ST 3-22.7

STRYKER MORTAR PLATOON AND SECTION LEADERS' HANDBOOK

FEBRUARY 2009

DIRECTORATE OF OPERATIONS AND TRAINING
U.S. ARMY INFANTRY CENTER/SCHOOL
FORT BENNING, GEORGIA 31905

Special Text
No. 3-22.7

US Army Infantry School
Fort Benning, GA18 February 2009

Stryker Mortar Platoon and Section Leaders' Handbook

Contents

Figures

Tables

Preface

The purpose of this handbook is to provide M1129A1 Stryker mortar carrier vehicle (MCV) mortarmen with operational knowledge of the tactics, techniques, and procedures associated with the MCV. Special emphasis is placed on operational features of the Mortar Fire Control System (MFCS).

Though the MCV has multimortar capability, the primary focus of this handbook is 120-mm mortar operations. Subjects include:

- MFCS operational knowledge and fire missions
- 120-mm mortar boresight and sight calibration
- MCV unit training
- MCV drills
- MCV basic issue items, inspection, and load plan
- MCV equipment limitations and use during training and deployment
- MCV mortar ammunition storage
- MCV navigation and mortar platoon/section placement
- MCV gunner's examination

Unless otherwise stated, whenever the masculine gender is used, both men and women are included.

The proponent for this publication is the U.S. Army Infantry School. You may send comments and recommendations by any means, US mail, e-mail, fax, or telephone, as long as you use the format of DA Form 2028, *Recommended Changes to Publications and Blank Forms*.

E mail	BENN.DOT.systems.div@conus.army.mil
Office/Fax	COM 706 545 1619/6138 (DSN 835)
US Mail	Commandant, USAIS ATTN: ATSH-OTY 7602 Chesney Street Fort Benning, GA 31905-5593

Chapter 1

The M1129A1 Stryker Mortar Carrier Vehicle

This handbook provides Infantry mortarmen with the tactics, techniques, and procedures associated with the M1129A1 Stryker mortar carrier vehicle (MCV). The MCV is a multi-mortar carrier equipped with a fixed 120-mm mortar system and storage space for 81-mm or 60-mm mortars. Furnishing this choice of mortar configurations provides commanders with the flexibility to choose the system that best supports their area of operations (AO) terrain. Though the MCV has multi-mortar capability, the primary focus of this training handbook is 120-mm operations, and the operational steps and activities specific to the MCV. This introductory chapter discusses the MCV's place in the Infantry battalion, capabilities, and mortar training.

Section I — OVERVIEW

1-1. The Stryker Brigade Combat Team (SBCT) Infantry battalion's primary mission is to close the enemy by fire and maneuver to destroy, capture, or repel the enemy's assault by fire, close combat, and counterattack. These operations typically incorporate a primary base of fire provided by the respective platoon's weapon squads, and is supported, when possible, by the direct and indirect fires of supporting systems. Regardless of the operational scenario, Stryker Infantry tactical operations are controlled and synchronized at the battalion level. They are executed by companies employing organic and/or attached combined arms elements, and are supported by organic and supporting fires/effects. While the SBCT Infantry battalion's main combat mission is to defeat or destroy enemy forces, it also provides U.S. Army combat operations with a predominant force for seizing, securing, retaining, and controlling terrain. MCV squads contribute greatly to this mission.

ORGANIZATION

1-2. The 120-mm mortar is a traditional Infantry battalion asset. Attached to rifle companies as necessary by the battalion commander, the 120-mm mortar provides crucial fire support in combat operations. In addition to the four 120-mm mounted mortar carrier vehicles assigned to the battalion mortar platoon, each SBCT Infantry company is assigned a two-mortar carrier vehicle section consisting of 10 Soldiers that make up two mortar crews. The battalion mortar platoon as an organic asset of the Infantry battalion can perform direct support, general support, or reinforcing missions.

