the target center of mass of a point target and greater than 20 mils from the target center of mass of an area target.
- b. Two errors shall be scored if the designated trigger for the exercise is not activated between time of target activation and target deactivation. No error shall be scored if there is no trigger pull and the target is a friendly target.

[4287]

Identification error grading shall be as defined in table 3.7.3.2.6.4.3.1.2-1.

[6059]

Table 3.7.3.2.6.4.3.1.2-1. Acquisition / Manipulation Identification Error Grading

Errors	Grade
0	A
1	C
>1	F

3.7.3.2.6.4.3.2 Acquisition / Manipulation Exercise Reticle Aim Criteria

[4303]

The reticle aim measured state shall be based on the lowest score received in any of the following three criteria:

3.7.3.2.6.4.3.2.1 Acquisition / Manipulation Exercise Reticle Aim Activation Criteria

[9583]

The time to trigger activation shall begin when the initial target in a situation is fully exposed during offensive exercises or when the initial target in a situation is active and the ownvehicle stops, except the defilade position, during defensive exercises. If the ownvehicle is stopped, except the defilade position at the time of target activation, offensive criteria shall be applied. The time to trigger activation ends when the trigger specified for the exercise is activated. The time to trigger activation evaluation shall be as defined in table 3.7.3.2.6.4.3.2.1-1.

[9010]

Table 3.7.3.2.6.4.3.2.1-1. Time to Trigger Activation Grading

DEFENSIVE SITUATIONS	OFFENSIVE SITUATIONS	EVALUATION	GRADE
0-4 seconds	0-8 seconds	4	A
>4-8 seconds	>8-13 seconds	3	B
>8-13 seconds	>13-18 seconds	2	C
>13 seconds	>18 seconds	1	F

Exception: For each offensive situation following the situation in which the pre-programmed malfunction (announced) includes a stabilization failure, five seconds shall be added to the times given in table 3.7.3.2.6.4.3.2.1-1.

3.7.3.2.6.4.3.2.2 Acquisition/Manipulation Exercise Reticle Aim Error At Trigger Activation Criteria

[9585]

At trigger activation, the reticle aim error shall be the total distance that the reticle is off the centroid of the target or the correct aiming point for situations requiring manual lead aim off. For exercises that utilize normal mode, the correct aiming point shall be the target centroid. For exercises using STAB off, the correct aiming point shall be ahead of the target 2.5 mils for APFSDS ammunition, 5.0 mils for HEAT ammunition, and 7.5 mils for HEP. For exercises that use the Aux reticle, the correct aim point for these exercises shall be at the 1200 meter reticle line for APFSDS, 900 meters for HEAT (both are elevations), and 500 meters for HEP. The correct azimuth aim point shall be 2.5 mils, 5.0 mils, and 7.5 mils ahead of the target for APFSDS, HEAT, and HEP respectively.

[4336]

The reticle aim error shall be scored at trigger pull and the elevations shall be as defined in table 3.7.3.2.6.4.3.2.2-1.

[6061]

Table 3.7.3.2.6.4.3.2.2-1. Reticle Aim Error Grading

RETICLE ERROR	EVALUATION	GRADE
Projected impact is within K-Kill plate	4	A
Projected impact is within M-Hit plate	2	C
Projected impact is outside both plates	1	F

3.7.3.2.6.4.3.2.3 Acquisition/Manipulation Exercise Reticle Aim Tracking Evaluation Criteria

[4356]

During moving target acquisition/manipulation situations, a tracking evaluation shall be made.

[4357]

Once the trigger is activated, tracking shall be evaluated until the target begins to deactivate.

[4358]

The evaluation shall be made on the percentage of time that the reticle remains within an area defined by the kill hit plate (or the proper aiming point during emergency and manual mode operation).

[4359]

The tracking evaluation score shall be as defined in Table 3.7.3.2.6.4.3.2.3-1.

[6062]

Table 3.7.3.2.6.4.3.2.3-1. Tracking Accuracy Error Grading

Percentage Of Time Within K-Kill Plate	Evaluation	Grade
100-85%	4	A
<85-70%	3	B
<70-55%	2	C
<55%	1	F

3.7.3.2.6.4.3.3 Acquisition / Manipulation Exercise System Management Criteria

[4383]

For Acquisition / Manipulation exercises, a switch check shall be made when any of the simulated weapons are fired or at designated trigger pull. Acquisition / Manipulation Exercise System Management criteria for Prefiring Errors and Time of Fire Errors shall be as defined in section 3.7.3.2.6.2.3; Procedure Error criteria shall not apply.

3.7.3.2.6.4.4 Scoring Criteria for Commander to Gunner Hand-off Exercises

3.7.3.2.6.4.4.1 Commander to Gunner Hand-off Exercises Target Acquisition Criteria

[9586]

During CPV Hand-off Exercises, designate time shall be evaluated.

[9013]

Designate time shall begin at full target exposure (3.5 seconds following target activation).

[9587]

Designate time shall end with the activation of the CPV designate switch at the last active target in the situation.

[9015]

If the designate switch is not activated, the designate time score shall be set to F.

[9016]

Designate time evaluation shall be as defined in table 3.7.3.2.6.4.4.1-1.

[9017]

Table 3.7.3.2.6.4.4.1-1. Designate Time Evaluation

Time	Evaluation	Grade
0-20	4	A
>20	1	F

3.7.3.2.6.4.4.2 Commander to Gunner Hand-off Exercises Reticle Aim Criteria

[9588]

CPV Hand-off Exercise Reticle Aim criteria shall be as defined in section 3.7.3.2.6.2.2.

3.7.3.2.6.4.4.3 Commander to Gunner Hand-off Exercises System Management Criteria

[9589]

CPV Hand-off Exercises System Management criteria for Time of Fire Errors and Procedure errors shall be as defined in section 3.7.3.2.6.2.3.

[9590]

CPV Hand-off Exercises System criteria for Prefire errors shall be as follows:

3.7.3.2.6.4.4.3.1 Commander to Gunner Hand-off Exercises Prefiring Switch Errors

[9591]

In CPV hand-off exercises, a prefiring error shall be scored for the following:

- a. One error shall be scored for each situation in which the commander fails to designate the last active target in the situation.
- b. One error shall be scored for each activation of the target designate switch (within the time allowed) if the target is greater than three degrees from the center of the field of view.

[9022]

The prefiring evaluation shall be as defined in Table 3.7.3.2.6.4.4.3.1-1.

[9592]

Table 3.7.3.2.6.4.4.3.1-1. CPV Hand-Off Exercise Grading

NUMBER OF PRE-FIRING ERRORS	EVALUATION	GRADE
0	4	A
1	3	B
2	2	C
>2	1	F

3.7.3.2.6.4.5 Scoring Criteria for Evasive Helicopter Exercises

3.7.3.2.6.4.5.1 Evasive Helicopter - Target Acquisition Criteria

[4402]

Evasive Helicopter exercise Target Acquisition criteria shall be as defined in section 3.7.3.2.6.2.1.

3.7.3.2.6.4.5.2 Evasive Helicopter - Reticle Aim Criteria

[4404]

Evasive Helicopter exercise Reticle Aim criteria shall be as defined in section 3.7.3.2.6.2.2.

3.7.3.2.6.4.5.3 Evasive Helicopter - System Management Criteria

[4406]

Evasive Helicopter exercise System Management criteria shall be as defined in section 3.7.3.2.6.2.3.

3.7.3.2.6.4.6 Scoring Criteria for Gate-to-Live-Fire Exercises

[9593]

Gate-to-Live-Fire exercise scoring criteria shall be based on TC 3-20.31 Table VI.

3.7.3.2.6.4.7 Scoring Criteria for Long Range Gunnery Exercises

3.7.3.2.6.4.7.1 Long Range Gunnery - Target Acquisition Criteria

[4411]

Long Range Gunnery exercise Target Acquisition criteria shall be as defined in section 3.7.3.2.6.2.1.

3.7.3.2.6.4.7.2 Long Range Gunnery - Reticle Aim Criteria

[4413]

Long Range Gunnery exercise Reticle Aim criteria shall be as defined in section 3.7.3.2.6.2.2.

3.7.3.2.6.4.7.3 Long Range Gunnery - System Management Criteria

[4415]

Long Range Gunnery exercise System Management Criteria shall be as defined in section 3.7.3.2.6.2.3.

3.7.3.2.6.4.8 Scoring Criteria for Canister/Coax Gunnery Exercises

3.7.3.2.6.4.8.1 Canister/Coax Gunnery - Target Acquisition Criteria

[4425]

Canister/Coax Gunnery exercise Target Acquisition criteria shall be as defined in section 3.7.3.2.6.2.1.

3.7.3.2.6.4.8.2 Canister/Coax Gunnery - Reticle Aim Criteria

[4427]

Canister/Coax Gunnery exercise Reticle Aim criteria shall be as defined in section 3.7.3.2.6.2.2.

3.7.3.2.6.4.8.3 Canister/Coax Gunnery - System Management Criteria

[4429]

Canister/Coax Gunnery exercise System Management criteria shall be as defined in section 3.7.3.2.6.2.3.

3.7.3.2.6.4.9 Scoring Criteria for Wall Breaching

[10014]

If the crew shoots a HEAT round at the wall, a small sticker will be placed on the wall which is much smaller than HEP.

[10015]

If HEAT ammunition is used during the wall breach, the crew will be assessed an ammunition error of "A".

[10016]

Scoring for RA shall only use the following accuracy criteria:

- 3 HEP rounds provided the opening in the wall equal to 3X5 = "A".
- 4 HEP rounds provided the opening in the wall equal to 3X5 = "B".
- 5 HEP rounds provided the opening in the wall equal to 3X5 = "C".
- >5 HEP rounds provided the opening in the wall equal to 3X5 = "F".
- Opening in the wall did not equal 3X5 = "F".

[10017]

Wall breaching SM scoring.

- If the crew fails to breach the wall with a 3X5 entry point, the crew will fail the situation and be assessed an error of 3B.
- If the crew passes is able to achieve the 3x5 entry point but did not place the entry point in the proper location, the I/O will assess the situation as a NOGO, resulting in an error of 2B.
- If the crew fails to engage, the system will automatically fail the crew, and the I/O will not be prompted to assess the situation.
- Targets used to identify the wall targets and Bunkers will be special targets that will not count against the crew scoring.

3.7.3.2.6.4.10 Scoring Criteria for Bunkers

[10019]

Active bunkers shall have a "Bunker Busting" target associated with it and activated at the bunker location. These targets shall be used to identify bunkers. They shall be special targets that shall not count against the crew scoring and shall be excluded from target swap out.

[10020]

The target in the bunker shall be killed after the first round.

[10021]

To destroy the bunker, the crew must fire a HEAT round followed up by a HEP round.

[10056]

If the crew fires a HEP round followed by a HEAT round, the bunker shall be damaged but not destroyed, and the crew shall be assessed an SM procedure error (symbol B).

[10022]

Two HEP rounds shall destroy the bunker, but the crew shall get a procedure error of "B".

[10023]

Two HEAT rounds shall not transition the bunker to a destroyed state.

[10057]

If Coax, SABOT, or Canister is fired on bunkers, there shall be no effect on the target or bunker, and the crew shall be assessed an SM time-of-fire error for wrong ammunition (symbol A).

[10024]

If the crew fails to destroy the bunker or fires the incorrect ammunition sequence, the crew shall be assessed a procedure error of "B".

3.7.3.2.6.4.11 Scoring Criteria for Room Clearing Engagements

[10068]

The Room Clearing engagement shall be successfully completed when one HEP round hits the building and kills the room clearing target. The room clearing target kill time shall be applied to Task Point Scoring evaluation.

3.7.3.2.6.4.12 Scoring Criteria for Basic Gunnery Skill Exercises

[9594]

Basic Gunnery Skill exercise scoring criteria shall be based on TC 3-20.31 Table VI. To receive a PASS, a crew shall be required to score 70 or higher in a minimum of 7 of the 10 situations and shall have a minimum total score of 700.

3.7.3.2.6.4.13 Scoring Criteria for Digital Gunnery

[9596]

The I/O will evaluate and score the crew's performance in utilizing FBCB2 digital messages.

3.7.3.2.6.4.14 Scoring Criteria for Sniper

[11011]

Scoring criteria for Sniper shall be as defined in Scoring Criteria for Default Gunnery Skills.

3.7.3.2.7 Computer Recommendation Criteria

[4470]

The computer recommendations for the three skill areas shall be the average score of all situations in the completed exercise.

[4471]

If the exercise is not completed, the previous computer recommendation shall be used.

[4472]

The computer recommendation shall be as defined in table 3.7.3.2.7-1.

[6063]

Table 3.7.3.2.7-1. Computer Recommendation Criteria

Grade	Averaged Score Value	Recommendation
A	3.5-4.0	Rapid Advancement
B	2.5-3.49	Normal Advancement
C	1.5-2.49	No Advancement
F	1.0-1.49	Individual Skills

3.7.3.2.8 Evaluation and Recommendation

[4496]

The measurements of the crew's performance shall be translated into recommended actions for the instructor.

[4497]

The recommendations shall be presented at the IOS at the end of each exercise.

[4498]

Progression Rules shall be as follows:

3.7.3.2.8.1 Progression

[10962]

Progression rules shall apply to a valid login with a valid vehicle identifier (ID) running computer recommended exercises.

[10963]

Each exercise that is run using a valid vehicle ID shall be stored in the student record.

[10964]

If an exercise selected by Special Purpose Menu, content or by exercise number qualifies as the Next Recommended Exercise (NRE), as defined in paragraph 3.7.3.2.7 Computer Recommendation Criteria, that exercise shall become the NRE and shall count towards progression.

[10965]

If an exercise selected by Special Purpose Menu, content or by number does not qualify as the NRE, as defined in paragraph 3.7.3.2.7 Computer Recommendation Criteria, that exercise shall not count towards progression.

3.7.3.2.8.1.1 Special Purpose Skills Training Progression

[4501]

Completion or scoring of Special Purpose Skill exercises shall not affect progression.

3.7.3.2.8.1.2 Initial Gunnery Skills Training Progression

[10787]

Initial Gunnery Skills Training shall be the default iCTP entry point. Upon entrance to Initial Gunnery Skills Training, progression rules shall provide linear movement from Proficiency Table III, Basic Table IV, then to Practice Table V exercises. Successful completion of the nine Initial Gunnery Skills exercises shall be required before exiting Initial Gunnery Skills.

[10788]

Upon completion of the Initial Gunnery Skills Training Table exercises, computer recommendation shall progress to Default Gunnery Skills.

3.7.3.2.8.1.3 Default Gunnery Skills Training Progression

[4514]

Progression in Default Gunnery Skills shall be based on Reticle Aim (RA), Target Acquisition (TA), and System Management (SM) scores. Successful completion is defined as scores equivalent to normal or rapid advancement.

[8452]

Entry to the Default Gunnery Skills shall be limited to successful completion of Initial Gunnery Skills or as the selected starting point for new record by the I/O.

[9035]

Default Gunnery Skills training shall begin with running an exercise at SM level I and one of the three fully operational RA status conditions. After successful completion of this exercise, progression shall move to the next exercise utilizing one of the seven remaining RA status conditions.

[4517]

Progression shall continue until each of the RA status conditions have been presented.

[9036]

In addition, the eighth and ninth exercises shall be a random selection of one of the eight RA status conditions and the remaining RA status condition in any order.

[9037]

Upon successful completion of the nine Default Gunnery exercises at SM level I, progression shall be to SM level II and to one of the three fully operational RA status conditions.

[9599]

Without rapid advancement, the pattern of advancement shall be repeated requiring successfully completion of nine RA status conditions in each SM level.

[8455]

Successful completion of all four SM levels shall be required before exiting Default Gunnery Skills and progressing to Basic Gunnery Skills.

[9039]

Upon a rapid advance movement, progression shall advance to the next SM Level. When this advancement to the next higher SM level occurs, the host computer shall select one of the fully operational RA status conditions as the first exercise at the new SM level. Before the host selects the fully operational RA status condition, it shall look at previous SM levels within Default Gunnery Skills and determine which fully operational RA status conditions have already been run (at a previous SM level excluding SM level I within Default Gunnery Skills). The host shall select a fully operational RA status condition exercise that was previously not executed within Default Gunnery Skills. If all fully operational RA exercises have been successfully executed, then the host shall randomly select any exercise at the new SM level.

[9040]

Once a higher SM level has been achieved as the result of a rapid advance movement, progression shall continue to recommend exercises at the new SM level until either another rapid advance movement is achieved or all exercises (including a random exercise) at that SM level have been successfully completed. Once those exercises are all successfully completed, the host shall randomly select a fully operational RA exercise at the next SM level within the Default Gunnery Skills.

[9041]

Unless another rapid advance movement is achieved, normal progression across the SM level shall occur. The above rules for rapid advance movement do not apply to SM level I of Default Gunnery Skills. One exercise per RA status conditions must be successfully completed for SM level I.

[10967]

If a rapid advance movement is achieved in SM level 4, the remaining RA status conditions that have not been run shall be required to be successfully completed before exiting Default Gunnery Skills. The host shall "look back" within the current Default Gunnery Skills to ensure all RA status conditions have been successfully completed at least once within the SM levels excluding SM level I. RA status conditions that have not been completed shall be recommended.

[9600]

If the equivalent of a no advance in RA, TA or SM evaluation is scored in one or more skill dimensions, a replication of the exercise shall be presented.

[9042]

Upon successfully completion of the replication, computer recommendation shall present another RA status condition exercise selected in a randomized sequence.

[4524]

If the remediation is applied, defined as the equivalent of two consecutive no advance scores or one reduced grade in one or more skill area, the host shall notify the I/O that the record has been flagged for remedial training.

[4526]

A negative response by the I/O to the opportunity to select an exercise by content or by number shall result in a replication of the failed exercise.

[9043]

Following the completion of an instructor selected exercise during remediation, a replication of the NRE shall be presented. After successful completion of the replication, progression shall continue in the Default Gunnery Skill SM level for any remaining RA status conditions.

3.7.3.2.8.1.4 Basic Gunnery Skills Training Progression

[4503]

Upon completion of the Default Gunnery Skills, computer recommendation shall progress to Basic Gunnery Skills Training at Basic Pre-Live Fire (BPLF) exercise 1. Progression rules shall provide linear movement to each BPLF exercise. After successful completion of the eight BPLF exercises, progression shall move to GTLF exercises. Completion of one GTLF exercise shall be required before exiting Basic Gunnery Skills.

[11009]

Entry to the Basic Gunnery Skills shall be limited to successful completion of Default Gunnery Skills or as the selected starting point for new record by the I/O.

[10966]

If the NRE is a GTLF exercise and another GTLF exercise is selected by Special Purpose Menu or by number that is not the computer recommended GTLF exercise, then the exercise selection shall revert to the NRE GTLF exercise. If an SIO built exercise is selected, it shall become the NRE.

[4512]

Capability to re-enter the pre-live fire sequence shall be provided as a default, but shall be changeable via the training manager password.

[11007]

Training in Advanced Gunnery Skills or Sustainment that repeat Basic Gunnery Skills training shall retain leveled status. Continued progression from the highest level of achievement shall be upon authorized training manager password.

3.7.3.2.8.1.5 Advanced Gunnery Skills Training Progression

[10969]

Progression in Advanced Gunnery Skills (AGS) shall be based on RA, TA, and SM scoring.

[10970]

Entry to Advanced Gunnery Skills shall be limited to successful completion of Basic Gunnery Skills training.

[10971]

Advanced Gunnery Skills (AGS) exercises shall begin with running an exercise at AGS level I, SM level I, and one of the three fully operational RA status conditions. Completion of these exercises shall result in the progression to the next exercise utilizing one of the seven remaining RA status conditions. Successful completion shall be defined as scores equivalent to normal or rapid advancement.

[10972]

Progression shall continue until each of the RA status conditions has been presented.

[10973]

In addition, the eighth and ninth exercises shall be a random selection of one of the eight RA status conditions and the remaining RA status condition in any order.

[10974]

Upon successful completion of the nine exercises, without any rapid advance movement within the current AGS and SM levels, progression shall be to next SM level and to one of the three fully operational RA status conditions.

[10975]

Without rapid advance movement, the pattern of advancement shall be repeated to successfully complete nine RA status conditions at each SM level.

[10976]

Upon successful completion of all four SM levels in AGS I, progression shall be to AGS II, SM level I.

[10977]

Upon successful completion of all four SM levels in AGS II, progression shall progress to Sustainment Skills.

[10978]

Upon a rapid advance movement, progression shall advance to the next SM Level. When this advancement to the next higher SM level occurs, the host computer shall select one of the fully operational RA status conditions as the first exercise at the new SM level. Before the host selects the fully operational RA status condition, it shall look at previous SM levels within AGS and determine which fully operational RA status conditions have already been run (at a previous SM level within the current AGS level). The host shall select a fully operational RA status condition exercise that was previously not executed within the AGS level. If all fully operational RA exercises have been successfully executed, then the host shall randomly select any exercise at the new SM level.

[10979]

Once a higher SM level has been achieved as the result of a rapid advance movement, progression shall continue to recommend exercises at the new SM level until either another rapid advance movement is achieved or all exercises (including a random exercise) at that SM level have been successfully completed. Once those exercises are all successfully completed, the host shall randomly select a fully operational RA exercise at the next SM level within the current AGS level.

[10980]

If a rapid advance movement is achieved in SM level 4, the remaining RA status conditions that have not been run shall be required to be successfully completed before exiting each AGS level. The host shall "look back" within the current AGS to ensure all RA status conditions have been successfully completed at least once within the SM levels. RA status conditions that have not been completed shall be recommended.

[10981]

If a rapid advance to SM level is scored and all RA exercises at a lower SM level have been run within the same AGS level, the host shall randomly select the first exercise from the three fully functional RA exercises in that SM level. Unless another rapid advance is scored, normal progression across the SM level shall occur. One exercise per RA status condition must be run and passed for this initial SM.

[10982]

If the equivalent of a no advance in RA, TA or SM evaluation is scored in one or more skill areas, a replication of the exercise shall be presented.

[10983]

Upon successfully completion of the replication, computer recommendation shall present another RA status condition exercise selected in a randomized sequence.

[10984]

If the remediation is applied, defined as the equivalent of two consecutive no advance scores or one reduced grade in one or more skill area, the host shall notify the I/O that the record has been flagged for remedial training.

[10985]

A negative response by the I/O to the opportunity to select an exercise by content or by number shall result in a replication of the failed exercise.

[10986]

Following the completion of an instructor selected exercise during remediation, a replication of the NRE shall be presented. After successful completion of the replication, progression shall continue in the AGS SM level for any remaining RA status conditions.

3.7.3.2.8.1.6 Sustainment Skills Training Progression

[4530]

Entry to the Sustainment Skills training shall be limited to successful completion of the AGS level II, SM level IV.

[4531]

In Sustainment training, progression upon successful completion of any exercise shall be to any other randomly selected AGS level (i.e., AGS level I or AGS level II), and SM and RA status conditions.

[4532]

If the remediation is applied, defined as the equivalent of two consecutive no advance scores or one reduced grade in one or more skill area, the host shall notify the I/O that the record has been flagged for remedial training.

[8457]

If the equivalent of a no advance in RA, TA or SM evaluation is scored in one or more skill dimensions, a replication of the exercise shall be presented.

[4533]

Successful completion of the replication of the failed exercise shall be followed by Sustainment progression.

[4534]

For all Sustainment exercises, AGS level II probabilities for visibility conditions, parameters for Hit on Ownvehicle rules and scoring rules shall be applied.

3.7.3.2.9 Student Record Update and Review

[4536]

The crew performance record shall be automatically updated at the conclusion of each exercise.

[4537]

Student record shall include results achieved, date of firing, instructor, location in the training program and training program type.

[4538]

The Instructor / Operator shall be provided capability to conduct student record reviews and searches using a mouse and pull down menus.

[9044]

Search support shall consist of capability to perform multi-level sorts by student name, vehicle number or training program.

[4540]

Instructor / Operator record review and search capabilities shall be available without the need for logging out of training.

3.7.3.3 SECTION/PLATOON TRAINING PROGRAM

[9601]

The AGTS provides a training program which trains sections/platoons in section/platoon gunnery tasks and procedures while conducting both offensive and defensive tactical operations (IAW FM 3-20.151). This program provides the capability to train section/platoon command and control procedures, conduct fire distribution planning and control fire distribution while conducting tactical operations. Vehicle fire control malfunctions and battlefield distractions may be experienced. During the conduct of these operations, individual vehicles will use precision gunnery procedures while engaging the target array. This training program provides the capability to train individual MGS crews, section/platoon leader, section/platoon sergeant, and section/platoon wingman 1 or a specified subset, i.e., 2 individual MGS crews as a section.

[10197]

The Stryker MGS AGTS platoon shall consist of three (3) member platoons. The wingman 2 position shall not be available.

3.7.3.3.1 Section/Platoon Training Program Characteristics

[9602]

All section/platoon crew stations shall be in the same active database, controllable via the section/platoon leader's IOS as well as the PAAR station, firing at the same target array.

[9603]

All active section/platoon crew stations shall be able to observe each other on the same database.

[9604]

The training program shall provide the company commander/role player with the following capabilities to:

- a. Provide the section/platoon leader and section/platoon sergeant an operations order and operations overlay which are contained in the TSUH.
- b. Accompany the section/platoon leader and section/platoon sergeant on a reconnaissance.
- c. Provide the section/platoon leader capability to perform reconnaissance from a vantage point of the defensive / battle position for defensive missions and moving up to the line of departure for offensive operations.
- d. Provide the section/platoon leader the capability to engage targets with indirect fire during both offensive ownvehicle and defensive ownvehicle situations.

3.7.3.3.2 Section/Platoon Training Skill Levels

[7674]

The section/platoon training program shall provide four (4) levels of section/platoon training exercises:

- a. Basic
- b. Intermediate
- c. Advanced
- d. Combat

3.7.3.3.2.1 Section/Platoon Basic Skills

[4684]

The basic training exercises shall provide the capability to train collective gunnery tasks.

[9605]

The training shall be performed by the section/platoon while conducting either defensive or offensive operations involving move & assembly area operations.

[4686]

Company operation orders with operation overlays shall be provided for all the exercises.

[9606]

The section/platoon vehicles shall move along predetermined routes/paths with the capability to change speed and start or stop movement at any point independent of the other vehicles in the situation. Vehicles in the hide positions or turret defilade can move to hull defilade (firing position), back again, and to an alternate or supplementary position as required by exercise design.

[9607]

The exercise characteristics for section/platoon basic skills level tasks shall be defined as follows.

3.7.3.3.2.1.1 Section/Platoon Basic Skills - Number of Targets

[9608]

The maximum number of targets displayed simultaneously per exercise shall be 50. Targets that are specifically placed into an exercise to be engaged with artillery fire are not included in this maximum target count.

3.7.3.3.2.1.2 Section/Platoon Basic Skills - Target Range

[9609]

Maximum range to targets at activation shall be 2300 meters. Targets that are specifically placed into an exercise to be engaged with artillery fire may exceed this range from the ownvehicles.

3.7.3.3.2.1.3 Section/Platoon Basic Skills - Moving Target Ratio

[9610]

The ratio of moving targets shall average less than 50% of the total targets presented.

3.7.3.3.2.1.4 Section/Platoon Basic Skills - Sector of Responsibility Size

[9611]

The sector of responsibility shall be classified as narrow and defined to be a maximum of 90 degrees from the section/platoon leader's vehicle.