Section II — MCV CHARACTERISTICS AND CAPABILITIES

STRYKER VARIANT

1-3. The Stryker MCV (Figure 1-1) is a configuration of the Stryker Infantry carrier vehicle (ICV) variant. The MCV has the on/off road ability of an ICV. Its power pack, suspension system, and portions of the hull are the same as the ICV. The rest of its characteristics are mortar carrier specific. MCV crews provide mobile, high-angle fire for close-in support of ground troops in complex terrain and urban environments.

Figure 1-1. The Stryker mortar carrier vehicle.

CREW CONFIGURATION

1-4. The MCV carries a crew of five: driver, squad leader, ammunition bearer, gunner, and assistant gunner (Figure 1-2). Each crewmember is assigned a duty station within the MCV.

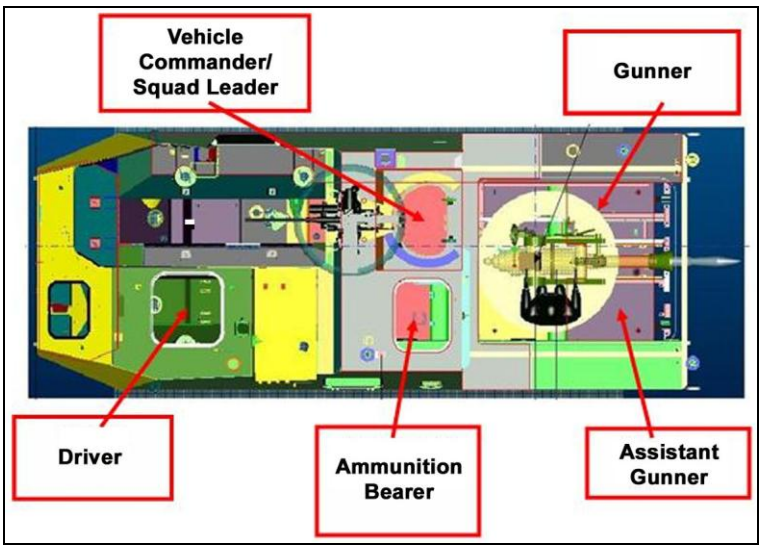


Figure 1-2. Crew configuration.

DRIVER'S STATION

1-5. An M95 mortar fire control system display was installed in the MCV's driver compartment to assist the driver with positioning the vehicle for firing the mounted mortar. An external step and handhold has also been added to aid entry and egress from the vehicle. There are no other differences in configuration or operation of the driver's station from the basic ICV. TM 9-2355-311-10-3-1, discusses in detail the MCV driver compartment.

SQUAD LEADER'S STATION

1-6. The MCV variant's absence of a remote weapons station (RWS) distinguishes its unique squad leader's station (Figure 1-2). The MCV has no RWS display which allows for more space for the squad leader and a mounted video display terminal (VDT). The VDT can display the driver's thermal viewer and FBCB2 screens. The commander's interface (CI) display and FBCB2 display are mounted on swing out mounts to enable viewing from both squad leader and ammunition bearer positions.

AMMUNITION BEARER STATION

1-7. The ammunition bearer sits to the left of and facing toward the squad leader (Figure 1-2). His station includes a single seat with a lap belt restraint, a padded base, and a fold down backrest. The CI display and FBCB2 display swings out for use from this position.

Note: The M3 heater and ventilated facemask hose have been moved from the ICV common variant position. Both are mounted forward and left of the ammunition bearer's position on the transition of the engine bulkhead.

GUNNER/ASSISTANT GUNNER STATIONS

1-8. The gunner/assistant gunner seats are in the rear of the troop compartment (Figure 1-2). The gunner sits on the right-rear side facing toward the front of the vehicle; the assistant gunner sits on the left-rear side of the vehicle facing the cannon's blast attenuator device. Both station's seats are designed to provide passenger restraints, including lap belts with inertia type retractors. Both Each station is equipped with overhead handholds (subway straps) mounted to the roof of the vehicle. The seatbacks in the gunner and assistant gunner stations fold down and have a step stool for raising and lowering the mortar doors. The seats fold up when not in use to allow for entry and exit from the carrier. In addition, both squad members have their own M3 heater and ventilated facemask hose that are located above the radio rack on the right side sponson shelf.