3.7.3.3.2.1.5 Section/Platoon Basic Skills - Battlefield Distractions

[4698]

There shall be no battlefield distractions.

3.7.3.3.2.1.6 Section/Platoon Basic Skills - Malfunctions

[9612]

For Section/Platoon Basic Skills exercises, there shall be no preprogrammed fire control malfunctions. Malfunctions may occur as a result of an ownvehicle sustaining a hit.

3.7.3.3.2.1.7 Section/Platoon Basic Skills - Number of Situations

[4702]

The maximum number of situations per exercise shall be eight (8).

[9613]

This limit does not include situations that are specifically designed to cause the section/platoon leader to engage targets with artillery fire.

3.7.3.3.2.1.8 Section/Platoon Basic Skills - Visibility Conditions

[9614]

Exercises with the following visibility conditions shall be available for training:

- a. Day - unlimited
- b. Day - dawn / dusk
- c. Day - fog
- d. Day - haze
- e. Day - dust
- f. Day - rain
- g. Day - snow falling (cumulated snow is an objective requirement)
- h. Night - unlimited
- i. Night - limited

3.7.3.3.2.1.9 Section/Platoon Basic Skills - Hit on Ownvehicle

[9615]

A hit on ownvehicle shall occur 10 to 14 seconds after a near miss is received if all destroyer targets that meet their limitations, as defined in paragraph 20.4.1.9.2, then the ownvehicle shall be killed.

[9617]

A hit on the ownvehicle by main gun fire from an ownsection/platoon vehicle shall result in a kill. A canister round hit effect shall be determined by the kill criteria of 3.7.3.2.6.2.2.2 - APC Target.

[9618]

A near miss shall occur 20 to 25 (randomly) seconds after full target exposure.

3.7.3.3.2.2 Section/Platoon Intermediate Skills

[9619]

The intermediate training exercises shall provide the capability to train section/platoon collective gunnery tasks during the conduct of offensive and defensive exercises under daylight and limited visibility conditions. These exercises are designed for sections/platoons which have Combat table X or ARTEP experience. Company operations orders with operation overlays, along with any fragmentary orders will be developed for all the exercises. The exercises will be conducted with all the section/platoon vehicles being on predetermined routes / paths with the same movement capabilities as described for the basic category exercises. Vehicles in the hide positions or turret defilade can move to hull defilade (firing position), back again, and to an alternate or supplementary position as required.

3.7.3.3.2.2.1 Section/Platoon Intermediate Skills - Number of Targets

[4713]

The maximum number of targets displayed simultaneously per exercise shall be 50.

[9052]

Targets that are specifically placed into an exercise to be engaged with artillery fire are not included in this maximum target count.

3.7.3.3.2.2.2 Section/Platoon Intermediate Skills - Target Range

[4715]

Maximum range to targets at activation shall be 2400 meters. Targets that are specifically placed into an exercise to be engaged with artillery fire may exceed this range from the ownvehicles.

3.7.3.3.2.2.3 Section/Platoon Intermediate Skills - Moving Target Ratio

[4717]

The ratio of moving targets shall average less than 50% of the total targets presented.

3.7.3.3.2.2.4 Section/Platoon Intermediate Skills - Sector of Responsibility Size

[9620]

The sector of responsibility shall be classified as medium and defined to be a maximum of 135 degrees from the section/platoon leader's vehicle.

3.7.3.3.2.2.5 Section/Platoon Intermediate Skills - Battlefield Distractions

[4721]

The battlefield distractions in the form of chemical attack and enemy smoke may be present.

3.7.3.3.2.2.6 Section/Platoon Intermediate Skills - Malfunctions

[9621]

For Section/Platoon Intermediate Skills exercises, a maximum of one unannounced preprogrammed fire control malfunction may occur at any time during an exercise. Additional malfunctions may also occur as a result of an ownvehicle sustaining a hit.

3.7.3.3.2.2.7 Section/Platoon Intermediate Skills - Number of Situations / Engagements

[4725]

The maximum number of situations/engagements per exercise shall be nine (9).

[9622]

This limit does not include situations that are specifically designed to cause the section/platoon leader to engage targets with artillery fire.

3.7.3.3.2.2.8 Section/Platoon Intermediate Skills - Visibility Conditions

[4727]

Visibility conditions shall be as defined in paragraph 3.7.3.3.2.1.8.

3.7.3.3.2.2.9 Section/Platoon Intermediate Skills - Hit on Ownvehicle

[4729]

Hit on ownvehicle shall be as defined in paragraph 3.7.3.3.2.1.9.

3.7.3.3.2.3 Section/Platoon Advanced Skills

[9623]

The advanced training exercises shall provide the capability to train section/platoon collective gunnery tasks while executing the training tasks during the conduct of offensive and defensive exercises under daylight and limited visibility conditions. These exercises are designed for sections/platoons which have Combat table X and ARTEP experience.

[9055]

Company operations orders with operation overlays, along with any fragmentary orders shall be provided for all the exercises. These exercises will be conducted with all the vehicles being on predetermined paths in the same manner as for the Basic and Intermediate exercises.*

* Not supported.

3.7.3.3.2.3.1 Section/Platoon Advanced Skills - Number of Targets

[9624]

The maximum number of targets displayed simultaneously per exercise shall be 50.

[9056]

Targets that are specifically placed into an exercise to be engaged with artillery fire are not included in this maximum target count.

3.7.3.3.2.3.2 Section/Platoon Advanced Skills - Target Range

[7690]

Maximum range to targets at activation shall be 3000 meters or less.

[9625]

Note: Targets at greater than 3000 meters will be designed for call for fire.

3.7.3.3.2.3.3 Section/Platoon Advanced Skills - Moving Target Ratio

[4738]

The ratio of moving targets shall average less than 66% of the total targets presented.

3.7.3.3.2.3.4 Section/Platoon Advanced Skills - Sector of Responsibility Size

[9626]

The sector of responsibility shall be classified as wide and defined to be a maximum of 180 degrees from the section/platoon leader's vehicle.

3.7.3.3.2.3.5 Section/Platoon Advanced Skills - Battlefield Distractions

[7692]

The battlefield distractions in the form of chemical attack, friendly vehicles, and enemy smoke may be present.

3.7.3.3.2.3.6 Section/Platoon Advanced Skills - Malfunctions

[9627]

For Section/Platoon Advanced Skills exercises, a maximum of two unannounced preprogrammed fire control malfunctions may occur at any time during an exercise. Additional malfunctions may also occur as a result of an ownvehicle sustaining a hit.

3.7.3.3.2.3.7 Section/Platoon Advanced Skills - Number of Situations / Engagements

[9628]

The maximum number of situations/engagements per section/platoon exercise shall be twelve (12).

[9058]

This limit does not include situations that are specifically designed to cause the section/platoon leader to engage targets with artillery fire.

3.7.3.3.2.3.8 Section/Platoon Advanced Skills - Visibility Conditions

[4748]

Visibility conditions shall be as defined in paragraph 3.7.3.3.2.1.8.

3.7.3.3.2.3.9 Section/Platoon Advanced Skills - Hit on Ownvehicle

[4750]

Hit on ownvehicle shall be as defined in paragraph 3.7.3.3.2.1.9.

3.7.3.3.2.4 Section/Platoon Combat Skills

[9629]

The Combat training exercises shall provide the capability to train section/platoon collective gunnery tasks while executing the training tasks during the conduct of offensive and defensive exercises under daylight and limited visibility conditions. These exercises are designed for sections/platoons which have Combat table X and ARTEP experience.

[7695]

Company operations orders with operation overlays, along with any fragmentary orders shall be provided for all the exercises. These exercises will be conducted with all the vehicles being on predetermined paths in the same manner as for the Basic, Intermediate, and Advanced exercises.

3.7.3.3.2.4.1 Section/Platoon Combat Skills - Number of Targets

[4754]

The maximum number of targets displayed simultaneously per exercise shall be 50.

3.7.3.3.2.4.2 Section/Platoon Combat Skills - Target Range

[9273]

Maximum range to targets at activation shall be less than 3000 meters.

[9630]

Note: Targets at greater than 3000 meters will be designed for call for fire.

3.7.3.3.2.4.3 Section/Platoon Combat Skills - Battlefield Distractions

[9631]

The battlefield distractions in the form of chemical attack, friendly vehicles, enemy smoke, and enemy artillery may be present.

3.7.3.3.2.4.4 Section/Platoon Combat Skills - Malfunctions

[9632]

For Section/Platoon Combat Skills exercises, malfunctions may occur as a result of an ownvehicle sustaining a hit.

3.7.3.3.2.4.5 Section/Platoon Combat Skills - Number of Situations / Engagements

[9633]

The maximum number of situations/engagements per exercise shall be twelve (12).

3.7.3.3.2.4.6 Section/Platoon Combat Skills - Visibility Conditions

[4764]

Visibility conditions shall be as defined in paragraph 3.7.3.3.2.1.8, selected by the I/O at the start of the exercise.

3.7.3.3.2.4.7 Section/Platoon Combat Skills - Hit on Ownvehicle

[4766]

Hit on ownvehicle shall be as defined in paragraph 3.7.3.3.2.1.9.

3.7.3.3.3 Section/Platoon Exercises

[9634]

The section/platoon training program shall provide 50 section exercises and 50 platoon exercises utilizing the Korea, 29 Palms, Arab MOUT and USMC MOUT databases.

3.7.3.3.4 Section/Platoon Exercise Data

[9635]

Each section/platoon exercise shall consist of preprogrammed data which shall satisfy the following criteria:

Note: The Free movement option shall be available with each of the section/platoon exercises.

3.7.3.3.4.1 Section/Platoon Exercise Number

[9636]

Each section/platoon exercise shall be provided a unique file number.

3.7.3.3.4.2 Section/Platoon Exercise Preview

[9637]

The section/platoon exercise preview shall provide information to describe the desired training content including as a minimum, target ranges, battlefield distractions, malfunctions, number of targets and number of situations/engagements.

3.7.3.3.4.3 Section/Platoon Exercise Instructions

[9638]

A text briefing shall be provided which can be read by the instructor to the section/platoon crews explaining the purpose of the exercise, exercise conditions and standards.

3.7.3.3.4.4 Section/Platoon Ownvehicle Initial Position and Path

[9639]

Ownvehicle position and path shall be defined as follows.

- a. For all section/platoon skill level training exercises, ownvehicle positions shall be placed at least 50 meters from any other ownvehicle initial position and shall be positioned with main gun centered over the front slope and level.
- b. For section/platoon basic, intermediate and advanced skill level training exercises, ownvehicle preprogrammed paths for a given exercise will be the same for all visibility levels.

3.7.3.3.4.5 Section/Platoon Target Positions, Paths, Activation Times and Type

[9640]

Target position, path, activation times and type shall be provided for each exercise.

3.7.3.3.5 Section/Platoon Training Program Exercise Constraints

[9641]

The following constraints shall apply to section/platoon exercise design:

- a. During section/platoon operations with a missing vehicle, the section/platoon leader shall always remain.
- b. Defending enemy forces during own section/platoon offensive exercises consists of elements from a security force occupying security outposts and portraying the force ratio a section/platoon in the offense would engage.
- c. Engagement of enemy forces will be based upon the engagement criteria prescribed by the operations order or subsequent FRAGO.
- d. Sections/platoons executing offensive type operations will be expected to destroy squad/section type elements without support from the rest of the company/team.
- e. Evaluation of gunnery skills will be based upon percentage of targets destroyed.

3.7.3.3.6 Section/Platoon Performance Monitoring

3.7.3.3.6.1 Section/Platoon Situation Monitor

[9642]

The section/platoon situation monitor data shall be presented at the IOS when a situation is in progress and during the section/platoon crew after exercise briefing, as long as the exercise has not been terminated.

[10330]

The section/platoon situation monitor data shall consist of the data on the following tabs of the Runtime Training Execution Displays & Controls (paragraph 3.7.3.2.5), when running in platoon mode:

- Exercise Data tab
- Situation Monitor tab.

[9643]

See paragraph 3.7.3.2.5.1, Crew Training - Situation Monitor, for additional section/platoon situation monitor requirements.

3.7.3.3.6.2 Section/Platoon Performance Analysis

[9644]

The section/platoon performance analysis data shall be available at the conclusion of each situation.

[4798]

The performance analysis display shall be updated at no less than a 1 Hz rate.

[9645]

A hardcopy of the section/platoon performance analysis data shall be available as a response to a display prompt after completion of the exercise.

[10331]

The section/platoon performance analysis data shall consist of the data on the following tabs of the Runtime Training Execution Displays & Controls (paragraph 3.7.3.2.5), when running in section or platoon mode:

- Crew Data tab
- Performance Analysis tab.

3.7.3.3.6.3 Section/Platoon After Action Review (AAR)

[4817]

The training system provides after action review capability as defined in paragraph 3.7.6.1.

3.7.3.3.7 Section/Platoon Communications

[9647]

Section/platoon training communications will be as defined in paragraph 3.7.1.13.

3.7.3.3.8 Section/Platoon Ammunition Limits

[9648]

Section/platoon exercises shall be initially loaded with a total of 54 main gun rounds (18 rounds per vehicle), 5,100 coax machine gun rounds (1700 rounds per vehicle), and 48 (2 salvos of 8 per vehicle) smoke grenades.

[9649]

Main gun rounds shall be stored in the following manner:

- a. The carousel shall store 8 rounds.
- b. The replenisher shall store 10 rounds.

[9650]

For rounds stored in the carousel and replenisher, the allocation of rounds shall be defined within the exercise definition.

[9651]

At exercise initialization, the carousel shall store 8 rounds.

3.7.3.3.9 Section/Platoon Ammunition Transfers

[9652]

During section/platoon training, the training system shall support both intra-vehicle and supply truck ammunition transfers.

[9653]

The ammunition transfer request will be initiated by the commander via radio.

[9654]

During section/platoon exercises, ammunition transfer may be initiated in unfreeze or freeze (recess) modes.

[10187]

Capability for transfer ammunition shall be provided when the following conditions are met:

Ammo Type	Intra-Vehicle	From Supply Truck
	Weapons set to Safe	Weapons set to Safe
	Coax No Targets are Active	No Targets are Active
	Ownvehicle is Halted*	Ownvehicle is Halted*
		Autoloader switch set to Normal
Main Gun	No AGTS Checks	Weapons set to Safe
		No Targets are Active
		Ownvehicle is Halted*
		Autoloader switch set to Normal

* For defensive exercises, halted shall be equivalent to ownvehicle in the defilade position at the start of the ammunition transfer.

[10190]

The I/O shall not be allowed to cancel the ammunition transfer in progress. The transfer, once started, shall run its course to its end time. Once the transfer is started, it shall play out to its one minute time limit or whenever the VC changes from the RESTOCK switch position.

[9656]

Transfers of ammunition shall only occur when the replenisher has sufficient space for the total number of rounds being transferred.

[9657]

The following transfer time delays shall be imposed from supply truck:

- a. Main gun round transfers to the replenisher: at least 15 seconds.
- b. Coax rounds cannot exceed initial load of receiving vehicle: 500 rounds in the Ready Box and 1200 rounds in the Hull. For intra-vehicle transfers, the only switch check for coax round transfer is the Coax machine gun weapon being in Safe. Ammo transfer time for Coax rounds shall be at least 15 seconds.

3.7.3.3.10 Instructions to the Section/Platoon Crews

[9658]

During section/platoon mode, instructions will be read to all crews over the platoon net by the instructor operator acting in the role of company commander. After the instructions have been read and section/platoon reconnaissance has been performed, all subsequent instructions will be directed to the section/platoon leader in the format of situation reports (SITREP's) and fragmentary orders (FRAGO's). All other direction to other crew(s) in the section/platoon will be the responsibility of the section/platoon leader.

3.7.3.3.11 Section/Platoon Scoring

[9659]

The section/platoon scoring shall be based on gunnery results and instructor subjective evaluation of collective tasks.

3.7.3.3.11.1 Section/Platoon Gunnery Scoring

[9660]

Section/platoon exercise gunnery scoring shall be the percentage of targets killed within the time allotted for the situation.

3.7.3.3.11.1.1 Section/Platoon Exercises Time to Kill Criteria

[9661]

Minimum target exposure time for section/platoon exercises shall be as defined in table 3.7.3.3.11.1.1-1, except for those targets considered Call For Fire targets. Call For Fire targets are not restricted in their exposure times.

[9662]

Table 3.7.3.3.11.1.1-1. Section/Platoon Exercise Minimum Target Exposure

Type of Situation	Minimum Target Exposure Time	
	Day	Night
Offensive	50 seconds	60 seconds
Defensive	30 seconds	40 seconds
Artillery (Defensive)	60 seconds	60 seconds

[4852]

Time to kill shall begin at full target exposure which is defined as 3.5 seconds following target activation.

[4853]

Time to kill ends at the minimum target exposure for the situation as defined in Table 3.7.3.3.11.1.1-1.

[9663]

Target paths in section/platoon exercises shall have a minimum of 3.5 seconds of remaining travel time after the maximum time to kill is reached to allow for hide positions.

[4855]

Targets engaged or killed beyond the minimum target exposure time shall not be included in the aggregate score.

3.7.3.3.11.1.2 Section/Platoon Opening Time Criteria

[9664]

Section/platoon opening time shall be the shortest time to fire for any vehicle in the section/platoon.

[4859]

Time to fire shall begin when the first target in a situation is fully exposed (3.5 seconds following target activation).

[9665]

Time to fire shall end when any ownvehicle fires a round within 20 mils of a point target or fires a coax burst within 20 mils of an area target.

3.7.3.3.11.1.3 Section/Platoon Exercise Gunnery Error Criteria

[9666]

One section/platoon gunnery error shall be assessed for each crew station engaging a friendly vehicle, friendly helicopter, dismounted infantry or noncombatant.

[9065]

Each situation in which firing at a friendly occurs shall result in a 10% deduction from the total (aggregate) score for each situation in which a friendly vehicle is killed or fired at.

[9667]

Friendly fire shall not be calculated for section/platoon ownvehicles.

3.7.3.3.12 Section/Platoon Training Evaluation and Recommendation

[9668]

Each exercise shall be evaluated and categorized into one of the following:

- a. Unqualified - The exercise shall be categorized as "unqualified" when the number of aggregate targets killed is 69% or less.
- b. Qualified - The exercise shall be categorized as "qualified" when the number of aggregate targets killed is in the range of 70% to 79%.
- c. Superior - The exercise shall be categorized as "superior" when the number of aggregate targets killed is in the range of 80% to 89%.
- d. Distinguished - The exercise shall be categorized as "distinguished" when the number of aggregate targets killed is in the range of 90% to 100%.

The successful completion of a section/platoon exercise shall be based on an exercise score of qualified or better.

3.7.3.3.13 Section/Platoon Records

[9669]

The instructional training system shall provide the capability to record, store, and download to a media device (CD) the section/platoon's training record.

[9670]

The records shall identify the section/platoon, crews assigned to the section/platoon, and section/platoon exercises completed, to include date and performance results.

[4878]

The instructional training system software shall provide the capability to display and print the training records.

3.7.3.3.14 Free Movement Operation

[9671]

The AGTS Free Movement is an operational configuration within the Section/Platoon Mode which provides capability for the ownvehicles to be moved under the control of a driver operator at the ownvehicle assigned IOS. The same exercises that are available under normal section/platoon training are selectable, but with the AGTS initialized in Free Movement operation. As the exercise starts, the driver and crew (with limited I/O participation) will communicate over the crew intercom to coordinate ownvehicle progression through the corresponding Operations Procedure.

3.7.3.3.14.1 Free Movement Section / Platoon Training Program Characteristics

[9672]

The AGTS trainer shall have the capability to move in section/platoon training mode, via free movement - section/platoon exercise selection, under driver control at each IOS.

[9673]

In free movement operation, the Driver Operator's headset shall be connected to the IOS intercom.

[4886]

The same ownvehicle dynamics shall be applied as for the preprogrammed path mode.

3.7.3.3.14.1.1 Free Movement in Defensive Situations

[4888]

Defensive situations shall be initiated in Free Movement.

[4889]

The CAPTURE/RELEASE GUI button shall be operable at the associated IOS as long as the ownvehicle is within 10 meters of the "leading edge" center point of the primary position ramp entry and within +20 degrees of forward pointing axis of the ramp. See figure 3.7.3.3.14.1.1-1.

[5853]

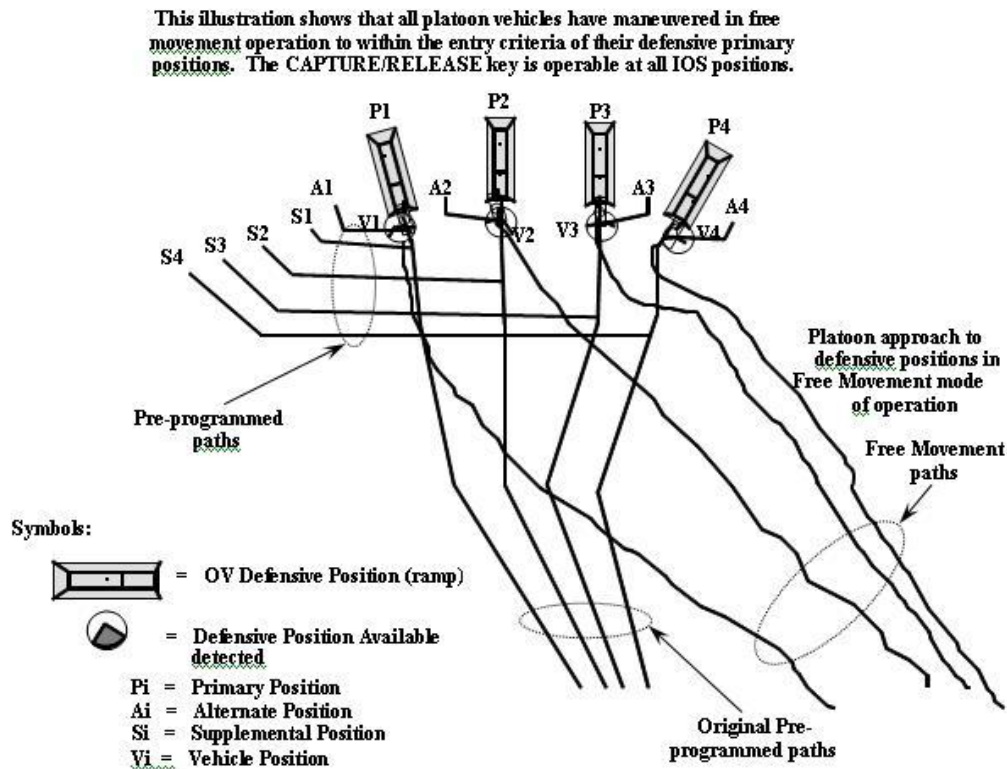


Figure 3.7.3.3.14.1.1-1. Typical Defensive Position Approach

[7729]

Activation of the CAPTURE/RELEASE GUI button shall move the section or platoon ownvehicle into the preprogrammed defilade position and transition the ownvehicle to the preprogrammed path section or platoon exercise operation, respectively. See Figure 3.7.3.3.14.1.1-2.

[4891]

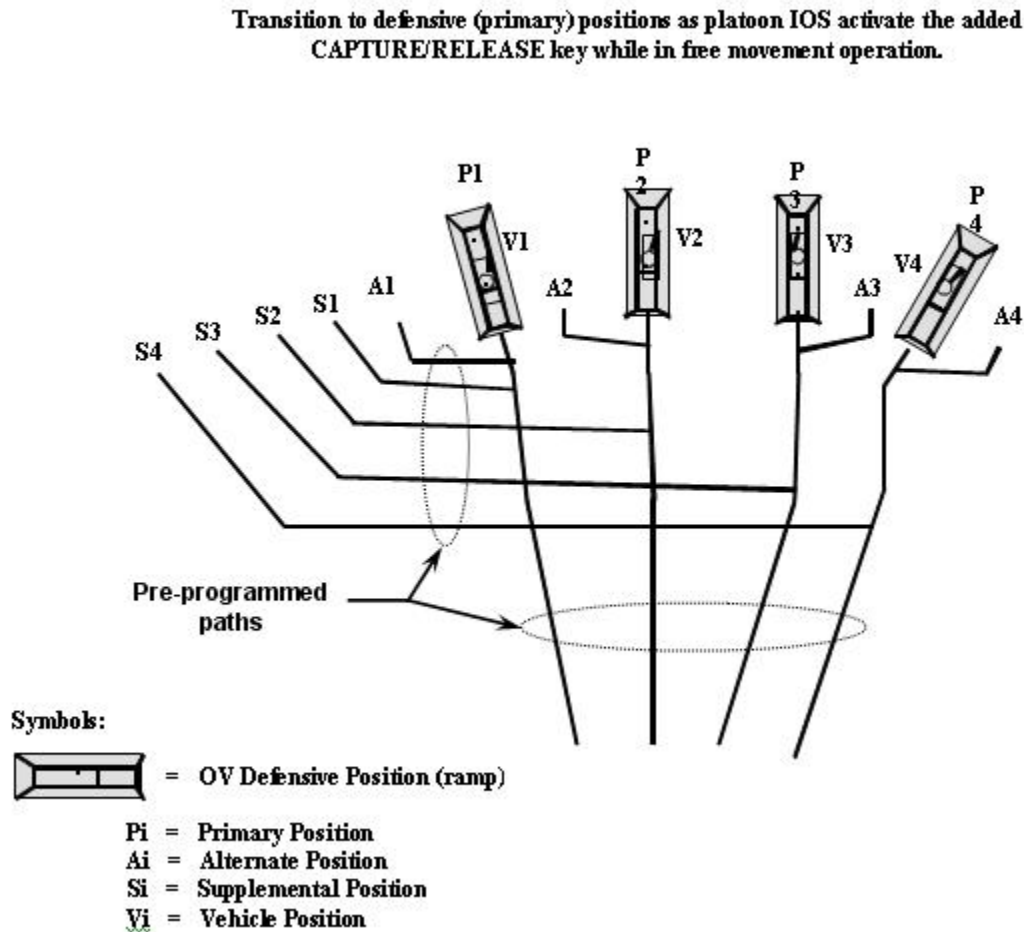


Figure 3.7.3.3.14.1.1-2. Transition To Defensive Position - Pre-programmed Path Operation

[9196]

The CGF Station Operator shall control the placement and activation of all targets.

[9675]

Section or platoon members not activating the CAPTURE/RELEASE GUI button shall remain in Free Movement mode and be allowed to move throughout the database firing on targets and/or becoming a friendly target(s).

[9680]

If the section/platoon members who did not activate the CAPTURE/RELEASE GUI button engage targets in this defensive situation, defensive scoring criteria shall be applied.

[9676]

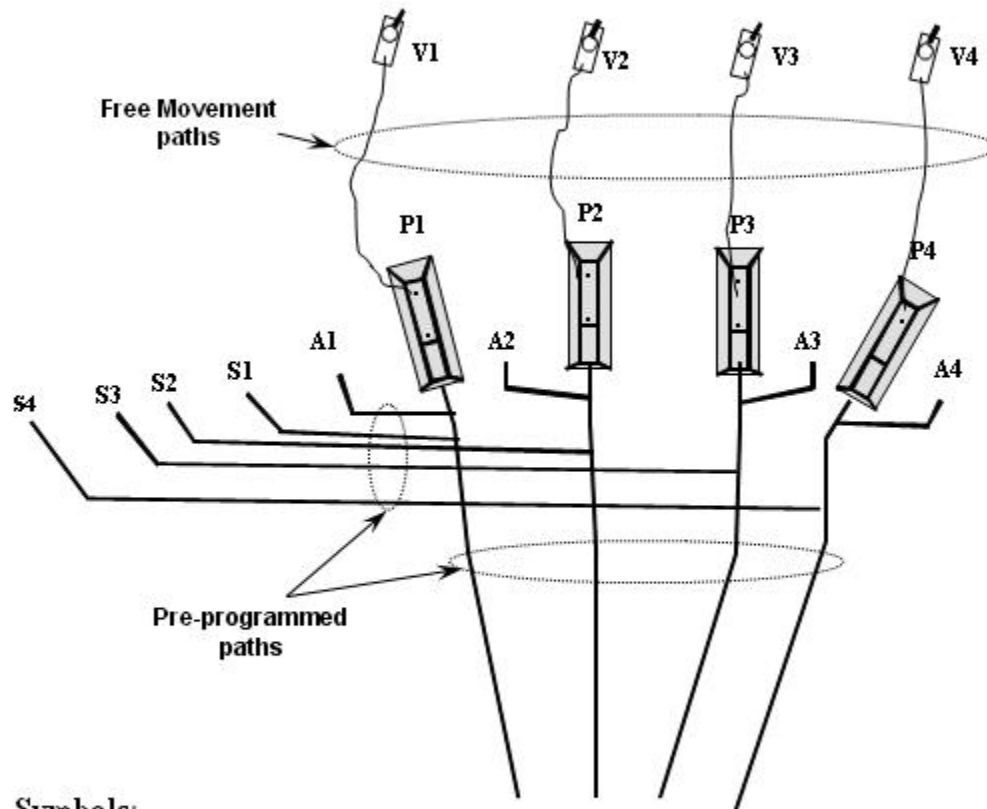
During the defensive engagements, the section or platoon vehicles who activated the CAPTURE/RELEASE GUI button are under preprogrammed path operation. All the IOS selection controls shall work normally with the addition of the CAPTURE/RELEASE GUI button.

[9677]

The CAPTURE/RELEASE GUI button shall release the captured section or platoon ownvehicles from preprogrammed path operation and return them to free movement operation when pressed by the ownvehicle IOS during defensive situations. See Figure 3.7.3.3.14.1.1-3.

[5854]

A second activation of the CAPTURE/RELEASE key releases vehicles for free movement operation after completion of the defensive engagements.



Symbols:



= OV Defensive Position (ramp)

Pi = Primary Position

Ai = Alternate Position

Si = Supplemental Position

Vi = Vehicle Position

Figure 3.7.3.3.14.1.1-3. Section/Platoon Release From Defensive Position - Pre-programmed Path Capture

3.7.3.3.14.1.2 Free Movement in Offensive Situations

[7735]

Offensive situations within a Free Movement section or platoon exercise operation shall precede start-to-finish under Free Movement section/platoon vehicle control.

[9204]

The targets shall be activated by the CGF Operator.

3.7.3.3.14.1.3 Free Movement - Scoring

[9679]

Trainer provided scoring shall be the same as in pre-programmed section/platoon exercises.

[7739]

Scoring is a responsibility of the section or platoon instructor/operator.

3.7.3.3.14.1.4 Free Movement - Section / Platoon Vehicle Behavior

[4905]

The ownvehicle collision model shall consist of a set of four vectors for modeling the hull collision volume.

[4906]

These collision vectors shall extend further from the center of the hull center in the direction of movement, corresponding to an increase in ownvehicle speed, beyond the minimum length.

[9915]

This ownvehicle model shall also include a collision vector which defines the main gun. This vector shall be articulated to track the orientation of the main gun relative to the hull orientation.

[4908]

Collisions shall be divided into two classifications: hard and soft collisions.

[9262]

Hard collisions shall occur when an ownvehicle collides with features, such as buildings, derricks, raised forests, pipelines, bridges, deep rivers, lakes, oceans, hard enemy targets (live or dead), and the following road obstacles/barricades: Jacks, Jersey walls, destroyed vehicles, and piles of tree logs.

[9916]

When a hard collision is detected, the ownvehicle shall be momentarily halted and moved back enough to clear the collision state. In the case of a main gun collision, movement of the main gun may also clear the collision state. Main gun movement shall be momentarily halted upon detection of a hard collision. The ownvehicle shall then be free to continue.

[9263]

Soft collisions shall occur when an ownvehicle collides with features, such as telephone poles, palm trees, bushes, shallow rivers, friendly targets, soft enemy targets (live or dead), troop targets, and the following road obstacles/barricades: tire piles and individual tree logs.

[9203]

Collisions with other ownsection or ownplatoon vehicles shall be considered soft collisions.

[4914]

When a soft collision is detected, the ownvehicle shall continue unimpeded.

[4915]

The ownvehicle shall follow the terrain polygons.

[4916]

Ownvehicle speed shall not be affected by terrain type.

3.7.3.3.14.1.5 Free Movement - Target Behavior

[9205]

Targets may not be visible following CGF Operator activation, depending on the section or platoon vehicles' positions.

[9681]

Prior to activation by the CGF Operator, the host shall not recognize them as scoreable targets.

[7741]

Targets may seem to pop onto or from the scene at activation or deactivation, depending on the section or platoon vehicles' positions.

3.7.3.3.14.2 Free Movement Joystick/Steering Wheel Capability

[9906]

See paragraph 3.7.5.3, IOS Steering Control, for definition.

3.7.3.3.15 Free Movement Crew Mode Operation

[10126]

The AGTS Free Movement is an operational configuration within the Crew Mode which provides capability for the ownvehicle to be moved under the control of a driver operator at the ownvehicle assigned IOS. The same offensive crew exercises that are available under normal crew training are selectable, but with the AGTS initialized in Free Movement operation. As the exercise starts, the driver and crew (with limited I/O participation) will communicate over the crew intercom to coordinate ownvehicle progression through the corresponding Operations Procedure.

3.7.3.3.15.1 Free Movement Crew Training Program Characteristics

[10132]

The AGTS trainer shall have the capability to move in crew training mode, via free movement - crew exercise selection, under driver control at the IOS.

[10133]

In free movement operation, the Driver Operator's headset shall be connected to the IOS intercom.

[10134]

Crew Mode Free Movement shall only be activated during the Crew Exercise selection process.

[10135]

The same ownvehicle dynamics shall be applied as for the preprogrammed path mode.

3.7.3.3.15.1.1 Reserved

3.7.3.3.15.1.2 Free Movement in Crew Mode Offensive Situations

[10150]

Offensive situations within a Free Movement crew exercise operation shall precede start-to-finish under Free Movement vehicle control.

[10151]

The ACTIVATE TARGETS GUI button shall be operable at the IOS when the vehicle crosses the next situation target range ring.

[10152]

The targets shall be activated when the I/O presses the ACTIVATE TARGETS GUI button.

3.7.3.3.15.1.3 Free Movement - Scoring

[10154]

Trainer provided scoring shall be the same as in pre-programmed crew exercises.

[10155]

Scoring is a responsibility of the instructor/operator.

3.7.3.3.15.1.4 Free Movement - Crew Vehicle Behavior

[10157]

The ownvehicle collision model shall consist of a set of four vectors for modeling the hull collision volume.

[10158]

These collision vectors shall extend further from the center of the hull center in the direction of movement, corresponding to an increase in ownvehicle speed, beyond the minimum length.

[10159]

This ownvehicle model shall also include a collision vector which defines the main gun. This vector shall be articulated to track the orientation of the main gun relative to the hull orientation.

[10160]

Collisions shall be divided into two classifications: hard and soft collisions.

[10161]

Hard collisions shall occur when an ownvehicle collides with features, such as buildings, derricks, raised forests, pipelines, bridges, deep rivers, lakes, oceans, hard enemy targets (live or dead), and the following road obstacles/barricades: Jacks, Jersey walls, destroyed vehicles, and piles of tree logs.

[10162]

When a hard collision is detected, the ownvehicle shall be momentarily halted and moved back enough to clear the collision state. In the case of a main gun collision, movement of the main gun may also clear the collision state. Main gun movement shall be momentarily halted upon detection of a hard collision. The ownvehicle shall then be free to continue.

[10163]

Soft collisions shall occur when an ownvehicle collides with features, such as telephone poles, palm trees, bushes, shallow rivers, friendly targets, soft enemy targets (live or dead), troop targets, and the following road obstacles/barricades: tire piles and individual tree logs.

[10165]

When a soft collision is detected, the ownvehicle shall continue unimpeded.

[10166]

The ownvehicle shall follow the terrain polygons.

[10167]

Ownvehicle speed shall not be affected by terrain type.

3.7.3.3.15.1.5 Free Movement - Target Behavior

[10169]

Targets may not be visible following CGF Operator activation, depending on the ownvehicle position.

[10170]

Prior to target activation by the CGF Operator, the host shall not recognize them as scoreable targets.

[10171]

Targets may seem to pop onto or from the scene at activation or deactivation, depending on the ownvehicle position.

3.7.3.3.15.2 Free Movement Crew Mode Joystick/Steering Wheel Capability

[10173]

See paragraph 3.7.5.3, IOS Steering Control, for definition.

3.7.3.4 TRAINER OPERATION

[7838]

The Instructional Subsystem training operations shall be reconfigurable to provide individual skills, crew duties, section, and platoon training.

[5071]

The simultaneous crew training sessions shall be capable of being completely independent and separate from each other.

[5072]

Capability to assign sessions shall be provided to the Instructor / Operator.

3.7.3.4.1 System Protection

[7839]

Access to the Training Management System (TMS) shall be via password controlled accounts.

[7840]

There shall be separate accounts for crew training, section training, platoon training and training system management.

[5075]

A separate login shall be provided for FSR access to the AGTS.

3.7.3.4.2 Mode Control and Selection

[7841]

The instructor shall be provided with the capability to select the following modes of operation.

- a. Start Training - The training mode shall allow the instructor to present gunnery exercises to the trainee, observe their performance, and instruct proper gunnery procedures and tactics; allow the platoon instructor to assign roles (platoon leader, platoon sergeant, wingman 1, wingman 2) to the crewstations being used in the platoon training exercise, or allow the section instructor to assign roles (section leader, and remaining member assigned) to the crewstations being used in the section training exercise.
- b. Training management - This mode shall allow the instructor to review, print, or backup crew, section, and platoon records of past crew performance.
- c. Hardware Diagnostics - This system mode shall allow access to hardware diagnostic options used to initialize or troubleshoot the trainer.
- d. Built-In Test - This mode shall allow the instructor to access that portion of the diagnostic support software system designed for his use.
- e. Exit - This training mode shall allow the instructor to terminate the training session.

3.7.3.4.3 Training Session Control - Crew Exercises

3.7.3.4.3.1 Crew Training Session Initialization

[5085]

The instructor shall initialize the training session.

[5086]

This initialization shall include:

- a. Entering the instructor's, commander's, gunner's and driver's name
- b. Selecting Training Program option: Initial Gunnery, Basic Gunnery Skills, Default Gunnery
- c. Entering the vehicle ID

[9682]

To permit initialization in the case in which no student record update is desired, entry of "XXX" for the vehicle identifier shall result in the establishment of scratch records which may be discarded at the end of the training session.

[10332]

Exercise selection shall then be made available to the instructor by computer recommendation, exercise content, special purpose menu, or exercise number.

[10952]

Entry to Default Gunnery Skills shall be limited to crews who have successfully completed Initial Gunnery Skills training or upon selection by the I/O during initialization.

[10953]

Entry to Basic Gunnery Skills shall be limited to crews who have successfully completed Default Gunnery Skills training or upon selection by the I/O during initialization.

[10954]

Entry to Advanced Gunnery Skills shall be limited to crews who have successfully completed Basic Gunnery Skills training.

3.7.3.4.3.2 Crew Training Exercise Selection

[9072]

The following methods of crew exercise selection shall be made available to the instructor.

- a. By computer recommendation - Computer recommended exercises, shall be selected based on the criteria and rules established in paragraphs 3.7.3.2.8.1.2 and 3.7.3.2.8.1.3.
- b. By exercise number - When running with a valid vehicle ID, the instructor shall be able to select any exercise number. The only exception is if the current position is at GTLF and is attempting to enter a GTLF exercise number other than the NRE. The host will automatically default to the NRE in GTLF.
- c. By exercise content - It shall be possible for the instructor to select an exercise with reference to the content of that exercise as defined by Table 3.7.3.4.3.2-1.

[6065]

Table 3.7.3.4.3.2-1. Exercise Content Descriptors

1. Ownvehicle Speed
2. Target Type
3. Target Speed
4. Initial Target Range
5. Crew Member Firing
6. Weapon Selection
7. Sight Selection
8. Visibility Conditions
9. Malfunctions

[10333]

The AGTS shall use the AGTS GUI terrain database names, or appropriate abbreviations, corresponding to the AGTS terrain database names whenever displaying or outputting (e.g., softcopy file or print) this data:

<u>AGTS Terrain Database Name</u>	<u>AGTS GUI Terrain Database Name</u>
Euro 1 - 4	Woodland 1 - 4
Korea	Woodland 5
Des 1 - 4	Desert 1 - 4
29 Palms	Desert 5
Arab MOUT	Urban 1
USMC MOUT	Urban 2

3.7.3.4.3.3 Crew Training Selected Exercise Preview

[5117]

The selected exercise description shall be as defined in paragraph 3.7.3.2.4.2.

3.7.3.4.3.4 Crew Training Selected Exercise Instructions

[5119]

The selected exercise instructions shall be as defined in paragraph 3.7.3.2.4.3.

3.7.3.4.3.5 Crew Training Exercise Set-up

[5121]

The training system shall check crew station switch positions and shall prevent the commencement of an exercise if the switches are not set properly for the exercise selected.

[5122]

Switch errors shall be displayed in the messages field of the initialization tab on the Training GUI.

[5123]

When the exercise status indicates ready to start, crew station controls shall be active to permit prefire checks, except weapon firing, and adjustments before the exercise begins.

3.7.3.4.3.6 Crew Training Exercise Control

[9683]

Exercise control functions shall be provided at the IOS in support of crew mode training when the Host/FBCB2 mode switch is in the Host state.

[10417]

ALTERNATE POSITION

Activation of the ALTERNATE POSITION function when ownvehicle is in defilade shall cause ownvehicle to follow a preprogrammed path laterally at least 25 meters and then stop in defilade of the alternate firing position.

[10424]

ENFILADE / DEFILADE MOVEMENT

Activation of the ENFILADE / DEFILADE MOVEMENT function when ownvehicle is stationary in the defilade position shall cause ownvehicle to move to the enfilade position.

Activation of this function again when ownvehicle is stationary in the enfilade position shall cause ownvehicle to move to the defilade position. If the ownvehicle is stopped anywhere along the ramp, the ENFILADE / DEFILADE MOVEMENT function activation shall cause the ownvehicle to reverse its previous motion.

[10430]

PRIMARY POSITION

Activation of the PRIMARY POSITION function when the ownvehicle is in the defilade position of an alternate or supplemental position shall cause the ownvehicle to follow a preprogrammed path from its current position and stop at the defilade of the primary battle position. Activation of this function while in the alternate position of a one-tiered battle position shall cause the ownvehicle to return to the primary position of the one-tiered battle position.

[10420]

AMMO TRANSFER

Ammo Transfer shall provide selections for transferring main gun ammo available in the Carousel, Replenisher, and supply truck (external).

Ammo Transfer shall also provide selections for transferring coax ammo within the vehicle and from the supply truck (external).

[9684]

STOP / GO MOVEMENT

When ownvehicle is moving, activation of the STOP / GO MOVEMENT function shall cause ownvehicle to come to a normal stop. When ownvehicle is stopped, activation of the STOP / GO MOVEMENT function shall cause ownvehicle to continue its programmed movement. If the ownvehicle is moving to enfilade and is stopped via activation of the STOP / GO MOVEMENT function, subsequent activation of the ENFILADE / DEFILADE function shall cause the ownvehicle to return to defilade. The same stop and return control applies to the ownvehicle moving back from enfilade. When ownvehicle is in a defilade position, activation of the STOP / GO MOVEMENT function shall cause the ownvehicle to leave the defensive position and proceed along the ownvehicle path.

[10428]

Friendly Illumination

If a night exercise, illumination of the target area shall be activated using the FRIENDLY ILLUMINATION function. A subsequent activation shall be possible 30 seconds after the previous activation.

[10425]

PRINT

Activation of the PRINT function while in freeze shall allow printing of one or more of the following:

- Situation monitor, or
- Performance analysis, or
- Shot pattern, or
- Scoring errors (depending on type of exercise).

*Note - The language used for printouts shall be the same as used on the GUI.

[10418]

TERMINATE

Activation of the TERMINATE function, when the exercise is in a freeze status, shall cause the exercise to be terminated.

[10419]

REPEAT

Activation of the REPEAT function shall enable the instructor to repeat the selected exercise (same replication). Upon activation of the REPEAT function, the exercise shall be restarted, commencing with the instructor's exercise briefing display page.

[10423]

FREEZE / UNFREEZE*

The instructor shall be able to activate the FREEZE / UNFREEZE function to interrupt an exercise only when targets are not active. The instructor shall be able to activate the FREEZE / UNFREEZE function to resume the exercise as if no interruption had occurred. The FREEZE / UNFREEZE function shall be available at all times during real-time execution only when targets are not active or during playback of a training exercise. When the system is in freeze, the instructor shall have the following training options:

- (1) Repeat the exercise from the beginning without re-selection using the Repeat function.
- (2) Playback all or part of the exercise using the Playback function.
- (3) Terminate the exercise using the Terminate function.
- (4) Unfreeze
- (5) Print

*Note - The FREEZE / UNFREEZE function shall be available at any time during real-time execution for Boresight exercises or when running under Rapid Login ID.

[10435]

SITUATION

This function shall provide for selecting the situation number used in PLAYBACK.

[10422]

PLAYBACK

Shall initiate the playback of all or part, selected by situation numbers, of the current or just completed training exercise. The playback shall run up to 30 minutes. The last 30 minutes of an exercise shall be saved, if the exercise runs more than 30 minutes. Playback can be aborted once it is started within an exercise. Playback is not available after the exercise is terminated.

A boresight exercise is processed as a regular exercise with one situation in it. As such, playback recording for a boresight exercise shall always start at the beginning of the boresight exercise. A selected playback shall start 30 minutes prior to the current point of the exercise or at time 0, if the current point is less than 30 minutes in duration.

[10427]

Fast Forward

When in a stationary ownvehicle exercise and no targets are active, then activation of the FAST FORWARD function shall advance the exercise to five seconds prior to the start of the next situation and transition the training mode to FREEZE.

[10421]

ZOOM / UNZOOM

Activation of the ZOOM / UNZOOM function during playback shall zoom the scenes in both the commander's and gunner's sights. A second activation of the function shall unzoom the scenes.

[10426]

ACTIVATE TARGETS

Selecting the ACTIVATE TARGETS function shall cause target activation to occur.

[10431]

ID ERROR

Activation of the ID ERROR function shall provide the capability for the Instructor to log target identification/classification errors that the I/O detects due to the commander's verbal communication during non-task point engagements.

[10436]

TOWER TALK

Upon selecting the Tower Talk function in Gate to Live Fire (GTLF) exercises, activation of this function shall display a list of situations for the GTLF exercise and the Tower Talk text for the highlighted situation.

This function shall be unavailable to non-GTLF exercises.

[10432]

HELP

Selection of the HELP function shall display an explanation of abbreviations used on the AGTS displays.

[9075]

The following exercise control functions shall be enabled at the crew instructor's IOS in support of crew-FBCB2 training when the Host/FBCB2 mode switch is in the FBCB2 state:

The Instructor shall have access to the FBCB2 personal computer, via the IOS keyboard and mouse, providing the Instructor capability of generating digital messages and transmitting them to his crew.

[5126]

Individual FBCB2 role assignments shall be made on all units.

3.7.3.4.3.7 Crew Training Management

[5145]

The data necessary to assess crew performance shall be provided to the training manager including crew records, unit summaries and crew back-up records.

[7851]

The outputted XML crew student record structure shall use the CGA XML schema defined in Section 6 of the Common Gunnery Architecture (CGA) Stryker MGS AGTS Integrated Product Team (IPT) Technical Reports - Software Engineering Data and updated per the Stryker MGS AGTS Software Integration Team IPT.

3.7.3.4.3.7.1 Crew Record

[9076]

The crew record shall include:

- a. Vehicle number
- b. Training program
- c. Commander's name
- d. Gunner's name
- e. Total main weapon rounds fired
- f. Percent of targets killed
- g. Percent of targets hit
- h. Total number of computer recommended crew exercises completed
- i. Exercise data (for the last 100 exercises) which includes:
 - (1) Exercise completion date
 - (2) Exercise number
 - (3) Instructor's name
 - (4) Exercise progress recommendation
 - (5) Scoring information including:
 - (a) Total Task Points
 - (b) Number of qualified situations
 - (c) Total number of targets in situation
 - (d) Total number of killed targets in situation
 - (e) Total number of hit targets in situation
 - (f) Average Target ID Time
 - (g) Average Target Kill Time
 - (h) Average First Round Time
 - (i) Total number of main weapon rounds
 - (j) Target acquisition score
 - (k) Reticle aim score
 - (l) System management score
 - (6) Limited Training Indicator
 - (7) Type of Training System

Note: Items 5(a)-(l) will not be shown when the crew record is printed.

[5173]

Student records shall be maintained and available for 200 crews.

[5174]

The progression status (for computer recommended and remedial exercises) or letter grade (for exercise number and content selected exercises) shall be displayed.

[10863]

Records conversion shall convert existing student records from CTP to iCTP progression:

Basic Gunnery

- Table IV maps to Initial Gunnery Basic Table IV Exercise 1
- Table V maps to Initial Gunnery Practice Table V Exercise 1
- Table VI maps to Basic Gunnery Pre-Live Fire 1
- Table VII maps to Basic Gunnery Pre-Live Fire 1
- Table VIII Gate to Live Fire maps to Basic Gunnery Gate to Live Fire Exercise 1

Advanced Gunnery

- CTP Advanced Skill Level 1 maps to iCTP Default Gunnery
- CTP Advanced Skill Level 2 maps to iCTP Advanced Skill Level 1
- CTP Advanced Skill Level 3 maps to iCTP Advanced Skill Level 2

3.7.3.4.3.7.2 Crew Back-up Records

[5176]

Crew back-up records shall consist of the exercise group positions for crews and commanders as obtained from the training management system. Crew backup records for a battalion shall be made on a removable media. The capability to restore records from backup media to Training Management System shall be provided.

3.7.3.4.3.7.3 Crew Record Retrieval Options

[7866]

A student record retrieval process shall be provided which requests identification information from the IOS terminal, retrieves the student record, displays it at the terminal and prints a hardcopy.

- a. By vehicle ID - The training manager shall be able to select a crew record by vehicle ID. When this option is activated, a complete list of all crew shall be listed (sorted by vehicle number) on the IOS display.
- b. By student name - The training manager shall be able to select a crew record by the student's name. When this option is activated, a complete list of all crews shall be listed (sorted alphabetically by name) on the IOS display.

3.7.3.4.3.7.4 Record Correction and Printing

[5182]

A record correction process shall be provided for the training manager.

[5183]

This capability shall be password protected.

[5184]

The basic options under this function shall be the DELETE EXERCISE and DELETE RECORD(s) options.

[5185]

Included in the Training Management System shall be the provisions to allow the training manager to change the vehicle number, commander's and gunner's name, and the commander's and crew's exercise group position.

[5186]

Under the DELETE ITEM option, the training manager shall have the capability to delete both exercise records, one at a time, and the entire crew file.

[5187]

The training manager shall be prompted with questions when any of the options are selected.

[9911]

All entries shall be via the keyboard or mouse.

[5189]

Record print capability shall be provided to the instructor and training manager.

[5190]

The capability to change the time and date shall be provided.

3.7.3.4.3.7.5 Crew Training Exercise Building

[10829]

AGTS shall provide the capability for the Senior Instructor/Operator (SIO) to build GTLF exercises.

[10830]

A GTLF Exercise Creation GUI shall be provided for selecting the following items for up to 10 situations:

- Task Number (60-69)

- OV Posture (Offensive, Defensive)

- Targets (Short Main, Short MG, Long Main, Long MG, Not Selected)

- CBRN (Off or On)

- Visibility Ratio (5 Day/5 Night, 6 Day/4 Night, 7 Day/3 Night)

- Database (Desert or Woodland)

- Degradation (AUX, STAB, MAN, Not Selected)

[10831]

The GTLF Exercise Creation GUI shall provide a means for checking that the combination of RPMs is valid and displaying an error message when validation fails.

[10832]

The GTLF Exercise Creation GUI shall provide a Situation status for indicating whether the situation exists or does not exist in the GTLF scenario library.

[10833]

The GTLF Exercise Creation GUI shall provide an overall status for indicating whether RPMs have been met or have not been met.

[10834]

The TMS shall provide the capability for the SIO to save an SIO-built GTLF exercise.

[10835]

The training system shall provide the capability for the I/O to load existing SIO-built GTLF exercises.

[10836]

The TMS shall provide the capability for the training manager/SIO to delete an SIO-built GTLF exercise.

[10837]

The TMS shall provide the capability for the training manager/SIO to rename an SIO-built GTLF exercise.

[10838]

The TMS shall provide the capability for the training manager/SIO to copy one or more SIO-built GTLF exercises from a CD onto AGTS.

[10839]

The TMS shall provide the capability for the training manager/SIO to save one or more SIO-built GTLF exercises onto a CD from AGTS.

3.7.3.4.4 Training Session Control - Section/Platoon Exercises

[9685]

The following control occurs when an I/O has logged into the IOS for section/platoon training.

3.7.3.4.4.1 Section/Platoon Training Session Initialization

[9686]

During section/platoon training, all required initialization shall be accomplished by the section/platoon instructor from a single IOS.

[9687]

This initialization shall include assignment of roles (section/platoon leader, section/platoon sergeant, section/platoon wingman 1, wingman 2) to the crew stations being used in the training exercise.

[5196]

The system shall inform the I/O that selected crew stations and the PAAR station data logger are available and ready for training.

[9688]

The Section/Platoon Leader shall enter the vehicle ID.

The section/platoon operators at each IOS shall:

- a. Enter the operator or instructor's name
- b. Enter the commander's name
- c. Enter the gunner's name

3.7.3.4.4.2 Section/Platoon Training Exercise Selection

[9689]

The following method of section/platoon exercise selection shall be made available to the section/platoon instructor.

- a. By exercise number.

3.7.3.4.4.3 Section/Platoon Training Selected Exercise Preview

[9690]

The section/platoon training selected exercise scope shall be as defined in paragraph 3.7.3.3.4.2.

3.7.3.4.4.4 Section/Platoon Training Selected Exercise Instruction

[5207]

The selected exercise instructions shall be as defined in paragraph 3.7.3.3.4.3.

3.7.3.4.4.5 Section/Platoon Training Exercise Set-up

[9691]

Switch errors shall be displayed in the messages field of the Initialization tab on the Training GUI. All trainers must complete exercise set-up before the Section/Platoon Leader instructor can start the exercises.

3.7.3.4.4.6 Section/Platoon Training Exercise Control

3.7.3.4.4.6.1 Section/Platoon Instructor Exercise Control (Leader)

[9692]

Exercise control functions shall be enabled at the section/platoon leader's IOS in support of section/platoon training when the Host/FBCB2 mode switch is in the Host state.