WEAPONS SYSTEMS

1-9. MCVs come equipped with two weapon systems: an M240B machine gun mounted at the commander's station and a mounted RMS6-L 120-mm mortar. The MCV is also designed to carry an 81-mm mortar (battalion load plan), and a 60-mm mortar (company load plan), with ammunition storage capabilities for all three systems. The MCV retains the same integral protection characteristics as the ICV. However, it is not provided with slat armor at initial delivery, though it can be mounted with slat armor if required.

CARRIER DOORS

1-10. The two mortar doors on the roof of the MCV span the length of the troop compartment; from just behind the commander and ammunition bearer—to the rear of the vehicle (Figure 1-3). Each door weighs approximately 400 pounds with an opening/closing force of approximately 65 pounds. The latches to open/close the doors remain ICV common to other latches on the vehicle. However, the latch mechanism to hold the doors in the open position for firing is unique to the MCV. The latch design securely holds the doors in the open position while the vehicle is being repositioned. An MCV unique locking pin secures the doors in the open position.

Figure 1-3. Mortar doors.

CAUTION

Moving with the mortar doors open and latched is limited to short distances and vehicle speed no faster than 10 mph. Crew members must verify that the mortar doors are latched and the latch pins are properly installed. Crew members must remain in their seat with their seatbelts properly secured. The 120-mm mortar must be secured in the travel position.

WARNING

Mortar doors are large and extremely heavy. Two people are required to safely open, close, and secure the doors in the opened or closed position. Attempts to open or close mortar doors with less than two people may result in serious injury.

Mortar doors must be securely locked when in the open position with safety pins installed to prevent doors from accidentally closing. Failure to lock mortar doors in open door position may result in serious injury.

WARNING

Mortar doors must be securely locked when in the closed-door position. Doors may bounce up and down while vehicle is moving and cause serious injury.

WARNING

Mortar doors are under spring tension. To avoid serious injury, keep face and body parts clear of doors, and hands clear of door edges when opening or closing mortar doors.

1-11. A minor modification made to the left rear of the MCV accommodates a horizontal ammunition rack located above the left rear sponson (Figure 1-4). This adaptation incorporated changes to the upper sidewalls of the MCV that restructured the common upper sidewall angles of the ICV to a vertical angle. To accommodate the ammunition rack, portions of the spall lining were removed. More armor was added to this area to retain the same level of protection.

Figure 1-4. Horizontal ammunition rack.

MCV CONFIGURATIONS

1-12. The MCV recoiling mortar system incorporates some characteristics of the basic M120/M121. Except for adding an external shoulder on the breech cap that allows mounting the barrel into the recoiling system, the mortar tube is identical to the M120/M121. The RMS6-L 120-mm Mortar System recoiling mechanism is designed to reduce the recoil forces transferred to the vehicle. The type of dismountable mortar carried on the vehicle is dependent upon vehicle configuration. Configurations include:

- **Battalion Configuration**. The platoon MCVs consists of the 120-mm Mounted Mortar System and carries the 81-mm mortar M252 for dismounted use. The 81-mm base plate is stowed on the outside right rear of the vehicle above the tires. The bipod is stowed in the right side of the vehicle just behind the squad leader's station. The bipod can also be stowed on top of the vehicle just behind the winch pocket.
- **Company Configuration.** The company section MCVs consists of the 120-mm Mounted Mortar System and carries the 60-mm mortar M224 for dismounted use. The 60-mm base plate, bipod, and cannon are stowed in the same location as the 81-mm on the battalion configuration.

RECONNAISSANCE, SURVEILLANCE, TARGETING, AND ACQUISTION (RSTA) SQUADRON

1-13. The SBCT battalion RSTA squadron MCV consists of only the 120-mm Mounted Mortar System.