[10441]

ENFILADE / DEFILADE MOVEMENT

Activation of the ENFILADE / DEFILADE MOVEMENT function when ownvehicle is stationary at the defilade position shall cause ownvehicle to move to the enfilade position.

Activation of the ENFILADE / DEFILADE MOVEMENT function when ownvehicle is stationary in the enfilade position shall cause ownvehicle to move to the defilade position. If the ownvehicle is stopped anywhere along the ramp, the ENFILADE / DEFILADE MOVEMENT function activation shall cause the ownvehicle to reverse its previous motion.

[10448]

PRIMARY POSITION

Activation of the PRIMARY POSITION function when the ownvehicle is in the defilade position of an alternate or supplemental position shall cause the ownvehicle to follow a preprogrammed path from its current position and stop at the defilade of the primary battle position. Activation of this function while in the alternate position of a one-tiered battle position (i.e., BP without defilade used for offensive halt) shall cause the ownvehicle to return to the primary position of the one-tiered battle position.

[10437]

ALTERNATE POSITION/PATH

Activation of the ALTERNATE POSITION/PATH function when ownvehicle is in defilade shall cause ownvehicle to follow a preprogrammed path laterally at least 25 meters and then stop in defilade of the alternate firing position.

Activation of the ALTERNATE POSITION/PATH function when ownvehicle is moving and approaching an alternate ownvehicle path shall cause the ownvehicle to take this alternate path. Activation of this function while in a one-tiered battle position (i.e., BP without defilade used for offensive halt) shall cause the ownvehicle to follow a preprogrammed path laterally to an adjacent position on the database floor.

[9694]

SUPPLEMENTAL POSITION

Activation of the SUPPLEMENTAL POSITION function when ownvehicle is in the defilade position shall cause ownvehicle to follow a preprogrammed path from its current position, move to the supplemental position laterally at least 75 meters, and then stop at the new defilade position.

[10440]

AMMO TRANSFER

Activation of the AMMO TRANSFER function shall result in the display of ammo transfer options on the host computer monitor. Options shall include ammunition type, quantity, location from which the ammo is transferred and location to which ammo is transferred.

[10442]

STOP / GO MOVEMENT

When ownvehicle is moving, activation of the STOP / GO MOVEMENT function shall cause ownvehicle to come to a normal stop. When ownvehicle is stopped, activation of the STOP / GO MOVEMENT function shall cause ownvehicle to continue its programmed movement. During offensive exercises, activation of inactive remaining targets in the exercise shall be delayed the amount of time ownvehicle is stopped.

If the ownvehicle is moving out to enfilade and is stopped via activation of the STOP/GO MOVEMENT function, subsequent activation of the ENFILADE / DEFILADE MOVEMENT function shall cause the ownvehicle to return to defilade. The same stop and return control shall apply to ownvehicle moving back from enfilade. When ownvehicle is in a defilade position, activation of the STOP / GO MOVEMENT function shall cause the ownvehicle to leave the defensive position and proceed along the ownvehicle path.

[10449]

INCREASE VELOCITY

Activation of the INCREASE VELOCITY function when the ownvehicle is moving shall increase the ownvehicle velocity by 5 mph.

[10450]

DECREASE VELOCITY

Activation of the DECREASE VELOCITY function when the ownvehicle is moving shall decrease the ownvehicle velocity by 5 mph. The minimum velocity upon activation of this function shall be 5 mph.

[10444]

ACTIVATE TARGETS

The ACTIVATE TARGETS function shall cause target activation to occur.

[10445]

FRIENDLY SMOKE*

The FRIENDLY SMOKE function shall cause friendly smoke to be created between targets and ownvehicle.

*Note - Friendly Smoke function shall be inhibited when no targets are active or during exercise situations that contain only friendly targets.

[10446]

FRIENDLY ARTILLERY*

The FRIENDLY ARTILLERY function shall cause friendly artillery simulation to occur.

*Note - FRIENDLY ARTILLERY function shall be inhibited when no targets are active or during exercise situations that contain only friendly targets.

[10447]

FRIENDLY ILLUMINATION

Illumination of the target area shall be activated upon selecting the FRIENDLY ILLUMINATION function. A subsequent activation shall be possible 30 seconds after the previous activation.

[10453]

CAPTURE/RELEASE

The CAPTURE / RELEASE function shall transition the ownvehicle between free movement and preprogrammed path control under conditions defined 3.7.3.3.14.1.1, Free Movement in Defensive Situations.

[10443]
PRINT

Activation of the PRINT function while in freeze shall allow printing of one or more of the following:

- Situation monitor, or
- Performance analysis, or
- Shot pattern, or
- Scoring errors.

*Note - The language used for printouts shall be the same as used on the GUI.

[10438]
TERMINATE

Activation of the TERMINATE function, when the exercise is in a freeze status, shall cause the exercise to be terminated.

[10439]
REPEAT

Activation of the REPEAT function shall enable the instructor to repeat the selected exercise (same replication). Upon activation of the REPEAT function, the exercise shall be restarted, commencing with the instructor's exercise briefing display page.

[9693]
FREEZE / UNFREEZE*

The instructor shall be able to activate the FREEZE / UNFREEZE function to interrupt an exercise only when targets are not active. The instructor shall be able to activate the FREEZE / UNFREEZE function to resume the exercise as if no interruption had occurred only when targets are not active.

*Note - the FREEZE / UNFREEZE function shall be available at any time during real-time execution for Boresight exercises or when running under Rapid Login ID.

[10451]
RECORD NOTE

Selecting the RECORD NOTE function shall override the current setting on the intercom control box and set the radio ID for the instructor to enable transmission on the Note-Taking network as long as the function is activated. When the function is reactivated, transmission on the Note-Taking network shall cease and control shall switch back to the current setting on the intercom control box.

[10452]
HELP

Selection of the HELP function shall display an explanation of abbreviations used on the AGTS displays.

[9695]
The following exercise control functions shall be enabled at each crew instructor's IOS in support of section/platoon training when the Host/FBCB2 mode switch is in the FBCB2 state: Each Instructor shall have access to the FBCB2 personal computer, via the IOS keyboard and mouse, providing the Instructor capability of generating digital messages and transmitting them to all section/platoon Instructors and crews.

[5214]
Individual FBCB2 role assignments shall be made on all units.

3.7.3.4.4.6.2 Section/Platoon Operator Exercise Control (Member)

[9696]

The following exercise control functions shall be enabled at all non-leader section/platoon IOSs in support of section/platoon training when the Host/FBCB2 mode switch is in the Host state: All the exercise control functions listed under 3.7.3.4.4.6.1 shall be available, with the exception of ACTIVATE TARGETS, FRIENDLY SMOKE, FRIENDLY ARTILLERY, and FRIENDLY ILLUMINATION.

[9697]

The following exercise control functions shall be enabled at each crew instructor's IOS in support of section/platoon-FBCB2 training when the Host/FBCB2 mode switch is in the FBCB2 state: Each Instructor shall have access to the FBCB2 personal computer, via the IOS keyboard and mouse, providing the Instructor capability of generating digital messages and transmitting them to all section/platoon Instructors and crews.

[5243]

Individual FBCB2 role assignments shall be made on all units.

3.7.3.4.4.7 Section/Platoon Training Management

[5263]

The data necessary to access crew performance shall be provided to the training manager including crew records, unit summaries and crew back-up records.

[9924]

A section/platoon's performance record shall be automatically updated at the conclusion of each exercise.

[7852]

The section/platoon student record structure shall use the CGA XML schema defined in Section 6 of the Common Gunnery Architecture (CGA) Stryker MGS AGTS Integrated Product Team (IPT) Technical Reports - Software Engineering Data and updated per the Stryker MGS AGTS Software Integration Team IPT.

3.7.3.4.4.8 Section/Platoon Record

[9698]

The section/platoon record shall include:

- a. Vehicle number and section/platoon identification
- b. Total number of section/platoon exercises completed
- c. Date of the last section/platoon record update
- d. Exercise data (for last 100 exercises) which includes:
 - (1) Date completed
 - (2) Exercise number
 - (3) Instructor name
 - (4) Number of target vehicles presented
 - (5) Number of target vehicles killed
 - (6) Percent of vehicles killed
 - (7) Number of troop targets presented
 - (8) Number of troop targets killed
 - (9) Percent of area targets killed
 - (10) Exercise score and section/platoon rating
 - (11) Number of main gun rounds fired
 - (12) Number of coax rounds fired
- e. Exercise completed
- f. For each crew of the section/platoon, exercise data which includes:
 - (1) Number of target vehicles killed
 - (2) Number of troop targets killed
 - (3) Number of main gun rounds fired

(4) Number of coax rounds fired
[9925]
Section/platoon records shall be maintained and available for 100 sections/platoons.

3.7.3.4.4.9 Section/Platoon Record Retrieval Options

[9926]
The Instructor/Operator shall be provided the capability to conduct section/platoon record reviews using a mouse and pull-down menus.
[5292]
Instructor/Operator record review capabilities shall be available without the need for logging out of training.

3.7.3.4.4.10 Section/Platoon Record Correction and Printing

[5294]
A record correction process shall be provided for the training manager.
[5295]
This capability shall be password protected.
[5296]
The basic option under this function shall be the DELETE EXERCISE and DELETE RECORD(s) options.
[5297]
Under the DELETE ITEM option, the training manager shall have the capability to delete exercise records one at a time.
[5298]
Under the DELETE RECORD, capability to delete the entire crew, company, or battalion file.
[5299]
The training manager shall be prompted with questions when any options are selected.
[9912]
All entries shall be via the keyboard or mouse.
[9927]
Record print capability shall be provided to the instructor and training manager. A selection shall be provided to print individual records or all records for the current section/platoon training session.

3.7.3.4.4.11 Section/Platoon Back-up Records

[9699]
Section/platoon back-up records for the battalion shall be made on a removable media (CD). The capability to restore records from the removable media to the Training Management System shall be provided.

3.7.3.4.7 Trainer Usage Data

[10878]
The system shall capture trainer usage and proficiency data automatically, with the following exceptions:
a) manual user inputs, as specified in 3.7.3.4.7.4 Trainer Usage Data User Interface
b) when logged in as "FSR".
[10879]
The system shall be capable of exporting trainer usage and proficiency data into character-separated values file format.
[10880]
The system shall provide a mechanism to transfer the trainer usage and proficiency data to removable media.

3.7.3.4.7.1 Host Data

3.7.3.4.7.1.1 Host Training Data

[10881]

During training, each AGTS Host computer shall capture the following raw training data for every exercise, including those exercises logged in as “XXX” except when logged in as FSR.

[10882]

Identification Settings

- Vehicle ID - This field shall be a valid vehicle ID
- Instructor Name - This field shall be a user entry. It shall be tied to the Vehicle ID
- Commander Name - This field shall be a user entry. It shall be tied to the Vehicle ID
- Gunner Name - This field shall be a user entry. It shall be tied to the Vehicle ID
- Driver Name - This field shall be a user entry. It shall be tied to the Vehicle ID
- Device Serial Number - This field shall be a user entry that designates the serial number of the device.

[10853]

Exercise Data

- Exercise Number
- Exercise Type
- Session ID Date - This field shall identify the session start date.
- Session ID Time - This field shall identify the session end when the training session is terminated.
- Miles Driven - This field shall be the distance the OV has driven, based on the length of time the vehicle has moved at a non-zero speed (forward and reverse).
- Ammo Subdesignation Rounds Fired - This field shall capture the number of rounds fired in the exercise for each ammo type supported. There shall be one column for each ammo sub-designation supported.
- Configuration Mode - This field shall be the training mode in which the exercise was run (i.e., crew, platoon, etc.)

[10883]

Exercise Flags

- Free Movement Selected - This field shall be a flag that will be used to determine whether the driver participated in the exercise.

- Combat Selected - This field shall be a flag used to determine whether the CGF participated in the exercise.

- Exercise Completed - This field shall be a flag used to determine whether the exercise was run to completion or was terminated prior to completion.

[10884]

"Reason Exercise Terminated" shall be a raw data field captured by the AGTS Host computer which identifies the reason for exercise termination prior to exercise completion.

The "Reason Exercise Terminated" data includes the following possibilities:

- 1) Exercise was terminated by the instructor prior to exercise completion,
- 2) Exercise was terminated by a software exception,
- 3) Exercise was terminated by an unknown system failure.

[10885]

Time and Date Fields

- Exercise Start Time - This field shall be a system timestamp which is captured when the Start Exercise button is pressed.
- Exercise Start Date - This field shall be a system datestamp which is captured when the Start Exercise button is pressed.
- Exercise Terminate Time - This field shall be a system timestamp which is captured when the I/O presses the Confirm button on the Terminate Exercise pop-up.
- Exercise Terminate Date - This field shall be a system datestamp which is captured when the I/O presses the Confirm button on the Terminate Exercise pop-up.
- Session End Time - This field shall be a system timestamp which is captured when the session is terminated.
- Session End Date - This field shall be a system datestamp which is captured when the session is terminated.
- Total Exercise Training Time - This field shall be the total time spent in training for the exercise. It shall be calculated as the difference between Exercise Terminate Time and Exercise Start Time.

[10886]

Host Training data Time Fields shall be represented as whole number of Hours, Minutes, and Seconds. (hr:mm:ss)

[10887]

The system shall provide the Host Training Data in a single, cumulative file on the Host computer.

[10888]

A summary file shall contain a summary of the data collected at the Host computer. This summary file shall include the following information:

- Number of Sessions - The cumulative number of sessions spent training in all exercises.
- Trainer Utilization Hours - The cumulative number of hours spent training in all exercises.
- Powered On Hours - The number of hours the system is powered.
- Number of Crews Trained
- Number of Completed Exercises
- Number of Completed Exercises with Driver
- Number of Non-Completed Exercises
- Number of Non-Completed Exercises with Driver
- Number of Exercises Run
- Number of Exercises Run with Driver
- Number of Exercises Run with CGF
- Number of Rounds Fired (one column for each ammo subdesignation supported)
- Number of Miles Driven
- Device Serial Number

[10889]

The summary file shall be updated at the end of every exercise.

3.7.3.4.7.1.2 Host Proficiency Data

[10891]

During training, when running a platoon level exercise, the AGTS Host computer shall capture the following Platoon Proficiency Field raw data:

[10892]

Platoon PFA data

- Total Main Gun (MG) Targets: total main gun targets presented.
- Total Main Gun (MG) Kills: total main gun targets killed during exercise.
- Total Machine Gun (Coax/Cal.50) Targets: total coax targets presented during exercise.
- Total Machine Gun (Coax/Cal.50) Kills: total coax targets killed during exercise.
- Target Fratricides: total fratricide against other friendly forces.
- Avg % Coverage: average coverage percentage for coax area targets.
- Total Kills: total targets killed during exercise.
- Aggregate Score: total main gun and coax targets killed divided by the number of main gun and coax targets presented, times 100.
- Deductions: 10% is deducted from the total aggregated score each time a friendly target is engaged during the exercise.
- Final Score: final exercise score 0 through 100.
- Exercise Rating: Unqualified, Qualified, Superior & Distinguished.

[10893]

During training, when running a Crew level non task-point exercise, the AGTS Host computer shall capture the following Crew Proficiency Field raw data:

[10894]

Crew PFA Data

- Total Main Gun (MG) Targets: total main gun targets presented.
 - Total Machine Gun (Coax) Targets: total coax targets presented during exercise.
 - Total MG Rounds: Total number of main gun rounds fired during the exercise.
 - Total Machine Gun (Coax) Rounds: Total number of Coax rounds fired during the exercise.
 - Average Time to ID: Average length of time it took the trainee to respond to the presence of targets during the identified exercise
 - Average Time to Fire: Average length of time it took before the trainee fired at targets during the identified exercise
 - Average Time to Kill: Average length of time it took before the trainee killed targets during the identified exercise
 - Total Hits: Total number of main gun and Coax hits on target.
 - Total Acq Errors: Identifies the total number of acquisition errors for each situation determined at the end of each situation.
 - Total SM Errors: Identifies the total number of system management errors for each situation.
 - Average TA Score: Target Acquisition (TA) letter score determined after each situation.
 - Average RA Score: Reticle Aim (RA) letter score determined after each situation.
 - Average SM Score: System Management (SM) letter score determined after each situation. For computer-recommended exercises, scores are given as abbreviated grades. For instructor-selected exercises or repeated computer recommended exercises, scores are given as letter grades.
- Note: For computer-recommended exercises, TA, RA, and SM scores are given as abbreviated grades. For instructor-selected exercises or repeated computer recommended exercises, scores are given as letter grades.

[10895]

During training, when running a Crew level task-point exercise, the AGTS Host computer shall capture the following Crew Proficiency Field raw data:

[10896]

Crew QPFA Data

- Total Main Gun (MG) Targets: total main gun targets presented.
- Total Machine Gun (Coax) Targets: total coax targets presented during exercise.
- Total MG Rounds: Total number of main gun rounds fired during the exercise.
- Total Machine Gun (Coax) Rounds: Total number of Coax rounds fired during the exercise.
- Average Time to ID: Average length of time it took the trainee to respond to the presence of targets during the identified exercise.
- Average Time to Fire: Average length of time it took before the trainee fired at targets during the identified exercise.
- Average Time to Kill: Average length of time it took before the trainee killed targets during the identified exercise.
- Total Points: Combination of all initial points earned for each situation.
- Total I/O 30-point Cuts: Combination of all points deducted by the 30-point for each situation.
- Total I/O 5-Point Cuts: Combination of all points deducted by the 5-point for each situation.
- Total Final Points: Total Combination of final points earned for each situation.
- Qualified Situations: Indicates the total number of situations fired during the exercise that the crew received a qualifying score.
- Total Score Points: Indicates the combined score for the exercise.
- Total Score Pass Fail: Total combined score for the exercise with "Pass, Fail" evaluation.

3.7.3.4.7.2 PAAR Training Data

[10898]

During training, each AGTS PAAR computer shall capture the following data, including exercises logged in under "XXX":

- a. Time Exercise Real Time Monitoring (RTM)/Playback Started - This field is a System timestamp, including date and time, which is captured when one of the actions listed below occurs.
 - 1) the I/O presses the OK button on the Choose Log File pop-up
 - 2) the I/O presses the Play button for RTM
 - 3) a new exercise starts during RTM
- b. Date Exercise Recorded
- c. Time Exercise Recorded
- d. Exercise Number
- e. Device Serial Number

[10899]

A summary file shall contain a summary of the data collected at the PAAR computer. This summary file shall include the following information:

- Number of Exercises Monitored in Real Time/Played Back
- Device Serial Number

[10900]

The summary file shall be updated when exercise RTM or playback begins.

3.7.3.4.7.3 HOST/PAAR Exception Handling

[10903]

Trainer usage data shall track unhandled software exceptions on the AGTS Host and PAAR computers.

When an unhandled software exception occurs, the system shall log the following data:

- Exception Time - This field shall be a system timestamp, which includes date and time, denoting when the exception occurred.
- Exception Type - This field shall be the category of the exception.
- Device Serial Number - This field shall be a user entry that designates the serial number of the device.
- Exception Location - This field shall be a filename and line number of where exception occurred.
- Exception Message - This field shall contain additional information about why the exception occurred.

3.7.3.4.7.4 Trainer Usage Data User Interface

[10905]

A user login shall be provided at the AGTS Host and PAAR computers to manage Trainer Usage Data.

[10855]

After logging in, a GUI shall provide the user the capability to perform the following tasks:

- Manually input data
- Device Number - Input once per Host/PAAR PC
- Device Serial Number - Input once per Host/PAAR PC
- Device Description - Input once per Host/PAAR PC
- Date (user entered, but using system calendar)
- Time (user entered)
- Comments: User defined data that can be used to record trainer malfunctions, deficiencies, down time, maintenance, etc.
- Transfer data - This function shall allow user to copy trainer usage summary file(s) to removable media. All available Trainer Usage Data summary data shall be copied. The user shall not be able to specify a date range.
- Reset data - This function shall reset all training data to zero. All trainer usage data shall be deleted when this option is selected.
- Restore data - This function shall allow user to copy trainer usage summary file(s) from removable media to the hard drive.
- Data Protection - Proficiency and Usage Data shall be automatically backed-up to another storage device within the local AGTS system. (i.e., not an external storage device)

3.7.3.5 MALFUNCTIONS

3.7.3.5.1 Malfunctions Provided

3.7.3.5.1.1 Stabilization Failure

[9433]

A turret stabilization failure shall be indicated by unusual scene perturbation in the CMS Daysight, CMS Thermal Sight, and Commander Panoramic Viewer when ownvehicle is in motion (i.e., stabilization system shall be inoperative; therefore, the turret/gun shall move with the hull even when the palm switch(es) is depressed on the gunner's or commander's control handles. The turret still traverses, depresses and elevates when using the control handles.

[5350]

A stabilization failure shall display "Caution_Tda" in the CCP CAUTION Message Area.

3.7.3.5.1.2 Laser Rangefinder Failure

[9434]

An LRF failure shall be indicated by:

- a. A flashing "o" fault symbol appears in the CMS failure symbology field.
- b. Inability to fire the LRF unit.
- c. Fail indication in the Crewstation Data on the Exercise Data selection (see paragraph 3.7.3.2.5).
- d. "LRF" appears in CCP CAUTION Message Area.

3.7.3.5.1.3 Lead Sensor Failure

[9435]

A lead sensor failure shall be provided within an exercise containing a stabilization failure and shall be indicated by:

- a. A flashing "o" fault symbol in the CMS (LOS mode only) sights.
- b. No automatic lead offset.
- c. "USEU" appears in CCP CAUTION Message Area.

3.7.3.5.1.4 Mobile Gun Computer Failure

[9436]

A randomly induced complete mobile gun computer failure shall be indicated by:

- a. A flashing "o" fault symbol in the CMS (LOS mode only) sights.
- b. No ballistic solution.

3.7.3.5.1.5 Reserved

3.7.3.5.1.6 Gunner's Control Handle Failure

[7903]

A gunner's control handle failure shall be simulated by causing all inputs from the handle to be ignored, including position, control, and fire commands.

[5368]

Failed firing switches on the gunner's control handle shall be simulated by stopping the aural and visual cues associated with weapon firing.

[5351]

A gunner's control handle failure shall display "Caution_Tseu" in the CCP CAUTION Message Area.

3.7.3.5.1.7 Reserved

3.7.3.5.1.8 Coaxial Machine Gun Firing Failure

[5371]

A coax machine gun firing failure shall be simulated by generating a "bolt going forward" misfire aural cue and simultaneously stopping the coax firing aural and visual cues associated with coax firings.

[9437]

The coaxial machine gun misfire may be corrected by pulling the manual charging handle at the gunner's station.

[5373]

The probability of a coaxial machine gun misfire occurring in an exercise shall be 7.5%. If in a "misfire candidate" exercise and the selected weapon for the misfire malfunction is not fired for the exercise mission, then the exercise will not count toward satisfying the malfunction insertion probability.

3.7.3.5.1.9 Reserved

3.7.3.5.1.10 Main Gun Misfire

[9286]

Main gun misfire shall be simulated randomly by a failure to fire (no simulated sound, recoil, or visual effects) when an electrical trigger is actuated after performing all main gun prefire steps correctly.

[9440]

Subsequent activation of the emergency firing device shall result in the main gun firing.

[5352]

A main gun misfire shall display both "Advisory_Misfired" in the CCP ADVISORY Message Area and "Caution_Gun_Not_Loaded" in the CAUTION Message Area.

3.7.3.5.1.11 Results of Direct Hit to OwnVehicle

[9442]

A direct hit to ownvehicle shall result in one of the following conditions:

- a. Random gun tube bend error caused by a direct hit on ownvehicle shall result in a MRS error of +/-1.5 mils in azimuth and +/-1.5 mils in elevation. MRS error due to a direct hit shall occur 20 percent of the time and shall affect the CMS reticle.
- b. Computer lockup (failure). Computer lockup due to a direct hit shall occur 10 percent of the time. The LRF shall remain operational, but the computer system shall not provide a ballistic solution or super elevation.
- c. CMS symbology failure. GPS symbology failure due to a direct hit shall occur 10 percent of the time and shall require the crew to operate with no symbology appearing in the CMS Daysight and Thermal Sight (the reticle is the only visible image projected onto the CMS Daysight and Thermal Sight).
- d. Stabilization failure (stab failure). Stab failure due to a direct hit shall occur 20 percent of the time and shall require the crew to operate in emergency mode.
- e. Ownvehicle kill or CMS/TIS failure. Ownvehicle kill shall be possible only in crew Advanced Skill Level I, II, and III exercises. Ownvehicle kill or CMS/TIS failure due to a direct hit shall occur 20 percent of the time. If the exercise type does not allow ownvehicle kill, the CMS/TIS shall fail.
- f. CPV failure. CPV failure due to a direct hit shall occur 10 percent of the time and shall require the commander to default to using unity periscopes to detect targets outside the gunner's field of view.
- g. No degradation. Ownvehicle will not sustain any type of degradation resulting from a direct hit 10 percent of the time.

[9917]

These malfunctions due to a direct hit to ownvehicle shall be limited by the reticle aim status conditions of the exercise fired.

[5404]

CPV failures shall not happen during defensive crew engagements. In these cases, the 10 percent for CPV failures shall be prorated and added to the remaining percentages.

3.7.3.5.1.12 CMS Daysight Failure

[9443]

A CMS Daysight failure shall be indicated by a visual scene black out when viewed through the CMS Daysight or CDU when the CMS Day video is selected.

This failure will indicate to the gunner to use the CMS Thermal Sight or GAS and the commander to use the CDU selected CMS Thermal or CPV (Day or Thermal), or CAS for sighting and firing all weapons.

[5411]

A CMS Daysight failure shall display "Caution_Cms" in the CCP CAUTION Message Area.

3.7.3.5.1.13 Thermal Sight Failure

[9441]

Failure shall be simulated by a complete blackout of the CMS thermal scenes (if activated) on the gunner's biocular and CCP selected CMS Thermal.

3.7.3.5.1.14 CPV Failure

[9445]

A CPV failure shall be simulated with a black CDU screen when CPV Day or CPV Thermal is selected on the CCP.

[9446]

Additionally, all CPV controls shall be inoperative.

[10191]

A CPV failure shall display "Caution_Useu" in the CCP CAUTION Message Area.

3.7.3.5.1.15 Loss of CMS Symbology

[10495]

A CMS symbology failure shall be indicated by a visual scene failure of the CMS symbology (Ready to Fire Indicator, Range Data, Fault Indicator, and Low Coax Ammo Indicator) as viewed through the gunner's CMS Daysight or Thermal Sight and commander selected CMS Daysight or Thermal video at the CDU.

[10192]

A Loss of Symbology failure shall display "Caution_Useu" in the CCP CAUTION Message Area.

3.7.3.5.1.16 CMS Failure

[9920]

A CMS failure shall be indicated by a visual scene black out when viewed through the CMS Daysight and/or at the Gunner's Display Unit or the commander viewing the CDU when the Gunner Day or Gunner Thermal video is selected.

[10181]

A CMS failure shall also disable the LRF.

[9921]

This failure will indicate to the gunner to use the GAS and the commander to use the CDU selected CPV (Day or Thermal) for target detection, or CAS for sighting and firing all weapons.

[10193]

A CMS failure shall display "Caution_Cms" in the CCP CAUTION Message Area.

3.7.3.5.1.17 Boresight Loss - Main Gun

[9922]

A Main Gun Boresight Loss shall be simulated with a boresight offset being induced that forces a main gun miss.

3.7.3.5.1.18 Turret Drive System Failure

[10183]

The turret drive system (TDS) failure shall be simulated by loss of power mode control of the turret and main gun positioning. The commander's and gunner's control handles shall be otherwise functional, including the commander's control handle operation of the CPV.

[10194]

A Turret Drive System failure shall display "Caution_Tds" in the CCP CAUTION Message Area.

3.7.4 COMPUTATIONAL SUBSYSTEM

3.7.4.1 COMPUTER SYSTEM HARDWARE

[5433]

The computer system hardware shall consist of one or more Commercial Off-The-Shelf (COTS) computers and peripherals, interface hardware, controllers and cables.

3.7.4.1.1 System Composition

[5435]

Any combination of computers, peripherals, cables, and interface hardware may be used together to form the system, however, intermixing of different products will be limited to minimize logistics support costs.

3.7.4.1.2 Processor Requirements

[5437]

The system dynamic response requirements of this specification shall be utilized to develop the iteration rate structure and processor input/output design.

[5438]

The minimum iteration rate for critical dynamics computational paths shall be 30 Hz.

[5439]

The processor shall be capable of sustaining real-time operation at 30 Hz minimum.

3.7.4.1.3 Peripherals

[5441]

Peripherals shall be provided as required to support the AGTS Computational Subsystem. As a minimum, peripherals described below shall be provided and installed as part of the computer system. The equipment necessary for commercial software updates shall also be provided.

[8551]

- a. Disk system - Disk systems including controllers shall consist of one or more hard disk (e.g., winchester type, including removable disk drives units) units. Total installed capacity shall be sufficient to store all required program software; and provide required spare capacity (paragraph 3.7.4.1.4). Disk storage expansion capability of at least twice the required storage shall be available.

[9210]

- b. Removable media drive unit - Media drive unit(s) shall be provided, installed, and connected. The media drive unit shall have the capability to write and read in accordance with a recognized and approved formal industry or other formal organizational standard (e.g., ANSI, IEEE, ISO) so that media written/read by the provided media drive unit can be read/written, with no errors, by a different manufacturer's COTS unit. The media drive unit shall have sufficient capacity to store crew, section and platoon records as identified in 3.7.3.4.3.7.1 and 3.7.3.4.4.8.

[8552]

- c. Printer - An appropriate printer shall be provided to support operations and maintenance.

3.7.4.1.4 Spare and Expansion Requirements

[5446]

Spare resources shall be provided to allow for expansion and modification. The following spare resources are required:

[5447]

- a. Spare memory - Spare memory for each processor equal to 20 percent of the installed memory for that processor shall be provided. Spare memory for any shared memory (or other memory configuration such as reflective memory) equal to 20 percent of the installed shared (or reflective) memory shall also be provided. All installed spare memory shall be directly addressable by the delivered processor and operating system. Memory shall be expandable to twice the required storage.

[5448]

- b. Spare disk - Spare disk storage shall be provided for each disk media unit, (magnetic, optical or other equivalent technology) equal to 25 percent of the available installed, formatted storage on that disk media unit. Disk storage expansion to at least twice the required storage shall be provided.

[5449]

- c. Spare processing time - The computer system as installed and accepted shall provide the following spare processing capacity. Spare processing time in each period of time corresponding to the highest iteration rate being used shall be provided for each processor equal to 20 percent of the available processing time in that period (e.g., for a 30 Hz iteration rate, the period of time is 33.33 milliseconds, and the spare provided in each of the 30 periods shall be at least 6.67 milliseconds). Spare processing time shall be tested under worst case trainer operating conditions. Computational capability shall be expandable to at least twice the required throughput via add-on modules or board replacements, with the exception of the PCIG, which is configured to maintain 100% processing time by design.

[5450]

- d. Spare input/output capacity - The spare input/output (I/O) channel capacity shall be equal or greater than 20 percent of the total installed I/O channel capacity. The spare interface channels shall include all analog-to-digital, digital-to-analog, and discrete interface devices. The spare interface equipment shall be distributed such that 20 percent or greater spare for each type of channel shall exist for each separate interface when the system is installed and accepted. This spare capacity shall be provided within the WAGO interface design.

3.7.5 INSTRUCTOR OPERATOR STATION (IOS)

3.7.5.1 IOS DISPLAYS

3.7.5.1.1 IOS Commander's Video Display

[9700]

A video monitor at the IOS shall display the Commander's Display Unit (CDU) view, which is dependent on the Commander Display Mode selection at the CCP (PAN DAY, PAN THERMAL, GUNNER DAY, or GUNNER THERMAL).

3.7.5.1.2 IOS Gunner's Video Display

[9701]

A video monitor at the IOS shall display the gunner's CMS Daysight or Gunner's Auxiliary Sight (GAS) view, dependent on the GAS in-use state.

[10089]

An LED indicator shall be mounted on the top edge of the monitor to show the ON state of the GAS in-use sensor. The indicator shall illuminate green in the ON state. The body of the indicator shall be mounted such that it is easily removable and transferable to a like monitor, if required.

3.7.5.1.3 IOS Training Performance Monitoring

[9111]

Upon selecting the Host computer source via the Host/FBCB2 switch control, a video monitor at the IOS shall display the output from the Host computer.

[9112]

Upon selecting the FBCB2 computer source via the Host/FBCB2 switch control, a video monitor at the IOS shall perform as the FBCB2 computer terminal monitor.

[5462]

The TSUH shall be displayed following the option selection from the Help menu.

3.7.5.1.4 IOS Free Movement Display

[6563]

A video monitor shall be provided at the IOS to support the ownvehicle in crew, section, and platoon free movement exercises.

[6564]

The viewpoint location shall approximate that of the driver's position in his compartment.

[6565]

The viewpoint and field-of-view (FOV) orientation shall be fixed to the hull.

[9702]

The free movement display FOV (horizontal x vertical) shall be 34.0 degrees by 9.5 degrees. Ownvehicle obstructions in azimuth and elevation shall not be present in the display.

[10076]

The free movement display shall include an inset of the Driver Compass defined in 3.7.2.5.2. The Driver Compass symbology shall be located in the lower-left corner of the display.

3.7.5.1.5 IOS Thermal System Video Display

[9703]

The video monitor at the IOS shall display the CMS Thermal view.

3.7.5.1.6 IOS Plan View Display

[5468]

A video monitor shall be provided at the IOS for viewing detailed correlated color topographic maps during simulation in crew, section, and platoon exercises.

3.7.5.1.7 IOS Commander's Auxiliary Video Display

[5458]

The video monitor at the IOS shall display the Auxiliary Sight scene. The trainer shall provide feedback to the Instructor to indicate when the Commander is viewing the Auxiliary sight.

[10090]

An LED indicator shall be mounted on the top edge of the monitor to show the ON state of the CAS in-use sensor. The indicator shall illuminate green in the ON state. The body of the indicator shall be mounted such that it is easily removable and transferable to a like monitor, if required.

3.7.5.2 IOS KEYBOARD

[9113]

Upon selecting the Host computer connection via the Host/FBCB2 switch control, the keyboard/mouse at the IOS shall provide an interface to the I/O for the activation of the instructional control functions defined in paragraphs 3.7.3.4.3.6 and 3.7.3.4.4.6.

[9114]

Upon selecting the FBCB2 computer connection via the Host/FBCB2 switch control, the keyboard/mouse at the IOS shall provide an interface to the I/O for generating and transmitting digital messages to the associated crew FBCB2 computer or the platoon network of FBCB2 computers, depending on the FBCB2 hub switch selection.

3.7.5.3 IOS STEERING CONTROL

[6568]

A joystick at the IOS shall support AGTS free movement mode by providing controls that allow personnel to drive the simulated vehicle throughout the environment. The joystick shall provide control of forward and reverse movement, steering, and speed.

3.7.5.4 IOS DIGITAL MESSAGE GENERATION

[9156]

Instructor generated digital messages shall be available for the Instructor / Operator to send during the exercise after the installation of the tactical FBCB2 terminal in the crew stations.

3.7.5.5 IOS COMMUNICATION

[9115]

The IOS shall support intercom, radio, and digital communication functions defined in paragraph 3.7.1.13.

[9704]

The I/O shall be provided talk and listen capability, and two observers (one being the driver participant) shall have listen only capability.

3.7.5.6 IOS PRINTER

[6570]

A printer shall be provided at the IOS with English print capability.

3.7.6 MONITORING SUBSYSTEM

3.7.6.1 PREBRIEF/AFTER ACTION REVIEW (PAAR) STATION

[9705]

The PAAR station shall support the section/platoon training session prebrief and after action review (PAAR) tasks. The prebrief and after action review shall not interfere with on-going training modes of operation.

[9706]

A single video monitor/terminal shall be provided at the PAAR to display log-in prompt for PAAR modes of operation.

[9708]

The PAAR log-in at the PAAR terminal shall initiate and control the PAAR replay mode of operation.

[9709]

The PAAR shall provide data logging capability for storing DIS PDU's as they are received over the DIS network. The data logger recording includes all the simulation / simulator activity as well as all the voice radio communications and instructor note taking network communications.

[9710]

The PAAR station shall provide capability for simultaneously logging an exercise and playback of previously recorded section or platoon exercises.

[9711]

The PAAR station shall provide for fast rewind and fast forward modes to support rapid searches of the previously stored section or platoon exercises.

[9712]

The PAAR station shall provide a Plan View Display (PVD) for real-time exercise monitoring and replay of a previously recorded section or platoon exercise.

[9713]

Voice communications traffic shall be replayed as audio synchronized with the PVD under PAAR control for section or platoon exercises.

[9714]

The PAAR station shall provide a 3-Dimensional view (stealth view) for the replay of a previously section or platoon recorded exercise.

[5489]

The crew actions in the crewstation shall be played back in section or platoon mode, in part, by utilizing the upgraded PAAR which provides the capability of displaying the gunner or commander's sight view (with reticles and symbology). Many of the crew actions can be observed by viewing the playing back of the selected sight views.

[5491]

The AAR Display Screen and Radio Display Window shall provide the same operation as previous AGTS systems. The PVD pull-down menus shall also operate the same, with the exception of one of the PVD pull-down menu options. In the PVD window, when one of the own-section or own-platoon vehicles is selected, the "Entity Options" pull-down menu - Tether options, which allows the operator to select the tether method on the Stealth display, shall include the gunner and commander's sight selections.

[5492]

The gunner or commander's sight views shall be formatted to fit on the stealth display as displayed at their respective IOS monitor.

[10072]

The PAAR shall support intercom and radio communication functions defined in paragraph 3.7.1.13.

[9212]

Section or platoon mode voice communications replay selection options shall include section and platoon net voice only, company command net voice only, platoon net voice and company command net voice, or instructor note taking net voice.

[5490]

An audio amplifier and speaker shall allow replay of voice communication for group use.

[9715]

The PAAR station shall generate a performance report which can be used by the instructor operator to identify strengths and weaknesses and areas requiring improvement. The capability of generating report/record files on CD/DVD shall be provided.

[9716]

The PAAR station shall provide capability to generate a printout take-home package of the exercise performance report.

3.7.6.2 LINKING SUBSYSTEM

[9717]

The Linking Subsystem is comprised of hardware and software that provides connectivity between multiple AGTS trainers and the PAAR in support of platoon training.

3.7.6.2.1 Distributed Interactive Simulation (DIS)

[5497]

Simulation data shall be communicated via DIS protocol compliant with "Standard for Distributed Interactive Simulation - Application Protocols", Version 2.0 Fourth Draft and "Enumeration and Bit-encoded Values for use with IEEE 1278.1-1994, Distributed Interactive Simulation - Application Protocols", Document No. IST-CR-93-46 including block 4 updates. See Table 3.7.6.2.1-1.

[5498]

Table 3.7.6.2.1-1. DIS Protocols

DIS PDU	PDU Description	DIS Protocol Revision 2.04, para.
entity state	Entity identification, creation, current/ position and status	4.4.2, 5.4.3.1
fire	Activates a visual effect and/or creates a trackable entity	4.4.3.1, 5.4.4.1
detonation	Activates a visual effect and/or terminates a trackable entity	4.4.3.2, 5.4.4.2
service request	Utilized for ammunitions logistics	4.4.4.4, 5.4.5.1
resupply offer	Utilized for ammunitions logistics	4.4.4.5, 5.4.5.2
resupply received	Utilized for ammunitions logistics	4.4.4.6, 5.4.5.3
resupply cancel	Utilized for ammunitions logistics	4.4.4.7, 5.4.5.4
Simulation/Exercise Management		
start/resume	Utilized for platoon mode initialization and synchronization	4.4.6.4.3, 5.4.6.3
stop/freeze	Terminate or pause simulation	4.4.6.4.4, 5.4.6.4
acknowledge	Required response to Start/resume and Stop/freeze PDU's	4.4.6.4.5, 5.4.6.5
set data	Utilized to set or change parameters of an entity	4.4.6.4.9
data	Utilized to provide requested information	4.4.6.4.10
Communication Control		
transmitter	Identification of radio channel	4.4.8.2, 5.4.8.1
signal	Radio communications and data transfer between entities	4.4.8.3, 5.4.8.2

3.7.6.2.2 Student File Transfers

[7804]

Section and platoon records shall be accessible from any IOS.

3.7.6.2.3 Linking Subsystem Network

[5571]

The linking subsystem network shall be an Ethernet network which is a physical star network with a hub.

[9718]

The linking subsystem network (see Figure 3.7.6.2.3-1) shall support four trainers and one PAAR. The interconnecting cable shall have a maximum length of 200 feet, hence each trainer can be no more than 200 feet from the PAAR.

[9719]

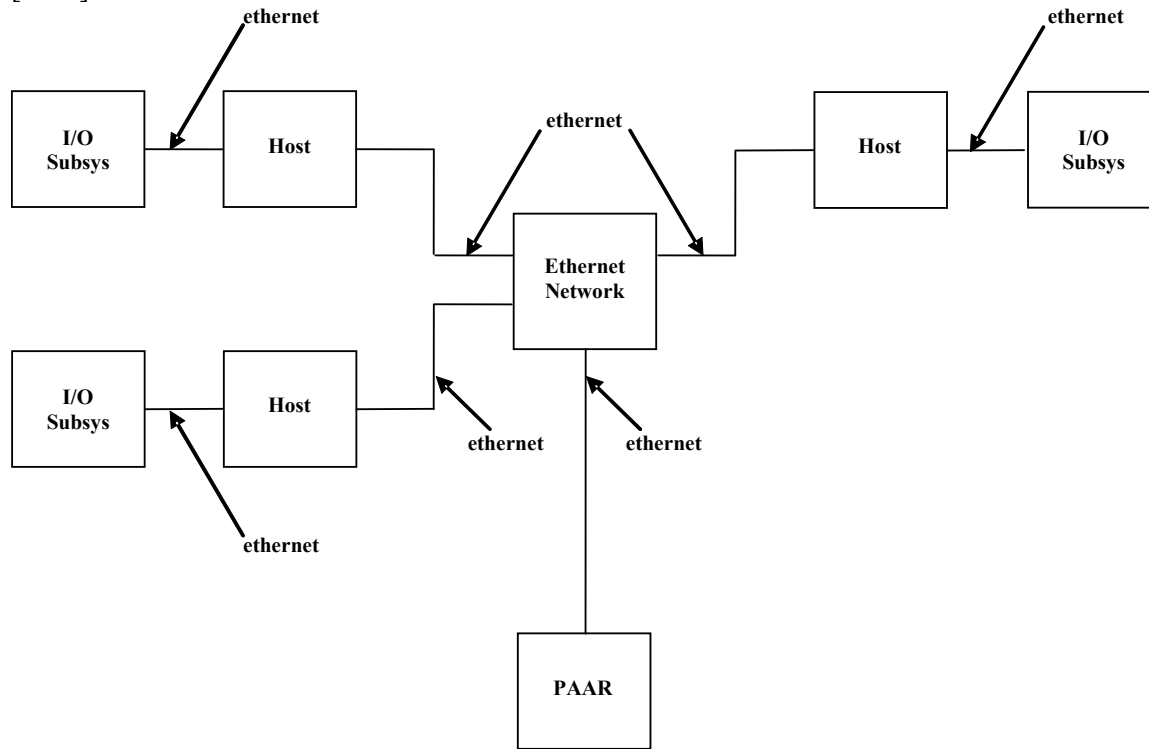


Figure 3.7.6.2.3-1. AGTS Top Level Platoon Architecture

[8544]

The PAAR linking subsystem hub/switch shall be configurable via cabling to support company level networking of up to sixteen (16) AGTS trainers.

3.7.7 MOBILITY/RELOCATABLE SUBSYSTEM

[10122]

This section defines the requirements for the following configurations:

- Section 3.7.7.1 defines the requirements for the AGTS Shelter Subsystem,
- Section 3.7.7.2 defines the requirements for the AGTS Mobility Subsystem,
- Section 3.7.7.3 defines the requirements for the AGTS Integrated Mobility Subsystem.

3.7.7.1 SHELTER SUBSYSTEM

[6575]

The shelter subsystem shall provide a housing for a vehicle trainer or PAAR subsystem.

3.7.7.1.1 Shelter Size

[6576]

The shelter size and form factor shall be selected to provide sufficient space for the assigned training operations, equipment, maintenance access, and personnel ingress/egress.

[6577]

The shelters shall also provide compatible integration with the mobile semi-trailer subsystem and overall mobile AGTS configuration requirements.

[6578]

The inside body dimensions shall be as follows:

- a. Interior shelter width shall be the maximum allowable with good design practice considering necessary insulation and structural reinforcement for shelter physical integrity during both relocatable and mobile configuration applications.
- b. Interior shelter height--the distance from the floor to the bottom of lights, cable runs, and other protuberances over the aisles and standing work spaces--shall not be less than 82 in.
- c. The minimum opening for personnel access shall be 80 inches high and 30 inches wide.
- d. The maximum height for the crew station shall not exceed 90 inches.

3.7.7.1.2 Body Construction

[6579]

Shelter body construction shall be in accordance with best commercial standards and as specified herein.

3.7.7.1.2.1 Thermal Protection

[6580]

The shelter shall be adequately insulated so that the body insulating efficiency shall not be reduced through the wall, door, floor, and roof sections.

[6581]

The insulation material shall be a non-hygroscopic, self-extinguishing, cellular material and shall be resistant to the growth of fungus and the retention of vermin.

[6582]

The insulation shall be sealed and bonded at all joints.

[6583]

The insulation shall be anchored to prevent sag and insulation voids.

3.7.7.1.3 Interior Construction

[6584]

The interior construction shall be such that the interior acoustical noise levels shall be in accordance with 5.8.3 through 5.8.3.3.5 of MIL-STD-1472.

3.7.7.1.3.1 Walls and Partitions

[6585]

The interior walls and partitions shall be securely fastened in place.

3.7.7.1.3.2 Ceiling

[6586]

A false ceiling may be provided with spacing for ECS ducts, lighting installations, and access for air flow and temperature sensor maintenance.

3.7.7.1.3.3 Floors

[6587]

The interior floor shall provide a safe walking surface free of hazards.

3.7.7.1.3.4 External Doors and Panel

[6588]

Door gaskets shall be installed with corners tightly fitted to provide a complete seal.

[6589]

A method for securely latching the doors in the fully closed position shall be provided.

[6590]

A lock and key shall be provided for each door.

[6591]

One key shall open all door locks.

[6592]

Doors shall open from the inside when padlocked on the outside.

[6593]

One or more exit(s) shall be provided for safety purposes and shall provide access to and egress from the working spaces of the shelter. Each exit shall be in accordance with best commercial standards. Location of the exit(s) shall be dictated by the interior layout of the shelter and its integration with the trailer subsystem. Marking and lighting of the exit(s) shall be provided.

[6594]

A removable end panel shall be provided for full width and height access into one end of the shelter body. The end panel shall not be used as a personnel entrance/exit.

3.7.7.1.3.5 Interior Lighting

3.7.7.1.3.5.1 Normal Lighting

[6595]

Light fixtures shall be supplied in sufficient quantity to provide lighting levels for all personnel areas in accordance with 5.8.2 of MIL-STD-1472.

[6596]

If different illumination criteria are applicable for a single area, the highest recommended illumination level shall be provided for the entire area.

3.7.7.1.3.5.2 Emergency Lighting

[6597]

Battery emergency lighting shall be provided for all personnel areas.

[6598]

This shall be furnished with a battery charger which operates from the shelter source of power.

[6599]

A method shall be provided to disable the lamps during storage and transit.

3.7.7.1.4 Environmental Conditions

[6601]

The shelters shall withstand the climatic environments specified in paragraph 3.2.5.2.1 and 3.2.5.2.2.

3.7.7.1.5 Lightning Protection

[6602]

The shelter shall be provided with lightning protection.

3.7.7.1.6 Shock and Vibration

[8538]

The AGTS Shelter configuration shall withstand the road conditions specified herein.

[8539]

The AGTS Shelter shall be designed such that it shall not be damaged, nor shall performance be degraded when it is subjected to the shock and vibrational stresses produced during transit and normal use.

[6605]

All equipment shall be secured in a manner that precludes damage and shifting during transit.

3.7.7.1.7 Environmental Control System (ECS)

[6606]

An ECS shall be provided as specified herein and under the guidance of MIL-STD-1472.

[6607]

The ECS shall automatically control the environment within the shelter when at a stationary location for training.

[6608]

The ECS shall be designed for a variable space control point temperature set by a thermostat.

[6609]

The ECS shall maintain the interior temperature at the thermostatically selected temperature (within specified tolerances) for all exterior temperatures within the extremes specified.

3.7.7.1.7.1 Maintainability

[6610]

All ECS equipment shall be maintainable without removing it from the shelter.

[6611]

Air filters shall be located in an easily accessible position for replacement and inspections.

3.7.7.1.8 Humidity Control

[6612]

A system for controlling humidity to prevent interior equipment damage during periods of storage and transit shall be provided.

3.7.7.1.9 Fire Extinguishers

[6613]

Fire extinguishers shall be furnished and shall be provided with brackets to secure the fire extinguishers during both transit and site use.

3.7.7.1.10 Alarm System

[6614]

An electronic alarm system operating from the shelter source of power or an alarm system battery back-up shall be provided in each shelter and shall sound an internal noise source in the event of a fire.

3.7.7.1.11 Telephone System

[6615]

The shelter shall contain telephone jacks and external telephone connectors to provide the capability of connecting telephone service to the shelter.

3.7.7.1.12 Electrical System

[6616]

The shelter electrical system shall provide 208/120 V ac (50/60 Hz) power from an external power source to a circuit breaker panel inside the shelter.

[6617]

A Power Monitoring system shall monitor the incoming power to the circuit breaker panel.

[6618]

Power shall be distributed from the circuit breaker panel to the shelter support system, including ECS, lighting, and electronic equipment.

[6619]

The shelter electrical system shall be installed in accordance with National Electrical Code requirements.

3.7.7.1.13 Light Switches

[6620]

Light switches shall be provided with a minimum of one per external door.

3.7.7.1.14 External Panels and Cables

[6621]

A means shall be provided at one location of the shelter for connecting power, communications, and shelter-to-shelter cabling.

[6622]

Externally mounted connectors shall be provided.

[6623]

All cable lengths shall be sufficient to meet the requirements for relocatable and mobile installation sites.

3.7.7.2 Mobility System Semitrailer

[6624]

The mobility system semitrailer shall be rated at 10 tons minimum payload capacity. The semitrailer shall not exceed 50 feet overall length.

[6625]

The trailer shall incorporate a means to secure the relocatable shelter.

[6626]

Mounting provisions to secure the Portable Power System (PPS) shall be provided.

[6627]

Two independently activated landing gears shall be provided at each end of the semitrailer.

[6628]

The trailer shall have a single dual wheeled axle with air-ride suspension at the rear and an air-ride king pin at the front.

[6629]

An air-ride upper coupler shall be provided with interchangeable 50mm and 90mm king pins.

[6630]

The semitrailer shall be equipped with lifting and tie-down fittings.

[6631]

The semitrailer shall be compliant with DOT Federal Motor Carrier Safety Regulations in effect at the date of manufacture.

[6632]

When set-up at a mobile site and when being transported as cargo by ship and rail, the tie-down attachments shall prevent the fully loaded semitrailer from tipping and falling over due to wind speeds up to and including 202 Km/hr (125 mph).

[6633]

Tiedowns shall include the attachment points on each semitrailer and the cables, chains, straps, or other means of tying down each semitrailer.

[6634]

Air transport tiedown rings shall be applicable for the C-5A aircraft, five each side.

[6635]

Maximum Shipping Weight (MSW) shall be defined as the GVW of the semitrailer.

[6636]

The safety restraints around the gooseneck platform shall be designed per OSHA 1926.502.

[6637]

The Mobility System Semitrailer shall be designed and built for internal air transport in the C-5A in accordance with MIL-HDBK-1791, with the capability of being on/off-loaded in a C-5A without the aid of a shoring kit.

3.7.7.2.1 External Platforms, Railings and Stairways

[6638]

External platforms, railings, and stairways shall be provided for access to and egress from the shelter doors which serve as entrance/exit doors.

[6639]

The platforms, railings, and stairways shall be in accordance with MIL-STD-1472.

3.7.7.2.2 Portable Power System (PPS)

[6640]

The PPS shall provide the power source switching capability in accordance with 3.2.2.5.

[6641]

The PPS electrical generation capability shall be provided by a commercial power generator. One or more auxiliary power connections will be provided.

[6642]

The power generator shall be a unit rated at 45 kW (Prime), 50 kW (Standby), 120/208 volts, 3-phase, 60 Hz.

[6643]

The generator shall have standard noise and smoke reduction techniques for mobile generators.

[6644]

Noise control shall include the use of a critical-grade (tuned) exhaust silencer.

[6645]

The power generator shall use turbo-charging to improve combustion efficiency.

[6646]

Sufficient fuel capability shall be provided for a 12 hour period of operation.

[6647]

The fuel shall be stored in a base-mounted tank.

[6648]

The PPS transformer/switch gear shall be configured to provide the trainer shelter subsystem and HVAC configuration their power requirements, as defined in paragraphs 3.2.2.5.2 and 3.7.7.2.3.

3.7.7.2.3 Heating, Ventilation, and Air Conditioning (HVAC) Provisions

[6649]

The rear wall of the AGTS shelter shall provide for securely mounting the HVAC configuration.

[6650]

The PPS shall be configured to provide a 208/230 volt 3-phase feed to the HVAC unit(s).

[6651]

The operating temperature and humidity range in the shelter shall be set and monitored within the shelter. It is the operator's responsibility to maintain the training equipment operational climatic environment.

3.7.7.3 Integrated Mobility Subsystem

3.7.7.3.1 Semitrailer

[10221]

The semitrailer interior shall consist of the following areas:

- Training Area
- Generator Room
- Maintenance Room

[10222]

For the crew training configuration, the semitrailer interior training area shall provide housing for the following major items:

- AGTS Crew Station
- IOS / Driver Station
- IG Rack

[10223]

The semitrailer interior generator room shall provide housing for the following major items:

- Power Generator

[10224]

The semitrailer interior maintenance room shall provide housing for the following major items:

- Cabling and Transformer (service side of switch gear)
- Access to Generator
- Generator Spares

[10225]

The semitrailer shall be rated at 4 tons minimum payload capacity.

[10226]

The semitrailer shall be equipped with dual aluminum wheels on the axle.

[10227]

The semitrailer shall not impose a total single axle loading in excess of 20,000 lbs (9,072 Kg) when fully loaded.

[10228]

The semitrailer shall be equipped with tie-down and lifting fittings.