***Note*:** MCV configurations are driven by the different assignments of the MCV, to the battalion, company, or RSTA squadron.

SECONDARY WEAPON

1-14. The secondary weapon on the MCV is the M240B 7.62-mm machine gun. The machine gun is attached to a skate mount with an articulated arm. The mount allows 360-degrees of coverage. A total of 1,000 rounds of ammunition can be stowed on the exterior of the vehicle. The stowage box is to the right of the commander and can hold up to 5 cans (200 rounds each) of ammunition.

RMS6-L 120-MM MORTAR SYSTEM

1-15. The RMS6-L 120-mm Mortar System is a simply constructed and mobile weapon capable of producing a large volume of fire quickly and accurately on any given target within its range. The system is designed for employment in all phases and types of land warfare—on every type of terrain—in all kinds of weather. The system can be brought into or taken out of action quickly.

MCV 120-MM MORTAR CAPABILITY

1-16. The MCV mortar is a smooth bore, muzzle loaded, high angle of fire weapon that provides—

- A traverse field of regard of 4400 mils.
- A maximum range of 6700 meters.
- A maximum angle of elevation of 1486 mils enabling the mortar to engage targets effectively on reverse slopes or behind cover.
- Accurate firing on targets from 180 to 6700 meters.

MCV 120-MM MORTAR CHARACTERISTICS

1-17. The MCV mortar system includes:

- A smooth bore barrel with rounded muzzle end to allow for easy loading.
- A sight instrument mounting bracket with cant correction knob provided for mounting the M67 sight unit.
- A replenisher mounted on top of the cradle that contains hydraulic fluid for the recoil system. The cradle assembly is attached to the saddle and contains a recoil mechanism that buffers barrel recoil during firing.
- Trunnions that allow for vertical pivot of the cradle.
- A connecting hub that attaches the barrel assembly to the cradle.
- The breech piece, which is screwed into the end of the barrel to form a gas tight metal seal. This breech piece houses the firing pin and safety mechanism.
- A traversing handle that provides quick and accurate rotation of the turntable changing the barrel azimuth.
- A saddle assembly, which supports the cradle/barrel assemblies and attaches to the traverse bearing of the lower vehicle mount.
- A traverse bearing assembly that attaches the mortar and recoil system directly to the MCV.
- A quick release lever used to disengage the traversing gear from the traverse bearing assembly that allows free rotation of the saddle assembly.
- An elevating mechanism attached through a folding mechanism to the underside of the cradle that allows for lowering the cannon to the travel position.

- An elevating handle that provides quick and accurate raising or lowering of the cannon in elevation.
- A folding mechanism bushing that allows lowering of the cannon to the travel position.
- A recuperator for maintaining nitrogen and fluid pressure forces the gun back into battery after recoil.

Note: To accept the weight and recoil forces transferred to the vehicle by the RMS6-L MCV 120-mm Mortar System, slight modifications were made to the floor panels. A mounting pad was added to provide for additional support and mounting of the bearing (turntable) on which the mortar traverses. The main bearing of the mortar system is bolted directly to the mounting pad on the floor of the MCV. A fuel transfer control access cover was added to the floor plates.

M95 MORTAR FIRE CONTROL SYSTEM

1-18. The M95 mortar fire control system (MFCS) provides "shoot and scoot" capability to the MCV. Controlled by a software operating system, the commander's interface microprocessor manages computer activities, performs computations, and controls the interface with other components and devices. MFCS components work together to—

- Compute targeting solutions.
- Direct movement of the MCV into position.
- Allow real-time gun orientation.
- Present gun orders to the M95 components mounted in the MCV.

1-19. MFCS components make up a complete, fully integrated digital on-board fire control system that can establish weapon location and orientation without the use of a sight unit, aiming posts, or distant aiming points. The MFCS delivers seamless integration of mortar fires into the digital fire support network, calculates navigation instructions, and computes ballistic solutions while the MCV is moving.

MFCS CAPABILITY

1-20. The 120-mm Mortar System is aligned on the MFCS to maintain alignment with accuracy of 3-mils azimuth and 1-mil elevation in all conditions. The commander's interface stores up to—

- 18 gun positions.
- 3 gun sections.
- 50 known targets.
- 16 registration points
- 3 final protective fire (FPF) missions.
- 12 forward observer (FO) locations.

1-21. If the designated fire direction center (FDC) becomes inoperative for any reason during tactical or training operations, any MFCS equipped MCV can assume FDC responsibilities.

MFCS COMPONENTS

1-22. Major components of the MFCS include the commander's interface, power distribution assembly, gunner's display, pointing device, and driver's display.

- **Commander's Interface**. Interface capabilities include:
  - Managing the information flow between the gun and FDC.
  - Providing interface between MFCS components using text and graphics.
  - Computing technical fire control solution for weapon operation.

- **Power distribution assembly**. Power assembly filters MCV power through the DC power system that isolates MFCS components from power fluctuations, and provides circuit breakers for MFCS components.
- **Gunner's display**. Display receives deflection and elevation orders, and provides "check fire" and "call for fire" capability to the gunner.
- **Pointing device.** Device provides effective pointing and position performance between 80 South to 84 North latitude.
- **Driver's display.** Display provides steering directions, distance and heading in a numerical format, and information needed to orient the MCV upon emplacement.

MORTAR AMMUNITION STOWAGE

1-23. The MCV's ammunition storage system consists of a modular rack system on the right side of the vehicle capable of storing 60-mm, 81-mm, and 120-mm ammunition. Storage is possible in three different combinations depending on the vehicle configuration (battalion, company, or RSTA). A permanent rack on the left side of the MCV holds 120-mm rounds only in horizontal and vertical "ready round" racks. See Chapter 2 for detailed instruction on mortar ammunition stowage and removal.

STOWED 120-MM AND 81-MM MORTAR AMMUNITION

1-24. The MCV is capable of storing sixty 120-mm rounds stored within their individual round containers. The left rear side of the vehicle contains a 120-mm rack that is capable of storing 48 120-mm rounds, 24 horizontal—and 24 vertical. The right side has a flex rack that is capable of storing 12 rounds of 120mm motor ammunition. The right side flex rack is also capable of storing 35, 81-mm rounds. On the 120-mm and 81-mm flex rack located in the right side of the MCV, mortar rounds are held in place by using webbed straps that tighten around the ammunition to provide a positive means of holding the rounds in place (Figure 1-5).

Figure 1-5. Right side ammunition rack.

STOWED 60-MM MORTAR AMMUNITION

1-25. The Infantry company MCV is capable of storing both 120-mm and 60-mm rounds. The left side storage space is common to the battalion and RSTA squadron's MCVs. The right-side rack is capable of storing 77 rounds of 60-mm ammunition. The 60-mm flex rack incorporates a single door that covers the front of the rack. In addition to the webbed straps and aluminum door of the 60-mm configuration, there are wave springs that keep rounds from sliding or rolling while loading and unloading.

RSTA SQUADRON MCV MORTAR AMMUNITION STORAGE

1-26. The RSTA squadron MCV carries the same number of 120-mm rounds as the battalion and company configurations. Though RSTA MCVs carry only 120mm mortar rounds, they can be configured to stow 60-mm and 81-mm ammunition.

SECTION III — UNIT MORTAR TRAINING

1-27. Because MCV lethal and disruptive fires in combat operations are only as effective as training permits, this section focuses on the need for efficient and continuing SBCT mortar training.

TRAINING PRIORITY

1-28. Continuing chapters in this handbook cover operational procedures and fire missions; however, without effective mortar training, effective fire cannot be attained. The importance of skilled and proficient mortarmen must not be overlooked within the context of the company or battalion's overall training strategy. A good training strategy will therefore prioritize continuing training and will allocate the needed resources to make training effective. Leaders may also require training. Unless leaders have a mortar background, they may not understand the distinct training requirements and tactical role of mortars. This can be achieved through officer professional development (OPD) and noncommissioned officer professional development (NCOPD) mortar instruction. Both training opportunities include technical and tactical mortar subjects.