[10229]

Air transport tie-down rings shall be applicable for the C-5A and C-17 aircraft. Eight (8) tie-down rings shall be provided, consisting of four (4) tie-down rings on each side of the semitrailer.

[10230]

When set-up at a mobile site and when being transported as cargo by ship and rail, the tie-down attachments shall prevent the fully loaded semitrailer from tipping and falling over due to wind speeds up to and including 125 mph (202 Km/hr).

[10231]

The semitrailer shall be equipped with four (4) lifting fittings, consisting of one lifting ring located near each corner of the semitrailer.

[10232]

The semitrailer shall be equipped with an air-ride upper coupler with 50mm king pins.

[10233]

The semitrailer shall provide a 100 gallon minimum fuel tank with a containment structure.

[10234]

The semitrailer shall provide storage compartment(s) for the stairs, railings and platforms.

[10235]

Exterior lighting shall be supplied in sufficient quantity to provide a minimum of four lights for the set up and dismantling of the configuration and for night operations.

[10236]

The semitrailer shall be compliant with Department of Transportation (DOT) Federal Motor Carrier Safety Regulations in effect at the date of manufacture.

[10237]

The design and construction of the LED lamps shall be in accordance with DOT Federal Motor Carrier Safety Regulations.

[10238]

Requirements and placement of lamps, reflectors, and electrical wiring shall conform to DOT Federal Motor Carrier Safety Regulations. Electrical wiring shall conform to SAE J1292.

[10239]

Drum brakes shall be provided for the semitrailer.

[10240]

Service brakes shall comply with the performance requirements of DOT Federal Motor Carrier Safety Regulations and the SAE Handbook.

[10241]

Parking brakes shall be provided for the semitrailer in accordance of DOT Federal Motor Carrier Safety Regulations with the following exception: parking brakes shall hold the semitrailer, with rated payload, on a 20 percent grade despite the depletion of the compressed air supply.

[10242]

Four independently activated landing gears shall be provided on the semitrailer.

[10243]

The semitrailer shall be supplied with landing gear in accordance of DOT Federal Motor Carrier Safety Regulations with the following exceptions: each leg shall operate independently; and landing legs shall be equipped with self-leveling skid pads.

[10244]

The semitrailer shall have a minimum of four level indicators attached near each corner of the trailer to adjust the level of the semitrailer.

[10245]

The semitrailer shall be able to be towed and backed-up when coupled to a towing vehicle.

[10246]

The identification marking, data plates, and registration numbers shall be in accordance with DOT Federal Motor Carrier Safety Regulations.

[10247]

The exterior shall be painted white with Imron 5000 or equivalent polyurethane finish system.

[10248]

Labels pertaining to safety shall be provided for the semitrailer in English language.

[10249]

The front of the semitrailer shall be equipped with a 7 contact, 12VDC receptacle conforming to SAE J560 with the connectors connected and color coded as specified therein. The receptacle shall be provided with a spring loaded cover. The receptacle shall be located in accordance with SAE J702.

[10250]

The front of the semitrailer shall be equipped with a 24 to 12 V converter for use on a 24V Military Tractor (12-pin NATO input connector) or a 24V European Commercial Tractor (7-pin SAE 560 input connector). Both input connectors shall have a spring loaded cover. The output of the converter shall be 12VDC via a plug at the end of a cable which mates with the 12V 7-pin SAE 560 receptacle on the trailer.

3.7.7.3.1.1 Semitrailer Size

[10252]

The exterior dimensions for the Integrated Mobile Subsystem (IMS) shall not exceed 32.5 feet long (not including the HVAC units) by 102 inches wide (excludes lights/reflectors, etc.) by a maximum of 155 inches high (not including exhaust).

[10253]

The interior dimensions for the Integrated Mobile Subsystem (IMS) AGTS training area shall be a minimum of 264 inches (22 feet) long by 95 inches (7.91 feet) wide by 97.5 inches (8.13 feet) high (excluding outlets, ducts, wire ways, e-track, etc).

[10254]

Interior semitrailer height - the distance from the floor to the bottom of lights, cable runs, and other protuberances over the aisles and standing workspaces - shall not be less than 78 in (1.981 m). However, in areas where the occupants seldom stand to perform normal operations, the ceiling height may be reduced to 74.5 in (1.893 m), unless otherwise directed by the Government.

3.7.7.3.1.2 Body Construction

[10255]

Semitrailer body construction shall be in accordance with best commercial standards and as specified herein.

3.7.7.3.1.2.1 Thermal Protection

[10256]

The entire semitrailer shall be insulated to with a minimum R-10 ($U = 0.10$), except the two personnel doors shall be a minimum R-7 ($U=0.14$).

[10257]

The insulation material shall be a non-hygroscopic, self-extinguishing, cellular material and shall be resistant to the growth of fungus and the retention of vermin.

[10258]

The insulation shall be sealed and bonded at all joints.

[10259]

The insulation shall be anchored to prevent sag and insulation voids.

3.7.7.3.1.3 Interior Construction**3.7.7.3.1.3.1 Walls and Partitions**

[10260]

The interior walls and partitions shall be securely fastened in place.

[10263]

Wall material shall be white.

[10261]

The internal tie down system shall utilize E-Track.

3.7.7.3.1.3.2 Ceiling

[10262]

The ceiling material shall be white.

3.7.7.3.1.3.3 Floors

[10264]

The interior floor shall provide a safe walking surface free of hazards.

3.7.7.3.1.3.4 External Doors

[10265]

The minimum opening for personnel access shall be 76 in (1.93 m) high and 30 in (760 mm) wide.

[10266]

The semitrailer shall be provided with front and rear cargo doors. The front and rear doors shall not be used as a personnel entrance or exit.

[10267]

Door gaskets shall be installed to provide a complete seal.

[10268]

Internal door shall be white.

[10269]

A method for securely latching the doors in the fully closed position shall be provided.

[10270]

A lock and key shall be provided for each door.

[10271]

Doors shall provide safeguards to prevent an individual from being trapped inside.

[10272]

One or more exit(s) shall be provided for safety purposes and shall provide access to and egress from the working spaces of the semitrailer.

[10273]

Each exit shall be in accordance with best commercial standards.

[10274]

Location of the exit(s) shall be dictated by the interior layout of the semitrailer and its integration with the semitrailer.

[10275]

Marking and lighting of the exit(s) shall be provided.

3.7.7.3.1.3.5 Interior Lighting

3.7.7.3.1.3.5.1 Normal Lighting

[10276]

Fluorescent light fixtures shall be supplied in sufficient quantity to provide lighting levels to the training area.

3.7.7.3.1.3.5.2 Emergency Lighting

[10277]

Battery emergency lighting shall be provided to the training area.

3.7.7.3.2 Environmental Conditions

[10278]

The integrated mobility subsystem shall withstand the climatic environments specified in paragraph 3.2.5.4.1 and 3.2.5.4.2.

3.7.7.3.3 Lightning Protection

[10279]

The integrated mobility subsystem shall provide lightning protection with a single exterior ground point separate from the equipment ground.

3.7.7.3.4 Shock and Vibration

[10280]

The integrated mobility subsystem shall be designed such that it shall not be damaged, nor shall performance be degraded when it is subjected to the shock and vibrational stresses produced during transit and normal use.

[10281]

All equipment shall be secured in a manner that precludes damage and shifting during transit, excluding unfastened items such as IOS work surface (i.e. monitors, keyboards, chairs, etc.).

3.7.7.3.5 Environmental Control System (ECS)

[10282]

An HVAC shall be provided as specified herein. The HVAC shall automatically control the environment within the semitrailer when at a stationary location for training.

[10283]

The HVAC cooling unit(s) shall consist of at least the following basic components:

- Compressor,
- Condenser coil and fan,
- Evaporator coil and fan,
- All necessary controls, piping, valves, and refrigerants required for normal operation.

[10284]

The HVAC shall be able to operate on 208 +/-10% V 3-phase 50/60 Hz input power.

[10285]

The HVAC control thermostat shall have a +/-2.0 deg. F response differential. Control set-point shall be adjustable.

[10286]

Training shall take place, without degradation, within the semitrailer when outside ambient temperatures and humidity are within the following extremes:

- a. Low temperature extreme: -40deg. F with no solar load.
- b. High temperature extreme: +125 deg. F plus a solar load of 1120 Watts per square meter (W/m²) (355 BTU/ft²/hr) on the semitrailer exterior skin.
- c. Relative Humidity: 0% to 95% non-condensing for temperatures below 80 deg. F; and as characterized by a curve connecting the following data points extracted from MIL-STD-210C for temperatures in the range of +80 deg. F to +125 deg. F.

Temperature in deg.F	Relative Humidity
80	95%
86	90%
105	60%
115	20%
125	0%

3.7.7.3.5.1 Maintainability

[10287]

Power Generator shall be maintainable without removing it from the semitrailer.

[10288]

All HVAC equipment shall be maintainable without removing it from the semitrailer.

3.7.7.3.6 Dehumidification

[10289]

A dehumidifier shall be provided for controlling excess humidity to prevent interior equipment damage during periods of storage and operation.

3.7.7.3.7 Fire Extinguishers

[10290]

Fire extinguishers shall be furnished and provided with brackets to secure the fire extinguishers during both transit and site use. The semitrailer shall provide a fire extinguisher at each personnel door.

3.7.7.3.8 Hazard Detection System

3.7.7.3.8.1 Smoke Detector

[10293]

Smoke detectors shall be provided which shall detect the onset of a possible emergency.

[10294]

Components used in the smoke detector shall be UL approved.

[10295]

Smoke detectors shall be provided in quantity of one in the Maintenance Room and at least one in the Training Room.

[10296]

Smoke detectors shall be wired into the Emergency Power Off (EPO) circuitry. Activation of the smoke detector alert shall initiate EPO.

3.7.7.3.8.2 Carbon Monoxide Detection System

[10297]

A Carbon Monoxide (CO) Detection System shall be provided which shall detect the onset of a possible emergency.

[10298]

A CO detector shall be provided in the Maintenance Room and in the Training Area.

[10299]

The CO detector shall be wired into the Emergency Power Off (EPO) circuitry. Activation of the CO alert shall initiate EPO.

[10300]

The CO detector shall generate an audible alert when a minimum threshold level of CO is detected.

[10301]

Components used in the CO Detection System shall be UL approved.

3.7.7.3.9 Electrical System

[10302]

A 208V 3-phase / 120V, 50/60 Hz electrical system shall be installed in the semitrailer in accordance with the National Electric Code (NFPA 70-1990) and as specified herein.

[10303]

The semitrailer shall be capable of accepting 480 +/-10% V, 400 V +/-10% or 208 V +/-10% 3-phase, 50/60 Hz electrical shore power.

[10304]

A Power Monitoring system shall monitor the incoming power to the circuit breaker panel.

[10305]

The semitrailer shall be provided with circuit breaker(s) in accordance with NFPA 70-1990.

[10306]

The following shall be provided:

- a. Power for lighting and electrical receptacles as necessary for maintenance equipment.
- b. Extra electrical receptacles, in addition to those necessary for computers and equipment, a minimum of four per compartment.
- c. Light switches, to operate the interior semitrailer lighting, a minimum of one per external door.

[10307]

The integrated mobility subsystem shall provide a single equipment ground stud (external).

[10308]

The site will provide facility earth ground system with a maximum resistance to the earth of 20 ohms.

3.7.7.3.10 Light Switches

[10309]

See Section 3.7.7.3.9 Electrical System.

3.7.7.3.11 External Panels and Cables

[10310]

A means shall be provided at one location of the semitrailer for connecting semitrailer-to-semitrailer network communication.

[10311]

Externally mounted connectors shall be provided to connect multiple semitrailer network communications.

3.7.7.3.12 External Platforms, Railing and Stairways

[10314]

External platforms, railings, and stairways shall be provided for access to and egress from the semitrailer doors which serve as personnel entrance/exit doors.

[10315]

The platforms, railings, and stairways shall be in accordance with OSHA Standards 1910.23 and 1926.1052 and MIL-STD-1472. OSHA standards shall have precedence over MIL-STD-1472.

3.7.7.3.13 Portable Power System (PPS)

[10316]

The PPS shall provide the power source switching capability between Generator Set and Shore Power.

[10317]

The power generator shall consist of a single unit rated at 32 KW continuous / 35 KW standby (peak), 208 volts, 3-phase 60 Hz.

[10318]

The noise produced by the PPS shall be less than 85dB at 1 meter and less than 70 dB at the IOS at maximum load.

[10319]

The power generator shall have standard noise reduction and vertical exhaust no lower than 2 inches below the roof line.

3.7.8 COMPUTER GENERATED FORCES CAPABILITY

[8540]

This Section or Platoon configured AGTS shall provide capability of running section or platoon exercises in free movement against Computer Generated Forces (CGF).

[6653]

CGF are automated forces which follow a specific set of rules to replicate the simulated vehicle or units.

3.7.8.1 CGF GENERATION

[9720]

The system shall provide the capability to create CGF forces interactively. CGF are controlled by the CGF operator based on the level of training required. CGF can be enemy or friendly vehicles or units. CGF targets have the restriction that they are not located within other models, such as buildings.

[10455]

CGF shall have the capability of selecting from the following types of models:

Moving Models (see 3.7.2.7.1)

Relocatable Models

- Destroyed Car Piles
- Pile of Tires
- Jersey Walls
- Tree Logs
- Jacks

CGF is not required to support life form models.

[10454]

The AGTS/CGF system shall provide 50 CGF targets active (alive and dead) at one time.

3.7.8.2 CGF EXERCISE CHARACTERISTICS

[5635]

Exercise files will be used to define initial starting positions and all of the defensive positions utilized within the planned area of operation, so that all battle positions shall be enabled for capture/release in a Section/Platoon Free Movement-CGF exercise. Free movement capability will provide flexibility in which defensive positions are used, and in which order.

[6655]

Section or Platoon exercises shall be run applying current terrain following capability for both ownvehicles and CGF targets.

[5637]

The AGTS/CGF system shall provide capability of engaging and killing CGF targets.

[6656]

Special effects shall be the same as provided in section and platoon mode on AGTS.

[5639]

CGF shall determine the hit/kill effects on the targets. Hit plates shall be used to determine if a target is hit, however, the CGF program shall determine the effect of the hit(s).

[5640]

In offensive situations, ownvehicles shall be killed if they are hit and ownvehicle hit criteria determines that kill conditions are met.

[5641]

There shall be no enemy artillery fire effects initiated from CGF targets.

[5642]

Ammunition transfers shall not be limited by no active target conditions.

[5643]

Incoming fire from CGF targets shall provide near miss effects, but their placement and detonation shall be controlled by CGF and limited to one near miss active at any time per vehicle.

3.7.8.2.1 CGF Target Scenario Capability

[9722]

The CGF target list shall be the same as the Stryker AGTS database vehicle target list

[5646]

The capability of running exercises with varying numbers of CGF forces shall be provided.

[5647]

CGF targets will be loaded and remain within the gaming areas of the databases.

[6663]

The maximum number of CGF generated targets per exercise is 150.

[5649]

Enemy targets will be selectable within AGTS/CGF.

[5650]

CGF Indirect fire shall be available and use the current AGTS special effects.

[5651]

AGTS shall support processing of CGF generated minefield detonations received by an AGTS ownvehicle. The minefield detonation shall be processed as an ownvehicle hit.

3.7.8.2.2 User Interface

[5653]

The CGF mode shall be enabled using the host initialization menu.

[9214]

The CGF mode will be under freeze/unfreeze control from the section or platoon AGTS controls.

[5655]

The CGF program shall not provide dual language capability.

[5656]

The CGF program will not provide report capability.

[5657]

Shot pattern capability shall be inhibited.

[9215]

Section and platoon scoring in the host computer shall be disabled in CGF mode.

[9721]

The CGF workstation shall be located in the PAAR station area. The PAAR shall provide the same capability as in section/platoon mode on AGTS.

[5660]

Radio communication is not required at the CGF station.

4 QUALITY ASSURANCE PROVISIONS

4.1 GENERAL

[5716]

A Quality Assurance Program shall be implemented to ensure that the inspections and tests performed verify design conformance with requirements of Section 3.

4.1.1 RESPONSIBILITY FOR TESTS

[6667]

All items must meet the requirements of sections 3, 5 and appendices of the specification. The inspections set forth in the specification shall become part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to the acceptance of defective material.

4.1.2 CLASSIFICATION OF VERIFICATION METHODS

4.1.2.1 CLASSIFICATION OF VERIFICATION METHODS

[5720]

The verification methods to be used are defined in the following paragraphs.

4.1.2.2 EXAMINATION (E)

[5722]

Examination is the physical inspection of documentation, hardware or software to verify conformance to specified requirements. Examination may be used to check adequacy of design documentation to applicable specifications, and conformance of hardware and software to design documentation and applicable standards.

4.1.2.3 ANALYSIS (A)

[5724]

Analysis is the use of recognized analytical techniques (including computer models) to interpret or explain equipment performance, personnel behavior or test data.

4.1.2.4 DEMONSTRATION (D)

[5726]

Demonstration is the performance of the actual function of the product, usually system or man-system level where visual observation is the primary means of verification. Demonstration is used when quantitative assurance is not required for verification.

4.1.2.5 TEST (T)

[5728]

Test is an activity designed to provide data in an operational environment. The data is subsequently used to evaluate quantitative product performance and effectiveness characteristics. Evaluation includes comparison of the demonstrated characteristics with requirements. Tests are conducted when an acceptable level or confidence cannot be established by other methods or if testing can be shown to be the most cost-effective method.

4.1.2.6 CERTIFICATION (C)

[5730]

The contractor shall provide a certification to verify that the requirement has been met. Certifications must include documented test results, performance data, analytical data, or vendor documentation. The certifications must be made available to the Government representative immediately upon request for review during inspections.

4.1.3 AMBIENT CONDITIONS

[5732]

Standard ambient conditions for room conditions at test facilities shall be as defined in paragraph 4.4 of MIL-STD-810.

4.1.4 CLASSIFICATION OF INSPECTIONS

[5734]

The specified quality conformance inspections are classified as follows:

- a. Subcontractor/Vendor Acceptance Testing (S/VAT) - 4.2.1
- b. Contractor Engineering Verification Tests (CEVT) - 4.2.2
- c. Government Functional Mission Evaluation (GFME) - 4.2.3
- d. On-site Testing (OST) - 4.2.4

The verification of requirements allocated to these inspections are identified in the Requirements Verification and Test Matrix (RVTM) or equivalent, included in the Coordinated Test Plan.

4.1.4.1 TEST PROCEDURES

[5741]

Test procedures shall be prepared by the contractor for approval by the Government.

[5742]

These test procedures shall incorporate the quality conformance inspection requirements and methods specified herein.

4.1.4.2 TEST LOG

[5744]

The contractor shall maintain a test log of all new AGTS subsystem and system tests conducted in-plant.

[5745]

The test log shall contain information by date, as to the equipment activated, maintenance performed including adjustments and alignments, equipment failure, redesign and replacement.

[5746]

The contractor shall present the information in the log to help the Government technical representative determine that the maintenance, alignment or replacement has not invalidated previously completed tests.

[6671]

The log shall be made available to the Government technical representative.

4.1.4.3 TEST REPORTS

[5748]

Engineering test reports shall be prepared listing conclusions, results and supporting data.

[5749]

The quantitative and qualitative data derived from acceptance testing shall be reviewed to insure that data recorded includes procedure step number, measurement ranges with tolerances (where applicable), type of sensitivity, test configuration, serial number and test data. Signatures of the Test and Quality representatives shall be required on the data sheets for test verification.

[9140]

The test data sheets and the as-run procedure shall be subjected to an audit at the completion of the test to determine that all procedural requirements were met during testing.

4.1.5 PERSONNEL AND MATERIAL

[5751]

The contractor shall support the daily conduct of the test process.

[5752]

Support shall include sufficient technical personnel to supplement the Government test team to accomplish test set-up, establish initial conditions, monitor maintenance of test articles, provide the support package for the system and provide adequate training to the test personnel prior to the Test Readiness Review (TRR).

[5753]

The contractor shall provide all equipment and material to conduct and support all AGTS tests and evaluations.

4.1.6 CONTRACTOR FURNISHED INSPECTION EQUIPMENT

4.1.6.1 CONTRACTOR DESIGN

[5756]

The contractor shall design and supply inspection equipment.

[5757]

Since tolerance of test equipment is considered normally within 10 percent of the product tolerance for which it is intended, this inherent error in the test equipment design must be considered as part of the prescribed product tolerance limit. Thus, concept, construction, materials, dimensions and tolerances used in the design of the test equipment shall be so selected and controlled as to ensure that the test equipment will indicate reliable acceptance of a product that does not exceed 90 percent of the prescribed tolerance limit and permit positive rejection when nonconforming.

[5758]

Construction shall be such as to facilitate routine calibration of the test equipment.

4.1.6.2 TEST FACILITIES

[5760]

The contractor shall ensure that the test and inspection facilities are of sufficient accuracy, quality, and quantity to permit the performance of required examinations, analyses, demonstrations and tests to ensure that the AGTS meets the requirements of this specification.

4.2 QUALITY CONFORMANCE INSPECTIONS

4.2.1 S/VAT

[5763]

Subcontractor/Vendor Acceptance Testing will be used to verify system design and performance end-item requirements as applicable.

[5764]

S/VAT will verify system requirements flowed down to subcontractors and vendors via lower tier specifications.

4.2.2 CEVT

[5766]

CEVT will be used to verify system requirements utilizing system test procedures where applicable. New procedures will be developed where existing procedures are insufficient.

[5767]

Government test personnel and SME's will be used extensively during the development and integration phase to support verification activities.

[5768]

Contractor Test Engineering will work with the development/integration team to incrementally verify system performance requirements.

[5769]

As requirements are verified the test will be documented and whenever possible not repeated during subsequent tests.

[5770]

Testing activities and development of procedures will be coordinated efforts between the contractor and the Government.

[5772]

Discrepancies will be documented on IPRs and maintained on the PPR system.

[5773]

Software build and test activities will be coordinated, documented efforts which will eliminate the need for cold start.

[6676]

Software build and test activities will be coordinated between the contractor and the Government. At the conclusion of the final CEVT an engineering cold start of the initial software baseline shall be performed.

[6677]

A Safety test shall be run as part of CEVT.

[5774]

In-process inspections shall include inspection and examination of materials, subassemblies, parts and accessories during the manufacturing process of each AGTS device to ensure compliance with the design and construction requirements of this specification.

[5775]

The inspection of the preservation and packaging, and interior package marking shall be in accordance with the requirements of MIL-STD-2073-1. The inspection of the packing and marking for shipment shall be in accordance with the quality assurance provisions of the applicable container specification and marking requirements of MIL-STD-129.

4.2.3 GFME

[5777]

GFME will be conducted following completion of CEVT and a Test Readiness Review (TRR).

[5778]

Procedures for the GFME will be developed by the contractor in coordination with Government test and SME personnel.

[5779]

Procedures will be developed from the AGTS test procedures and system requirements.

[5780]

GFME will be scheduled to include "free test" time for the Government test team.

[5781]

Discrepancies will be documented and tracked on the PPR system.

4.2.4 OST

[5783]

OST will include Safety and Facility interface testing.

[5784]

Functional tests will be performed to ensure proper installation and operation.

[5785]

Discrepancies will be documented and tracked on the PPR system.

4.3 REQUIREMENTS VERIFICATION

[9723]

The Stryker MGS AGTS System Test RVTM contains the requirements of Section 3 with the verification method for each of the Stryker MGS AGTS unique requirements. This RVTM will be provided for customer review, following the baseline Stryker MGS AGTS Prime Item Development Specification (PIDS) approval.

5 PREPARATION FOR DELIVERY

5.1 PRESERVATION, PACKAGING, AND PACKING

[6683]

The trainer shall be packaged, packed, and marked in a manner that will ensure acceptance by common carrier and safe delivery at destination.

APPENDIX I MATERIALS, PROCESSES AND PARTS

10 APPENDIX I - MATERIALS, PROCESSES AND PARTS

10.1 SCOPE

10.1.1 IDENTIFICATION

[6698]

This section establishes the requirements governing the use of materials, processes and parts to be used in the design of the AGTS.

10.2 REQUIREMENTS

10.2.1 MATERIALS

[6701]

Materials shall be selected which will assure compliance with the performance requirements of this specification.

10.2.2 PROCESSES

[6703]

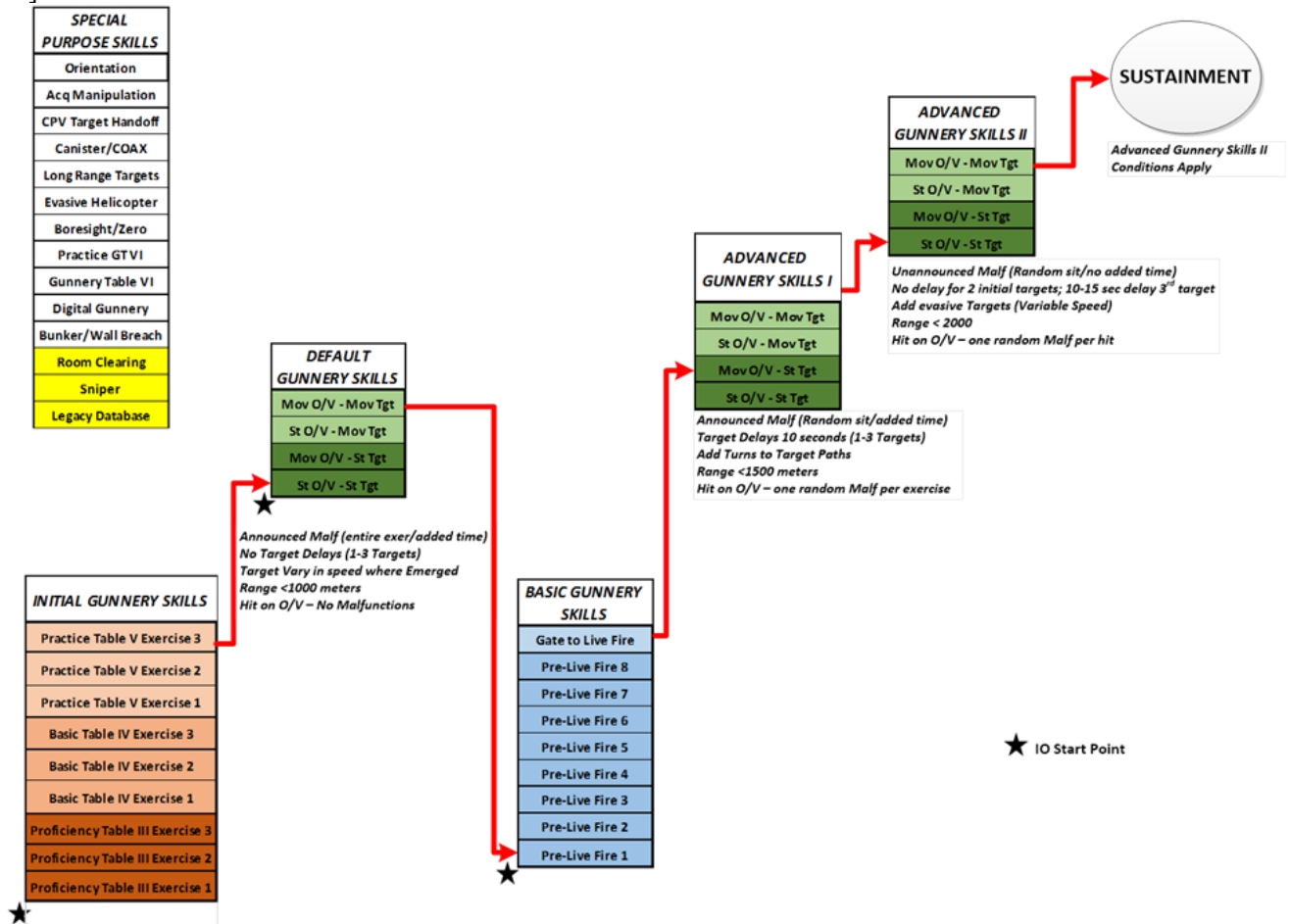
Processes shall be selected which will assure compliance with the performance requirements of this specification.