SOUND TRAINING

1-29. Technical and tactical proficiency is based on sound training. Once mortarmen have mastered their own tasks, they must be fully integrated into the training exercises of the company, battalion, or both. It is only within the context of a full maneuver exercise that a mortar unit's indirect fire support abilities can be fully trained and evaluated. Mortars suffer a training deficiency by not having a Multiple Integrated Laser Engagement System (MILES)-like training device to simulate the terminal effects of mortar rounds. As a result, maneuver units tend to under-employ their supporting mortars. Despite the current absence of such devices, there are other techniques to assess the effects of indirect fire. FM 25-4, *How to Conduct Training Exercises*, outlines them fully. Fire missions not specifically using enemy targets such as registration and adjusting final protective fire should also be routinely conducted in maneuver exercises.

***Note*:** A training plan that employs mortarmen only as an opposing force (OPFOR) riflemen is not effective for many reasons. First, when leaders make this training mistake, mortarmen are not being trained in the technical and tactical tasks pertinent to their mission. Second, riflemen are deprived of a valid training experience as OPFOR. Third, maneuver units are not trained to employ their mortar indirect fire support.

MORTAR TRAINING AT TRAINING BASE

1-30. Good mortar unit training strategies begin with a well prepared training base. Leaders must know what skills mortarmen bring with them when they report to their unit. This understanding provides a base on which they can build unit mortar training. The career pattern for officers and NCOs is developed individual training. Effective training will alternate between the training base and units with progressively advanced skill and responsibility levels. Mortar training in the institution focuses on Soldier preparation for these positions. Depending on the course, an effective training focus will include technical training in mortar skills, mortar familiarization, and mortar issues update. Table 1-1 illustrates an institutional mortar training skill level focus.

Table 1-1. Institution mortar training skill level focus.

COURSE	SKILL LEVEL					COURSE FOCUS
	1	2	3	4	OTHER	
One Station Unit Training	X					A
Basic NCO Course		X	X			C,D
Maneuver Advanced NCO Course				X		C,D
Infantry Mortar Leader Course			X	X	X	B,C,D
Basic Officer Leader Course					X	C
Maneuver Captain Career Course					X	D
Pre-Command Course					X	C,D
A = MOS PRODUCING B = ADDITIONAL SKILL IDENTIFIER FOR OFFICERS C = FAMILIARIZATION D = REVIEW/UPDATE						

ONE STATION UNIT TRAINING (11C)

1-31. One Station Unit Training (OSUT) prepares new Soldiers for their initial assignment in Infantry or mechanized units. Training is divided into two phases. Phase I (seven weeks) teaches common entry-level Infantry tasks. Phase II continues to foster the self-discipline, motivation, physical readiness, and proficiency in combat survivability started in Phase I. All indirect fire Infantry trainees receive instruction in mortar systems to prepare them for their specific unit assignments. Soldiers training for this 11C MOS receive familiarization on fire direction control and forward observer (FO) procedures. Trainees are required to pass the mortar gunner's examination to graduate.

BASIC NONCOMMISSIONED OFFICER COURSE (11C)

1-32. The Basic Noncommissioned Officer Course (BNCOC) teaches junior NCOs (sergeant promotable through staff sergeant) to lead, train, and direct subordinates in the maintenance, operation, and employment of weapons and equipment. Instruction includes tactical employment of mortars; fire support planning; FDC procedures with the M95 Mortar Fire Control System; FDC procedures with an M31 lightweight handheld mortar ballistic computer (LHMBC); team drills; and mechanical training. Upon successful completion of 11C BNCOC, Soldiers receive the Infantry Mortar Leader's Course certificate of training.