10.2.3 PARTS

[6705]

Parts other than NDI, COTS and GFE equipment shall be subject to the Class A derating criteria of AS-4613. The semiconductor junction temperatures for electronic devices under worst-case circuit and environmental conditions shall be derated to 100 degrees centigrade.

[10761]



20.1 Special Purpose Exercises

[10529]

Special purpose exercises shall be selected by the Instructor / Operator (I/O) to support specific objectives and are not included in computer recommended progression.

[10959]

Special Purpose exercises shall be introductory in content, involving special tasks that shall not be required to pass.

[10960]

For Special Purpose exercises, the standard ammunition load, distribution per 20.4.1.6 and replenishment shall be as defined in paragraph 20.4.1.7 unless it is specified within a special purpose skill.

20.1.1 Special Purpose - Legacy Database Exercises

[10809]

Legacy exercises within the Special Purpose menu shall be selected by the Instructor / Operator (I/O) to support specific objectives and are not included in computer recommended progression.

20.1.2 Special Purpose - Orientation/Familiarization

[10533]

An Orientation / Familiarization exercise shall be provided to introduce crews to the MGS AGTS simulation and demonstrate the visual and aural effects of the trainer.

[10534]

The exercises shall demonstrate the following conditions, components, actions and functions:

- a. Day unlimited visibility
- b. Day limited visibility
- c. TIS imagery
- d. Vehicle motion and engine sound
- e. Gunner's station (components, controls and sights)
- f. Commander's station (components, controls and sights)
- g. Target types
- h. Target hit / kill
- i. Main gun fire and hit / miss with SABOT
- j. Main gun fire and hit / miss with HEAT
- k. Main gun fire and hit / miss with HEP
- l. Main gun fire and hit / miss with Canister (percentage based)
- m. Coax firing
- n. Enemy firing
- o. Enemy artillery fire
- p. Enemy tank fire
- q. Target motion
- r. Ownvehicle smoke grenades
- s. Ownvehicle movement
- t. Ownvehicle hit and kill
- u. Enfilade - defilade movement

20.1.3 Special Purpose - Acquisition/Manipulation

20.1.3.1 Gunner - Acquisition/Manipulation

[10545]

Exercises shall be provided which are designed to teach acquisition and manipulation skills. Two exercise shall be fully operational for the Commander. Two exercises shall have a Stab and lead failure for the Gunner.

20.1.3.2 Commander - Acquisition/Manipulation

[10547]

Exercises shall be provided which are designed to teach acquisition and manipulation skills using the CDU, day sight and thermal, CPV or Aux fire control system.

20.1.4 Special Purpose - Crew CPV Target Handoff

[10560]

Exercises shall be provided which are designed to teach the commander and gunner the proper fire commands and methods of acquiring targets with the CPV and to teach handing targets off to the gunner.

20.1.5 Special Purpose - Canister/Coax Gunnery

[10561]

Four coax machine gun and/or canister exercises for the crew shall be provided to include sniper and RPG target engagements. These exercises shall be scored based on iCTP.

[10562]

Canister/Coax Special Purpose exercises shall be provided with one exercise in Arab MOUT database (Day), two exercises in the Korea database (one Day and one Night) and one in the USMC MOUT database (Day).

[10563]

The CANISTER/COAX exercises shall have a full array of target types presented for CANISTER/COAX training.

[10564]

For the CANISTER/COAX special purpose exercises, the ammo load shall be tailored for CANISTER/COAX engagements.

[10565]

There shall be eight CAN rounds in the Carousel, 500 COAX rounds in the ammo ready box, and 1200 coax rounds in the hull. There shall be ten CAN rounds loaded in the Replenisher and ammunition available externally.

20.1.6 Special Purpose - Long Range Gunnery

[10551]

Four exercises which include both day and night situations shall be provided to train long range gunnery skills.

[10552]

Targets shall range from 1000 m to 2700 m in preprogrammed exercises.

20.1.7 Special Purpose - Evasive Helicopter

[10549]

Four exercises shall be provided to train the task of engaging low flying helicopters that use evasive techniques.

20.1.8 Special Purpose - Crew Station Preparation

[10536]

Two Crew Station Preparation exercises shall be provided for training crews in the correct setting of knobs, switches, and controls in the vehicle at the beginning of the training session.

[10537]

The exercise shall require the crew to perform the following tasks:

- a. Conduct MGS boresight
- b. Conduct main gun and coax zero procedure
- c. Perform CCF determination

[10538]

Crew Inputs shall only be applicable to the current exercise.

[10539]

Boresight loss shall be simulated in the Stryker MGS trainer. Boresight loss shall start after firing the third round.

[10540]

If the MRS is not updated after firing the sixth round, the crew shall receive an MRS Update error "U".

[10541]

Boresight loss shall not be carried forward to the next exercise.

[10542]

Boresight functions which are performed external to the gunner and commander's stations shall be portrayed as having been completed at the appropriate place in the exercise.

[10543]

The exercises shall provide the appropriate targets at the required range for the performance of the boresighting and zeroing tasks.

20.1.9 Special Purpose - Practice Gate-To-Live-Fire Task

[10554]

Twenty-six Gate-To-Live-Fire Task practice exercises shall be selectable. The exercises shall be scored based on TC 3-20.31. Each exercise shall train one Gate-To-Live-Fire Task, and be composed of three situations.

[10555]

The exercises shall only be logged in student records if the crew is running with a valid Vehicle ID.

20.1.10 Special Purpose - Digital Gunnery

[10567]

Four digital message exercises shall be provided which present battlefield situations that require the crew and I/O to generate and respond to FBCB2 digital messages.

20.1.11 Special Purpose - Bunker Busting and Wall Breaching

[10569]

Exercises shall be provided to train crews on the skills of wall breaching and bunker busting. Scoring shall be unique to these two types of engagements.

[10570]

Bunker Busting/Wall Breaching Special Purpose exercises shall be provided with two exercises in Arab MOUT database (one Day and one Night), one exercise in the Korea database (Day) and one exercise in the USMC MOUT database (Day).

[10571]

For the Bunker Busting/Wall Breaching special purpose exercises, the ammo load shall be tailored for Bunker Busting/Wall Breaching engagements.

[10572]

There shall be six HEP and two HEAT rounds in the Carousel and 500 COAX rounds. There shall be eight HEP and two HEAT rounds loaded in the Replenisher or available externally.

20.1.12 Special Purpose - Room Clearing

[10763]

Four (4) room clearing engagement exercises shall be provided. Two of the exercises shall be in the AGTS Urban 1 database (urban desert) and two of the exercises shall be in the AGTS Urban 2 database (urban woodland).

[10860]

The room clearing engagement shall be successfully completed when one HEP round hits the building and kills the room clearing target. The room clearing target kill time shall be applied to iCTP Scoring evaluation, as described in 3.7.3.2.6.2 - Scoring Criteria for Default and Advanced Gunnery Skills.

Targets other than room clearing targets will be scored IAW iCTP scoring criteria.

[10861]

The ammo count for room clearing exercises shall be the following:

- Carousel: 4 HEP, 3 HEAT and 1 CAN
- Replenisher: 5 HEAT and 5 HEP
- Truck: 5 HEAT and 5 HEP
- 500 COAX rounds in the turret
- 1200 COAX rounds in the hull

20.1.13 Special Purpose - Sniper

[10765]

Four (4) sniper engagement exercises shall be provided.

[10766]

One exercise shall use the USMC MOUT database, and three exercises shall use the Arab MOUT database.

20.2 Initial Gunnery Skills

[10768]

Initial Gunnery Skills program trains those tasks defined in TC 3-20.31 Crew Tables III-V, Crew Qualification where the weapon employed is the main gun, coax machine gun or a combination of both. Initial Gunnery Skills is an entry point to iCTP. Initial Gunnery Skills will progress a crew to pass all exercises within Initial Gunnery Skills of Proficiency, Basic and then Practice exercises before advancing a crew to Basic Gunnery Skills.

[10780]

Crews shall execute their tasks in offensive and defensive postures within the exercise.

20.2.1 Initial Gunnery Skills - Proficiency Exercises

[10770]

Initial Gunnery Skills Proficiency exercises shall have 3 exercises that contain 10 situations each that is based on specific objectives from TC 3-20.31 Crew Table (CT) III.

[10771]

Proficiency exercises shall evaluate the crew's ability to engage stationary and/or moving targets placed during day and limited visibility conditions with a fully operational of simulated degraded fire control system, as applicable.

20.2.2 Initial Gunnery Skills - Basic Exercises

[10774]

Initial Gunnery Skills Basic exercises shall have 3 exercises that contain 10 situations each that is based on specific objectives from TC 3-20.31 Crew Table IV.

[10775]

Basic exercises shall evaluate the crew's ability to engage stationary and/or moving targets placed during day and limited visibility conditions with a fully operational or simulated degraded fire control system, as applicable.

20.2.3 Initial Gunnery Skills - Practice Exercises

[10778]

Initial Gunnery Skills Practice exercises shall have 3 exercises that contain 10 situations each that is based on specific objectives from TC 3-20.31 Crew Table V.

[10779]

Practice exercises shall evaluate the crew's ability to engage stationary and/or moving targets placed during day and limited visibility conditions with a fully operational or simulated degraded fire control system, as applicable.

20.2.4 Initial Gunnery Skills - Ammunition Allocations

[10782]

The Initial Gunnery Skills exercises shall provide the following ammunition allocations which are identified by the per Crew Table III, IV and V:

Proficiency Crew Table III:

- 650 Coax
- 2 Sabot
- 7 HEAT
- 4 HEP
- 1 Canister

Basic Crew Table IV:

- 550 Coax
- 2 Sabot
- 4 HEAT
- 2 HEP
- 1 Canister

Practice Crew Table V:

- 600 Coax
- 2 Sabot
- 7 HEAT
- 2 HEP
- 1 Canister

20.2.5 Initial Gunnery Skills - Targets

[10991]

Targets for Initial Gunnery Skills shall be defined in paragraph 20.3.4 - Basic Gunnery Skills - Targets.

20.3 Basic Gunnery Skills

[10516]

Basic Gunnery Skills program trains those tasks defined in TC 3-20.31 Crew Tables VI. Crew Qualification where the weapon employed is the main gun, coax machine gun or a combination of both.

20.3.1 Basic Gunnery Skills - Pre-Live-Fire

[10955]

Eight (8) scripted Basic Pre-Live-Fire (BPLF) exercises shall be provided to train the main gun Required Performance Measures (RPMs) as detailed in TC 3-20.31.

[10520]

BPLF exercises shall have 5 situations based on specific objectives from TC 3-20.31 Crew Table VI.

20.3.2 Basic Gunnery Skills - Gate-To-Live-Fire

[10522]

Gate-To-Live-Fire (GTLF) exercises shall be provided to train and evaluate crew's (Commander/Gunner) ability to successfully perform the tasks evaluated by TC 3-20.31 Crew Table VI, Qualification.

[10523]

The I/O shall have the capability of selecting Gate-To-Live-Fire exercises whenever a GTLF is not the NRE.

[10524]

Each Gate-To-Live-Fire exercise shall have a total of ten situations. These exercises shall be 5 day and 5 night situations.

[10840]

Twenty (20) scripted GTLF exercises shall be provided.

[10841]

Ten (10) exercises shall use the Woodland database, and ten (10) exercises shall use the Desert database.

[10842]

Each Gate-to-Live-Fire (GTLF) exercise shall contain 10 situations. GTLF exercise will utilize teleporting ownvehicles to transition from one situation to another situation throughout the exercise. This functionality is unique to GTLF exercises.

[10843]

Tower talk, in the form of text for the next Crew Table (CT) VI task, shall be presented at the IOS, as described in 3.7.3.4.3.6.

[10844]

Exercise instructions to the crew shall not include malfunctions or corrective procedures.

[10845]

The computer shall randomly select GTLF exercises from the set of twenty scripted exercises after progressing to Gate-To-Live-Fire status.

[10846]

The I/O shall have the capability of selecting an SIO-built GTLF exercise in place of the computer-selected GTLF exercise.

[10848]

The SIO shall have the capability to build GTLF exercises, as described in 3.7.3.4.3.7.5.

20.3.3 Basic Gunnery Skills - Ammunition Allocations

[10518]

During Basic Gunnery Skills exercises, the system shall support ammunition replenishment in accordance with 20.4.1.7.

[10526]

The Basic Gunnery Skills exercises shall provide the following ammunition allocations which are identified by TC 3-20.31 as follows:

Gate to Live Fire Crew table VI:

- 500 Coax
- 2 Sabot
- 9 HEAT
- 5 HEP
- 1 Canister

[10936]

The ammo allocation counts for Practice GTLF and BPFL IAW TC 3-20.31, as described in Table 20.3.3-1.

[10871]

Table 20.3.3-1. Practice GTLF and BPFL Ammo Allocation

Ex#	Carousel					Ready	Replenisher					Vehicle
	Sabot	HEAT	HEP	CAN	COAX		Sabot	HEAT	HEP	CAN	COAX	
26011	3	5					2	6				
26021						500						
26031	3	5					3	4				
26041	3	4		1	250			2				
26051					500						250	
26061		8			100			1				
26071	2	6			250			2				
26081	3	5			200							
35011	3	5					2					
35021					300							
35031					300							
35041	3	5					2					
35051	3	5					2					
35061	4	3		1	150		1					
35071	2	3			150							
35081	2	6						2				
35091					150							
35101					450							
35111	2	4	2				1	1				
35121					300							
35131					300							
35141	5	3						2				
35151	3	5						1				
35161	3	4		1	150			1				
35171	2	3			150							
35181	2	6						2				
35191					150							
35201					450							
35211					450							
35221	3	4		1	150			1				
35231	3	3	2					2				
35241	3	5					2					
35251	2	6						2				
35261	2	3			150							

CT III	Carousel					Ready	Replenisher					Vehicle
	Sabot	HEAT	HEP	CAN	COAX		Sabot	HEAT	HEP	CAN	COAX	
	2	7	4	1	650							
	2	3	2	1	500			4	2			150

20.3.4 Basic Gunnery Skills - Targets

[10940]

Hit plates for truck and civilian vehicle targets using coax shall be 3 rounds hit to the target to achieve a kill.

[10783]

Targets shall provide specific threat signatures (Hostile Fire Indicators) in accordance with the Types of Targets Found on Training Ranges Table 20.3.4-1.

[10939]

Quantity of troops per formation shall be in accordance with Table 20.3.4-1.

[10784]

Table 20.3.4-1. Types of targets found on training ranges

Target Type	Presentation	Execution Point
Armor	Stationary (frontal or flank) moving or evasive (flank) threat tank or tank-like targets.	5 seconds after target lock
Light Armored	Stationary (frontal or flank) moving or evasive (flank) threat personnel carrier (PC) targets.	5 seconds after target lock
Unarmored	Stationary (frontal or flank) moving or evasive (frontal or flank) threat truck targets.	5 seconds after target lock (AT system) or every 5 seconds.
Point Troop	Single target for Sniper, three targets for RGP teams. No more than three placed in line formation.	5 seconds after target lock. Snipers continue every 8 seconds thereafter.
Area Troop	Four (4) to seven (7) stationary troop targets.	5 seconds after target lock and every 5 seconds thereafter. No target should flash more than twice during one engagement.

20.3.5 Basic Gunnery Skills - Target Delays

[10808]

All target presentations shall have an exposure time of 50 seconds.

[10948]

Secondary target presentations shall be delayed 25 seconds after initial presentation.

20.3.6 Basic Gunnery Skills - Target Range

[10813]

Troop targets with regards to lateral dispersion shall be in accordance with Table 20.3.6-1.

[10814]

Table 20.3.6-1. Minimum and maximum lateral dispersion tables

Minimum Lateral Dispersion											
NFOV	Range to Target (meters)										
(degrees)	(mils)	200	400	600	800	1000	1200	1400	1600	1800	2000
8	142	28m	57m	85m	114m	142m	170m	199m	227m	256m	284m
Maximum Lateral Dispersion											
Range to Target (meters)											
Optic	(mils)	200	400	600	800	1000	1200	1400	1600	1800	2000
Auxiliary	200	40m	80m	120m	160m	200m	240m	280m	320m	360m	400m
Primary	400	80m	160m	240m	320m	400m	480m	560m	640m	720m	800m

20.3.7 Basic Gunnery Skills - Target Evasiveness

[10937]

An evasive target shall have the speed of 5-20 mph with varying speed and/or direction.

20.3.8 Basic Gunnery Skills - Target Speed

[10812]

A moving target shall have the speed of 10-15 mph.

20.3.9 Basic Gunnery Skills - Required Performance Measures (RPMs)

[10807]

The RPMs for the main gun crew table shall be incorporated into the scenario development per Table 20.3.9-1.

[10950]

Table 20.3.9-1. Main gun required performance measures (RPMs)

RPM	Frequency	Remarks
One defensive engagement	Day AND Night	
One offensive engagement	Day AND Night	Units should conduct multiple offensive engagements, day and night, whenever possible.
One short-range machine gun engagement	Day OR Night	Should not be used on a VC engagement for credit.
One long-range machine gun engagement	Day OR Night	
One short-range main gun engagement	Day OR Night	
One long-range main gun engagement	Day OR Night	
One CBRN engagement	Day AND Night	
Weapon System Requirements	Short Range	Long Range
7.62mm	< 400 m	> 600 m
105mm	< 400 m	> 1800 m

20.4 Default and Advanced Gunnery Skills

20.4.1 Default and Advanced Gunnery Skills - General

[10575]

The Default and Advanced Gunnery Skills level exercises are grouped in three levels (Default, Advanced Gunnery Skill I and II), and are arranged so that both gunnery tasks and ownvehicle conditions become progressively more difficult. The exercises are evaluated in three gunnery skill areas: target acquisition, reticle aim, and system management.

20.4.1.1 Default and Advanced Gunnery Skills - Target Acquisition

[10577]

Each default and advanced skill level increases the target acquisition level of difficulty in limited and battlefield conditions. Visibility conditions are defined as follows:

[10578]

Unlimited Visibility - Targets shall be presented fully or partially exposed under conditions of unlimited visibility for daylight exercises or with the absence of thermal noise for night exercises.

[10579]

Limited Visibility - Day exercises shall present fully or partially exposed targets under hazy or dusty visibility conditions. Thermal scenes shall be presented against backgrounds having a higher level of simulated sensor generated thermal noise than present in unlimited visibility thermal scenes.

[10580]

Battlefield Conditions - Difficulty in target acquisition shall be obtained by presenting targets fully or partially exposed under conditions of unlimited or limited visibility in the presence of enemy fire, friendly fire, and friendly vehicle targets in the ownvehicle sector of fire.

20.4.1.2 Default and Advanced Gunnery Skills - Reticle Aim

[10582]

For Default and Advanced Gunnery Skills, reticle status conditions shall be one of the following:

- a. Use CMS Day/Thermal (Day) with no vehicle malfunctions RA1 (F).
- b. Use CMS Thermal (Night) with no vehicle malfunctions RA2 (T).
- c. Use CMS Day/Thermal with no vehicle malfunctions while operating under CBRN conditions RA3 (N).
- d. Use CDU and CCH, with GPCH, and gunner triggers malfunctions, using normal gunnery techniques RA4 (C).
- e. Use CMS Day/Thermal with stabilization failure using emergency-precision gunnery techniques RA5 (S).
- f. Use CMS Day/Thermal with LRF failure using battlesight gunnery techniques RA6 (L).
- g. Use Auxiliary Sight with CMS, computer, LRF, and stabilization malfunctions using emergency-battle sight gunnery techniques RA7 (G).
- h. Use Auxiliary Sight with CMS, computer, stabilization, TDS, and GPCH malfunctions using manual-battlesight gunnery techniques RA8 (M).
- i. Random extra exercise from current SM level RA9 (R).

Note: A CMS failure will not occur in reticle aim T (thermal) and C (CCH).

20.4.1.3 Default and Advanced Gunnery Skills - System Management

[10584]

The training exercises shall provide for moving or stationary firing vehicle in combination with moving or stationary targets.

[10585]

Preprogrammed motion paths shall be provided for ownvehicle and target vehicles in each exercise.

[10586]

Stationary ownvehicle exercises shall provide preprogrammed movement from defilade to enfilade defensive positions with repeated movement control.

[10587]

Stationary vehicle preprogrammed exercises conducted in Urban databases shall provide short halt or hasty defensive positions.

[10588]

For moving ownvehicle exercises, the preprogrammed path shall provide sufficient time, as defined in Table 20.4.1.5-2, for the ownvehicle to engage all targets presented during the exercise.

[10589]

For stationary target vehicle situations, the paths shall cause the targets to move into view and then remain stationary until the exposure time limit is reached, then the target shall withdraw from the scene if it has not been hit or killed.

[10590]

Default and advanced skill levels of the improved crew training program shall train accurate tracking of moving targets. Target presentations and target paths shall be created to move targets across the visual scene of the ownvehicle, directly at the ownvehicle, or at an angle to the ownvehicle.

[10591]

Target paths of constant speed and direction and of variable speed and variable direction shall be provided as required by the objectives of each exercise.

[10592]

Default and Advanced skill levels of the improved Crew Training Program shall have four levels of Systems Management difficulty.

Level 1 - Stationary Ownvehicle and Stationary Targets

Level 2 - Moving Ownvehicle and Stationary Targets

Level 3 - Stationary Ownvehicle and Moving Targets

Level 4 - Moving Ownvehicle and Moving Targets

20.4.1.4 Default and Advanced Gunnery Skills - Target Types

[10595]

Specific target models shall be selected at exercise initialization.

[10596]

Target models shall be selected with the limitation that targets exchanged on a per situation basis are correctly engaged with the same weapon and ammunition.

[10941]

Hit plates for truck and civilian vehicle targets using coax shall be 3 rounds hit to the cab to achieve a kill.

20.4.1.5 Default and Advanced Gunnery Skills - Target Exposure Time

[10598]

Target exposure times for Stationary Ownvehicle exercises shall be as defined in Table 20.4.1.5-1 and target exposure times for Moving Ownvehicle exercises shall be as defined in Table 20.4.1.5-2. The target exposure time begins at target activation and ends at target deactivation.

[10599]

Outside battlesight denotes SABOT targets that are beyond 1400 meters or less than 1000 meters, HEAT targets that are beyond 1100 meters or less than 700 meters, HEP targets that are beyond 700 meters or less than 300 meters, and CANISTER targets that are beyond 300 meters.

[10600]

Table 20.4.1.5-1. Stationary Ownvehicle Target Exposure Times

Situation Status	Exposure Time (Seconds)**		
	1 target	2 targets	3 targets*
Fully operational exercises	47	57	82
Situations outside battlesight range in announced malfunction exercises	57	67	92
Situations within battlesight range in announced malfunction exercises	52	62	87
* Includes an additional 15 seconds to compensate for movement to alternate position.			
** Add 5 seconds to all exposure times if one or more targets in a situation is an area target.			

[10601]

Table 20.4.1.5-2. Moving Ownvehicle Target Exposure Times

Situation Status	Exposure Time (Seconds)**		
	1 target	2 targets	3 targets
Fully operational exercises	27	37	47
Situations outside battlesight range in announced malfunction exercises	42	52	62
Situations within battlesight range in announced malfunction exercises	37	47	57
** Add 5 seconds to all exposure times if one or more targets in a situation is an area target.			

20.4.1.6 Default and Advanced Gunnery Skills - Ammunition Limits

[10862]

Ammunition basic load shall be determined via formulas based on the exercise targets (not including friendly targets).

[10864]

Main gun and COAX rounds shall be stored up to the following limits:

- The carousel shall store 2 SABOT, 4 HEAT, 1 HEP, and 1 CAN rounds, and the crew shall determine the battle-carry at the start of the exercise. There shall be 500 COAX rounds in the turret.
- The replenisher shall store ten main gun rounds. Ammunition loaded in the replenisher shall be determined via formulas based on enemy targets within the exercise (minus any rounds allocated to the carousel).

NOTE: If there are any rounds in the carousel that did not factor into the formula, they will remain in the carousel.

[10865]

SABOT rounds shall be allocated by the following formula:

- One-and-a-half (1.5) SABOT rounds per tank target
- The first two SABOT rounds shall be allocated to the replenisher. Any additional rounds will have first priority to the replenisher after each round type has been allocated.
- When the formula results in n.5 SABOT rounds (where n is an integer), the number of SABOT rounds shall be rounded to the next higher number.

[10866]

HEAT rounds shall be allocated by the following formula:

- One-and-a-half (1.5) HEAT rounds per aircraft, bunker, truck beyond 900 meters or Personnel Carrier (PC) target
- The first three HEAT rounds shall be allocated to the replenisher. Any additional rounds will have second priority to the replenisher after each round type has been allocated.
- When the formula results in n.5 HEAT rounds (where n is an integer), the number of HEAT rounds shall be rounded to the next higher number.

[10867]

HEP rounds shall be allocated by the following formula:

- One-and-a-half (1.5) HEP rounds per bunker target
- The first three HEP rounds shall be allocated to the replenisher. Any additional rounds will have third priority to the replenisher after each round type has been allocated.
- When the formula results in n.5 HEP rounds (where n is an integer), the number of HEP rounds shall be rounded to the next higher number.

[10868]

Canister rounds shall be allocated by the following formula:

- Two (2) Canister rounds per mass of troops:

Each mass of troops must be made up of ten (10) DI's or greater

Each mass of troops must be 300 meters or less in range (as measured from the activation point and not factoring in target delays)

- Maximum of four (4) Canister rounds shall be allocated
- The first two Canister rounds shall be allocated to the replenisher. Any additional rounds will have fourth priority to the replenisher after each round type has been allocated.

[10869]

Main gun round allocation shall follow the formula rules below:

- Any main gun rounds allocated to the exercise that exceed the capacity of the replenisher shall be available for transfer from the supply truck.
- After the initial allocation of main gun rounds, any open slots shall be filled with one round of each ammunition type based on round priority until the replenisher is fully loaded.
- In those cases where the ammunition allocation amounts (as determined by the formula) do not fill the replenisher any open slot shall be filled with equal amounts of HEAT and HEP. Any odd slots shall be filled with HEAT.

[10989]

There shall be 1200 COAX rounds in the hull and 1700 COAX rounds on the supply truck.

[10870]

Smoke grenades shall be allocated as follows:

- 16 (2 salvos of 8 each)

20.4.1.7 Default and Advanced Gunnery Skills - Ammunition Transfer

[10607]

The system shall support intra-vehicle ammunition replenish.

[10608]

The ammunition transfer request will be initiated by the vehicle commander via the I/O. Ammunition replenishes are initiated via CCP.

[10609]

The ownvehicle may be moving or stationary during main gun ammunition replenishment.

[10610]

Capability to transfer ammunition shall be provided when the following conditions are met:

Ammo Type	Intra-Vehicle	From Supply Truck
	Weapons set to Safe	Weapons set to Safe
	Coax No Targets are Active	No Targets are Active
	Ownvehicle is Halted*	Ownvehicle is Halted*
		Autoloader switch set to Normal
Main Gun	No AGTS Checks	Weapons set to Safe
		No Targets are Active
		Ownvehicle is Halted*
		Autoloader switch set to Normal

* For defensive exercises, halted shall be equivalent to ownvehicle in the defilade position at the start of the ammunition transfer.

[10611]

The I/O shall have the capability to cancel ammunition transfer in progress when the transfer is only within the vehicle and Coax is the only ammunition being transferred.

For all other ammo transfers, the I/O shall not be allowed to cancel the ammunition transfer in progress. The transfer, once started, shall run its course to its end time. Once the transfer is started, it shall play out to its one minute time limit or whenever the VC changes from the RESTOCK switch position.

[10613]

The Supply Truck which holds virtually unlimited supplies of main gun ammunition and Coax rounds can be requested for from the Ammo Transfer function within the ammo transfer process. The Vehicle Commander (VC) shall request all main gun rounds via the RESTOCK switch selection and control at the CCP. Whatever the VC selects for ammunition type and quantity shall be placed in the replenisher.

[10614]

Supply truck replenishment of main gun ammunition shall only occur when the vehicle has sufficient empty tubes in the replenisher for the total number of rounds being transferred.

[10615]

The following time delays shall be imposed:

- a. CCP controlled replenishment from the replenisher to the carousel: determined by SCSL.
- b. Supply truck transfer to the replenisher: at least 15 seconds delay.

[10616]

Coax round transfer constraints shall differ between intra-vehicle or Supply Truck transfers. Coax rounds cannot exceed initial load of vehicle: 500 rounds in the Ready Box and 1200 rounds in the Hull. The switch checks for coax round transfers are defined above. Ammo transfer time for Coax rounds shall be at least 15 seconds.

[10617]

Under Supply Truck main gun transfer, the length of the ammunition transfer shall take at least one minute in duration (as long as the low-ammo override switch is not activated for COAX, wherein such cases it shall take two minutes).

- If the VC completes his selection via the CCP and changes the Autoloader switch from the RESTOCK position to any other position in less than a minute, then the transfer time shall take one minute.

- If after a minute the VC has not completed his selection, then the transfer time shall complete whenever the VC completes his selections and changes the Autoloader switch from the RESTOCK position to any other position.

[10618]

Overall ammo transfer shall be complete when all required operations for both Coax and main gun ammunition transfer have been completed.

[10619]

Since the VC can switch to RESTOCK and change the replenisher selections at anytime during simulation, AGTS shall only consider it a valid ammunition type change request while an ammo transfer is in progress.

[10620]

If the VC changes the replenisher selections outside of an ammo transfer in progress period, there can be a possible mismatch between the physical loading of the replenisher and the logical loading (CCP record) of the replenisher.

[10621]

Management of the main gun ammunition is controlled by the VC, CCP interface, SCSL software, AHS, and Fire Control System.

In the event of a logical round - physical round mismatch in the breech at the time of firing, this mismatch condition shall cause a System Management Time of Fire Ammo Mismatch Error to be generated.

20.4.1.8 Default and Advanced Gunnery Skills - Near Miss Round

20.4.1.8.1 Default and Advanced Gunnery Skills - Near Miss Round in Defensive Situations

[10624]

For a defensive situation, an active destroyer target or limited destroyer target, as defined in Table 20.4.1.9.1-1 that meets their limitations, shall fire a near miss round 10 to 14 seconds (randomly) after an ownvehicle arrives at the position where the ownvehicle stops along the ramp, including ownvehicle opening fire in the defilade position and meets the line-of-sight criteria. The line-of-sight criteria shall be implemented in the Image Generator and assures that nothing is blocking the view between the threat vehicle and the ownvehicle.

[10625]

One second later, an explosion shall impact 100 meters to the front, left or right front of the ownvehicle.

[10626]

A near miss shall occur in not more than 50% of the situations.

[10628]

If an alternate position is available and the ownvehicle returns to the primary position where it had previously sustained a near miss, and all tank destroyer targets and limited tank destroyer targets, as defined in Table 20.4.1.9.1-1, that meet their limitations have not been killed, the ownvehicle shall receive, within five seconds of reaching the primary position, a hit which in Default, Advanced Gunnery Skill levels I or II results in ownvehicle kill.

20.4.1.8.2 Default and Advanced Gunnery Skills - Near Miss Round in Offensive Situations

[10630]

For an offensive situation, a near miss shall occur 20 to 25 (randomly) seconds after full target exposure (defined as 3.5 seconds following target activation), and the line-of-sight criteria is met, if that target is a destroyer target or limited destroyer target, as defined in Table 20.4.1.9.1-1 that meets their limitations.

[10631]

A near miss shall occur in not more than 50% of the situations.

20.4.1.9 Default and Advanced Gunnery Skills - Hit on Ownvehicle

20.4.1.9.1 Default and Advanced Gunnery Skills - Hit on Ownvehicle in Defensive Situations

[10634]

For a defensive situation, a hit on ownvehicle shall occur 18 to 24 seconds (randomly) from the time the ownvehicle opens fire or is at any position along the ramp including the defilade position and meets the line-of-sight criteria, when the ownvehicle remains exposed after receiving a near miss and all tank destroyer targets and limited tank destroyer targets, as defined in Table 20.4.1.9.1-1, that meet their limitations have not been killed. If, after receiving a hit, the ownvehicle receives a second hit, it shall be killed for the current situation of the current exercise; this shall apply to Default and Advanced Gunnery Skills I and II exercises.

[10636]

If an alternate position is available and the ownvehicle returns to the primary position where it had previously sustained a hit, and all tank destroyer targets and limited tank destroyer targets, as defined in Table 20.4.1.9.1-1, that meet their limitations have not been killed, the ownvehicle shall receive, within five seconds of reaching the primary position, a hit which in Default, Advanced Gunnery Skill levels I or II results in ownvehicle kill.

[10637]

In the event of a vehicle short halt or hasty defense, ownvehicle hit or near miss shall be scored per the offensive criteria.

[10638]

Table 20.4.1.9.1-1. Target Categories for Near Miss

Enemy Target Type	Target-Destroyer Category (Destroyer, Limited-Destroyer, Non-Destroyer)	Limited-Destroyer Limitations		
		Motion (Stopped, Moving)	Orientation (Front, Rear, Flank)	Maximum Effective Range (meters)
Aircraft	Destroyer	N/A	N/A	N/A
Helicopter	Destroyer			N/A
APC	Limited Destroyer			< 2000 m
AT Type	Limited Destroyer	Stopped		< 2000 m
Bunker	Limited Destroyer	Stopped	Front	< 1000 m
Light APC	Limited Destroyer			< 800 m
Light Tank	Limited Destroyer			< 2000 m
Machine Gun Nest	Limited Destroyer	Stopped	Front/Flank	< 700 m
RPG - OPFOR/Insurgent	Limited Destroyer	Stopped	Front	< 300 m
Sniper	Limited Destroyer			< 300 m
Tank	Limited Destroyer			< 3000 m
Towed Gun	Limited Destroyer	Stopped	Rear	< 1000 m
Truck/Small Truck	Limited Destroyer			< 1000 m
Civilian Vehicle	Non-Destroyer	N/A	N/A	N/A
Missile Launcher	Non-Destroyer	N/A	N/A	N/A
Small Arms - OPFOR/Insurgent	Non-Destroyer	N/A	N/A	N/A

Note: Small arms include AK-47, RPK-74 and pistol.

[10639]

Table 20.4.1.9.1-1. Target Categories for Near Miss

Vehicle Type	Classification (Tank Destroyer / Limited Destroyer)	Limitations
KA-52	Destroyer	NA
HIND-D	Destroyer	NA
ENEMY RPG / RPG TEAM / SNIPER W/ RPG	Limited Destroyer	within 300 meters
MI-8C	Limited Destroyer	hover, front facing
BMP-1	Limited Destroyer	within 800 meters range
GAZ-TECH	Limited Destroyer	stopped, within 1500 meters
BM-21	Limited Destroyer	stopped, flank, within 1500 meters
2S3	Limited Destroyer	within 1500 meters
TRUCK w/SNAPPER	Limited Destroyer	stopped, rear facing, within 2000 meters
AT-4	Limited Destroyer	stopped, within 2000 meters
M47	Limited Destroyer	stopped, within 2000 meters
BMD-2 / BMP-2 / BMP-3 / BTR-T / TSCV	Limited Destroyer	within 2000 meters
T-55 / T-62	Limited Destroyer	within 2000 meters
T-64	Limited Destroyer	within 2200 meters
T-72S	Limited Destroyer	within 2800 meters
T-80U	Limited Destroyer	within 3200 meters
BMP-1	Limited Destroyer	stopped, within 3000 meters
MBENZ-TECH / PEGASSO-TECH	Limited Destroyer	stopped, flank/rear, within 3000 meters
ZSU23-4	Limited Destroyer	within 3000 meters
MITTS-TECH	Limited Destroyer	stopped, flank/rear, within 4000 meters
AT-5	Limited Destroyer	stopped, within 4000 meters
BMD-2 / BMP-2 / BMP-3 / BTR-T / BRDM-2	Limited Destroyer	stopped, within 4000 meters
TSCV	Limited Destroyer	stopped, within 5000 meters
Toyota Technical w 75mm	Limited Destroyer	stopped, flank, rear facing within 3000 meters range
Toyota Technical w MG	Limited Destroyer	stopped, within 1000 meters range
WZ551	Limited Destroyer	within 3000 meters range

20.4.1.9.2 Default and Advanced Gunnery Skills - Hit on Ownvehicle in Offensive Situations

[10641]

For offensive situations, a hit on ownvehicle shall occur 10 to 14 seconds (randomly) after a near miss is received if the line-of-sight criteria is met and all vehicle destroyer or limited vehicle destroyer targets, as defined in table 20.4.1.9.1-1, that meet their limitations have not been killed.

20.4.2 Default Gunnery Skills

[10643]

Default exercises allow the crew to train in a combat environment with accurate range determination to targets, subsequent fire commands, and an increased frequency of degraded gunnery. Default Gunnery Skills is an entry point to the iCTP progression. Default Gunnery Skills will progress a crew to pass all exercises within Default Gunnery Skills before advancing to Basic Gunnery Skills.

[10906]

Eight (8) legacy exercises shall be integrated into Default Gunnery Skills, System Management (SM) Levels 1-4 and Reticle Aim (RA) Levels 1 and 2.

[10907]

Default Gunnery Skills SM Level 1, RA Level 1, shall have one Desert 1 exercise.

[10908]

Default Gunnery Skills SM Level 1, RA Level 2, shall have one Woodland 1 exercise.

[10909]

Default Gunnery Skills SM Level 2, RA Level 1, shall have one Desert 1 exercise.

[10910]

Default Gunnery Skills SM Level 2, RA Level 2, shall have one Woodland 1 exercise.

[10911]

Default Gunnery Skills SM Level 3, RA Level 1, shall have one Desert 2 exercise.

[10912]

Default Gunnery Skills SM Level 3, RA Level 2, shall have one Woodland 2 exercise.

[10913]

Default Gunnery Skills SM Level 4, RA Level 1, shall have one Desert 2 exercise.

[10914]

Default Gunnery Skills SM Level 4, RA Level 2, shall have one Woodland 2 exercise.

20.4.2.1 Default Gunnery Skills - Target Acquisition

[10646]

Default Gunnery Skills exercises with different visibility conditions will provide appropriate target acquisition difficulty. Three visibility conditions will occur with predefined probabilities.

20.4.2.1.1 Default Gunnery Skills - Unlimited Visibility

[10648]

For Default Gunnery Skills exercise, unlimited visibility conditions, as defined in paragraph 20.4.1.1, shall be randomly selected at exercise initialization with a probability of 67%.

20.4.2.1.2 Default Gunnery Skills - Limited Visibility

[10650]

For Default Gunnery Skills, limited visibility conditions, as defined in paragraph 20.4.1.1, shall be randomly selected at exercise initialization with a probability of 33%.

20.4.2.1.3 Default Gunnery Skills - Battlefield Conditions

[10652]

For Default Gunnery Skills exercises, battlefield conditions, as defined in paragraph 20.4.1.1, shall be selected randomly at exercise initialization with a probability of 20%.

20.4.2.2 Default Gunnery Skills - Reticle Aim

[10654]

For Default Gunnery Skills exercises, reticle aim status conditions shall be as defined in paragraph 20.4.1.2.

20.4.2.3 Default Gunnery Skills - Systems Management

[10656]

For Default Gunnery Skills exercises, Systems Management difficulty shall be as defined in paragraph 20.4.1.3.

20.4.2.4 Default Gunnery Skills - Targets

[10658]

For Default Gunnery Skills defensive and offensive exercises, situations shall require the crew to engage one to three enemy targets.

20.4.2.5 Default Gunnery Skills - Sector Size

[10660]

For Default Gunnery Skills exercises, enemy targets shall be spread across a medium sector defined as 45 degrees or less. In all Reticle Aim Level M (manual) exercises, the maximum sector width across which targets are spread shall be 32 degrees or less.

20.4.2.6 Default Gunnery Skills - Target Delays

[10662]

For Default Gunnery Skills exercises, there shall be no target delays.

20.4.2.7 Default Gunnery Skills - Target Range

[10665]

For Default Gunnery Skills exercises, targets shall be located at ranges 1000 meters or less from the ownvehicle position.

20.4.2.8 Default Gunnery Skills - Target Evasiveness

[10667]

For Default Gunnery Skills exercises, moving targets shall vary speed between 5 and 15 mph as they move on their preprogrammed paths.

20.4.2.9 Default Gunnery Skills - Target Reaction to Fire

[10669]

For Default Gunnery Skills exercises, enemy targets, when fired upon, shall train their weapon system towards the ownvehicle position and moving targets shall first increase in speed and then decrease in speed such that proper exposure times will be maintained.

20.4.2.10 Default Gunnery Skills - Target Exposure Time

[10671]

For Default Gunnery Skills exercises, target exposure times shall be as defined in paragraph 20.4.1.5.

20.4.2.11 Default Gunnery Skills - Malfunctions

[10673]

For Default Gunnery Skills exercises, all malfunctions and corrective actions shall be announced to the crew during the crew instructions and will be present throughout the entire exercise.

[10674]

Pre-exercise switch checks shall support the announced malfunction conditions. Paragraph 20.4.1.5 defines impacts to target exposure time resulting from announced malfunctions.

20.4.2.12 Default Gunnery Skills - Result of Hit on Ownvehicle

[10676]

For Default Gunnery Skills exercises, ownvehicle hit shall result in effects defined in paragraph 3.7.2.8.3.4.3. A hit on the own vehicle shall not result in any additional malfunctions.

20.4.2.13 Default Gunnery Skills - Gun Tube Bend

[10678]

For Default Gunnery Skills exercises, accumulated gun tube bend shall not be carried over to the next exercise.

20.4.3 Advanced Gunnery Skills I

[10680]

Advanced Gunnery Skills I exercises allow the crew to train in a combat environment with accurate range determination to targets, subsequent fire commands, and an increased frequency of degraded gunnery.

[10915]

Eight (8) legacy exercises shall be integrated into Advanced Gunnery Skills I, System Management (SM) Levels 1-4 and Reticle Aim (RA) Levels 1 and 2.

[10916]

Advanced Gunnery Skills I SM Level 1, RA Level 1, shall have one Desert 3 exercise.

[10917]

Advanced Gunnery Skills I SM Level 1, RA Level 2, shall have one Desert 3 exercise.

[10918]

Advanced Gunnery Skills I SM Level 2, RA Level 1, shall have one Woodland 3 exercise.

[10919]

Advanced Gunnery Skills I SM Level 2, RA Level 2, shall have one Woodland 3 exercise.

[10920]

Advanced Gunnery Skills I SM Level 3, RA Level 1, shall have one Desert 4 exercise.

[10921]

Advanced Gunnery Skills I SM Level 3, RA Level 2, shall have one Woodland 4 exercise.

[10922]

Advanced Gunnery Skills I SM Level 4, RA Level 1, shall have one Woodland 4 exercise.

[10923]

Advanced Gunnery Skills I SM Level 4, RA Level 2, shall have one Desert 4 exercise.

20.4.3.1 Advanced Gunnery Skills I - Target Acquisition

[10683]

Advanced Gunnery Skills I exercises with different visibility conditions shall provide appropriate target acquisition difficulty. Three levels of visibility conditions shall occur with predefined probabilities.

20.4.3.1.1 Advanced Gunnery Skills I - Unlimited Visibility

[10685]

For Advanced Gunnery Skills I exercise, unlimited visibility conditions, as defined in paragraph 20.4.1.1, shall be randomly selected at exercise initialization with a probability of 50%.

20.4.3.1.2 Advanced Gunnery Skills I - Limited Visibility

[10687]

For Advanced Gunnery Skills I, limited visibility conditions, as defined in paragraph 20.4.1.1, shall be randomly selected at exercise initialization with a probability of 50%.

20.4.3.1.3 Advanced Gunnery Skills I - Battlefield Conditions

[10689]

For Advanced Gunnery Skills I exercises, battlefield conditions, as defined in paragraph 20.4.1.1, shall be induced into Advanced Gunnery Skills I exercises randomly at exercise initialization with a probability of 40%.

[10690]

Up to twenty-five percent of all Advanced Gunnery Skills I exercise situations shall have friendly dismounts and vehicles moving within them.

20.4.3.2 Advanced Gunnery Skills I - Reticle Aim

[10692]

For Advanced Gunnery Skills I exercises, reticle aim status conditions shall be as defined in paragraph 20.4.1.2.

20.4.3.3 Advanced Gunnery Skills I - Systems Management

[10694]

For Advanced Gunnery Skills I exercises, Systems Management difficulty shall be as defined in paragraph 20.4.1.3.

20.4.3.4 Advanced Gunnery Skills I - Targets

[10696]

For Advanced Gunnery Skills I defensive and offensive exercises, situations shall require the crew to engage one to three enemy targets.

20.4.3.5 Advanced Gunnery Skills I - Sector Size

[10698]

For Advanced Gunnery Skills I exercises, enemy targets shall be spread across a wide sector defined as 65 degrees or less. In all Reticle Aim Level M (manual) exercises, the maximum sector width across which targets are spread shall be 32 degrees or less.

20.4.3.6 Advanced Gunnery Skills I - Target Activation Delays

[10700]

For Advanced Gunnery Skills I exercises, selected targets shall have activation delays of 10 to 15 seconds between targets.

20.4.3.7 Advanced Gunnery Skills I - Target Range

[10702]

For Advanced Gunnery Skills I exercises, targets shall be located at ranges 1500 meters or less from the ownvehicle position.

20.4.3.8 Advanced Gunnery Skills I - Target Evasiveness

[10704]

For Advanced Gunnery Skills I exercises, selected targets shall change directions at various points along their preprogrammed path.

20.4.3.9 Advanced Gunnery Skills I - Target Reaction to Fire

[10706]

For Advanced Gunnery Skills I exercises, enemy targets, when fired upon and missed, shall train their weapon system towards the ownvehicle position and those targets that are not already moving at 25 mph or more shall speed up to 25 mph for a period of time, however the target's overall exposure time must remain the same as was originally programmed. For those targets already traveling at 25 mph or greater, they shall continue to travel at their original speed.

20.4.3.10 Advanced Gunnery Skills I Target Time

[10708]

For Advanced Gunnery Skills I exercises, target exposure times shall be as defined in paragraph 20.4.1.5.

20.4.3.11 Advanced Gunnery Skills I - Malfunctions

[10710]

For Advanced Gunnery Skills I exercises, all malfunctions shall be announced to the crew during the crew instructions but shall be induced at some point in the exercise no later than the fourth situation. Paragraph 20.4.1.5 defines impacts to target exposure time resulting from announced malfunctions.

20.4.3.12 Advanced Gunnery Skills I - Result of Hit on Ownvehicle

[10712]

For Advanced Gunnery Skills I exercises, an ownvehicle hit shall result in hit effects as defined in paragraph 3.7.2.8.3.4.3. For Advanced Gunnery Skills I exercises, ownvehicle can be hit but only stationary (defensive) ownvehicle can be killed. A hit on the own vehicle shall result in no more than one additional randomly selected malfunction per exercise.

[10713]

Selected malfunctions shall occur with probabilities as defined in paragraph 3.7.3.5.1.10.

20.4.3.13 Advanced Gunnery Skills I - Gun Tube Bend

[10715]

For Advanced Gunnery Skills I exercises, accumulated gun tube bend shall not be carried over to the next exercise.

20.4.4 Advanced Gunnery Skills II

[10717]

Advanced Gunnery Skills II exercises allow the crew to train in a less predictable combat environment. Exercises begin with a fully operational vehicle and force the crew to react to unannounced fire control malfunctions caused by enemy direct or indirect fire or system failures.

[10924]

Eight (8) legacy exercises shall be integrated into Advanced Gunnery Skills II, System Management (SM) Levels 1-4 and Reticle Aim (RA) Levels 1 and 2.

[10925]

Advanced Gunnery Skills II SM Level 1, RA Level 1, shall have one Woodland 3 exercise.

[10926]

Advanced Gunnery Skills II SM Level 1, RA Level 2, shall have one Desert 3 exercise.

[10927]

Advanced Gunnery Skills II SM Level 2, RA Level 1, shall have one Woodland 3 exercise.

[10928]

Advanced Gunnery Skills II SM Level 2, RA Level 2, shall have one Desert 3 exercise.

[10929]

Advanced Gunnery Skills II SM Level 3, RA Level 1, shall have one Woodland 4 exercise.

[10930]

Advanced Gunnery Skills II SM Level 3, RA Level 2, shall have one Desert 4 exercise.

[10931]

Advanced Gunnery Skills II SM Level 4, RA Level 1, shall have one Woodland 4 exercise.

[10932]

Advanced Gunnery Skills II SM Level 4, RA Level 2, shall have one Desert 4 exercise.

20.4.4.1 Advanced Gunnery Skills II - Target Acquisition

[10720]

Advanced Gunnery Skills II exercises with different visibility conditions shall provide appropriate target acquisition difficulty. Three levels of visibility conditions shall occur with predefined probabilities.

20.4.4.1.1 Advanced Gunnery Skills II - Unlimited Visibility

[10722]

For Advanced Gunnery Skills II exercise, unlimited visibility conditions, as defined in paragraph 20.4.1.1, shall be randomly selected at exercise initialization with a probability of 50%.

20.4.4.1.2 Advanced Gunnery Skills II - Limited Visibility

[10724]

For Advanced Gunnery Skills II, limited visibility conditions, as defined in paragraph 20.4.1.1, shall be randomly selected at exercise initialization with a probability of 50%.

20.4.4.1.3 Advanced Gunnery Skills II - Battlefield Conditions

[10726]

For Advanced Gunnery Skills II exercises, battlefield conditions, as defined in paragraph 20.4.1.1, shall be induced into Advanced Gunnery Skills II exercises randomly at exercise initialization with a probability of 60%.

[10727]

Up to fifty percent of all Advanced Gunnery Skills II exercise situations shall have friendly dismounts and vehicles moving within them.

20.4.4.2 Advanced Gunnery Skills II - Reticle Aim

[10729]

For Advanced Gunnery Skills II exercises, reticle aim status conditions shall be as defined in paragraph 20.4.1.2.

20.4.4.3 Advanced Gunnery Skills II - Systems Management

[10731]

For Advanced Gunnery Skills II exercises, Systems Management difficulty shall be as defined in paragraph 20.4.1.3.

20.4.4.4 Advanced Gunnery Skills II - Targets

[10733]

For Advanced Gunnery Skills II defensive and offensive exercises, situations shall require the crew to engage up to three enemy targets.

20.4.4.5 Advanced Gunnery Skills II - Sector Size

[10735]

For Advanced Gunnery Skills II exercises, enemy targets shall be spread across a very wide sector defined as 90 degrees or less. In all Reticle Aim Level M (manual) exercises, the maximum sector width across which targets are spread shall be 32 degrees or less.

20.4.4.6 Advanced Gunnery Skills II - Target Activation Delays

[10737]

For Advanced Gunnery Skills II exercises, two targets shall be activated without delay and 1 target may be activated with delays of up to 15 seconds from a previously activated target such that all targets in a situation are activated within a maximum 50 seconds.

20.4.4.7 Advanced Gunnery Skills II - Target Range

[10739]

For Advanced Gunnery Skills II exercises, targets shall be located at ranges up to 2000 meters or less.

20.4.4.8 Advanced Gunnery Skills II - Target Evasiveness

[10741]

A sniper in windows or DI shall be presented modeling evasive actions such as appearing and subsequently disappearing in windows or from behind obstructions. The total sequence period shall be considered the total target exposure time.

[10742]

For Advanced Gunnery Skills II exercises, selected targets shall change directions at various points along their preprogrammed path in a more evasive manner than in Advanced Gunnery Skills I exercises.

20.4.4.9 Advanced Gunnery Skills II - Target Reaction to Fire

[10744]

For Advanced Gunnery Skills II exercises, enemy targets, when fired upon and missed, shall train their weapon system towards the ownvehicle position and those vehicle targets that are not already moving at 25 mph or more shall speed up to 25 mph for a period of time, however the target's overall exposure time must remain the same as was originally programmed. For those targets already traveling at 25 mph or greater, they shall continue to travel at their original speed.

[10745]

Dismounted target shall be characterized by evasive behavior, as defined in 20.4.4.8.

20.4.4.10 Advanced Gunnery Skills II - Target Exposure Time

[10747]

For Advanced Gunnery Skills II exercises, target exposure times shall be as defined in paragraph 20.4.1.5.

20.4.4.11 Advanced Gunnery Skills II - Malfunctions

[10749]

In Advanced Gunnery Skills II exercises, RA malfunctions will not be announced to the crew and will be introduced to the crew during situations 1, 2, 3 or 4. No additional scoring time shall be allowed for any malfunction in Advanced Gunnery Skills II exercises. If the ownvehicle has not received an ownvehicle hit prior to the last three situations, an unannounced "hit related" malfunction shall occur in one of the last 3 situations, whether the ownvehicle receives a hit or not. These malfunctions and their probability of occurrence are defined in paragraph 3.7.3.5.1.10.

[10750]

No additional scoring time or target exposure time shall be given to the crew for any malfunction that occurs.

[10751]

Selected malfunctions shall occur with pre-defined probabilities.

20.4.4.12 Advanced Gunnery Skills II - Result of Hit on Ownvehicle

[10753]

For Advanced Gunnery Skills II exercises, every ownvehicle hit shall result in a malfunction as defined in paragraph 3.7.3.5.1.10. (If the ownvehicle has not received an ownvehicle hit prior to the last three situations, an unannounced "hit related" malfunction shall occur in one of the last 3 situations, whether the ownvehicle receives a hit or not.) For Advanced Gunnery Skills II exercises, the ownvehicle can be hit but only defensive (stationary) ownvehicles may be killed.

20.4.4.13 Advanced Gunnery Skills II - Gun Tube Bend

[10755]

For Advanced Gunnery Skills II exercises, accumulated gun tube bend shall not be carried over to the next exercise.

20.4.5 Crew Sustainment Training

[10757]

Sustainment training shall be limited to those individuals who have completed Advanced Gunnery Skills levels I and II.

[10758]

Sustainment exercises shall be randomly selected from the Advanced Gunnery Skills levels I and II

[10956]

Sustainment training shall be limited to those individuals who have completed Advanced Gunnery Skills levels I and II.