MANEUVER ADVANCED NONCOMMISSIONED OFFICER COURSE (11C)

1-33. The Advanced Noncommissioned Officer Course (ANCOC) builds on the experience gained in previous training and operational assignments and provides needed skills, knowledge, and experience to train, fight, and sustain a platoon in the contemporary operating environment (COE).

INFANTRY MORTAR LEADER COURSE

1-34. The Infantry Mortar Leader Course (IMLC) provides lieutenants and NCOs (sergeant through master sergeant) with the knowledge to supervise and direct the fire of a mortar platoon. Instructions

include tactical employment of the mortar platoon, graphics, fire planning, mechanical training, FO procedures, and fire direction control measures. Officers are awarded the additional skill identifier of 3Z. Mortar skills learned in this and other mortar classes are complex.. Therefore, commanders must ensure that IMLC graduates fill mortar leadership positions to apply and sustain this vital training.

INFANTRY BASIC OFFICER LEADERSHIP COURSE III

1-35. The Infantry Basic Officer leadership Course (IBOLC) III trains lieutenants in weapons, equipment, leadership, and tactics. The course also prepares them to instruct subordinates in the maintenance, operation, and employment of weapons. Students receive instruction on the fundamentals of fire support planning, and detailed instruction on FO procedures.

MANEUVER CAPTAINS CAREER COURSE (MC3)

1-36. MC3 trains first lieutenants (promotable) and captains with the skills required to serve as company commanders and staff officers at battalion and brigade levels. Course instruction includes leadership, warfighting, and combat service support skills. Mortar training focuses on supervisory tasks.

INFANTRY PRE-COMMAND COURSE

1-37. Infantry Pre-Command Course (IPCC) is intended for field grade officers (major through colonel) designated for battalion and brigade command. Training consists of a review and update on mortar issues such as new equipment, tactics, techniques, and procedures (TTP), battle drills, and safety.

UNIT TRAINING

1-38. An effective unit training program consists of initial and sustainment training. Both may include individual and collective skills. Resources such as training devices, simulators, and simulations (TADSS), ranges, and ammunition further develop skills learned at the institution. The main goal of unit training is the integration of Soldiers into a collective, cohesive effort as mortar squads and platoon members. Drills, simulated training exercises (STXs), and live-fire exercises (LFXs) serve to develop these collective skills.

TRAINING PLAN DEVELOPMENT

1-39. Training plans are developed at higher headquarters to be published in the form of command guidance so subordinate units can develop their plans. The process begins with identifying the unit's mission-essential task list (METL). The METL contains all the collective tasks that a unit must perform to be successful in combat. The following two steps are involved in the process:

1. Commanders assess the unit's proficiency level in each METL task. Information for this assessment is obtained by reviewing past gunner and FDC examinations, Army Training Evaluation Program (ARTEP) results, external evaluation after-action reports (AARs), and by observing the execution of current training.
2. Once the assessment is complete, the commander lists the tasks in priority. Tasks that are identified as untrained (U) and are critical to the mission have training priority. These are followed by tasks that need practice (P), and tasks that are trained (T) to standard. Resources (ranges, ammunition, equipment and time) are requested to train those tasks that do not meet the (T) standard. Finally, the commander refines his plan in the form of training guidance and training schedules. FM 7-1, *Battle Focused Training*, contains specific information on the training plan and METL development process.

INITIAL TRAINING

1-40. Initial training prepares Soldiers and units to a high degree of proficiency. This training level ensures that each Soldier, squad, and platoon has the basic core skills proficiency for his skill level or the collective team.

SUSTAINMENT TRAINING

1-41. Sustainment training reduces skill decay and maintains proficiency within the band of excellence described in FM 7-0.

INTEGRATED TRAINING STRATEGY

1-42. Figure 1-6 outlines a logical progression of events that a mortar platoon can adapt to their training strategy. Mortar squads and the FDC are dual-tracked to focus on their specific training needs. Both tracks must be integrated to develop a mortar platoon that fights as one unit. Individual and collective training must be evaluated against specific standards and discussed in AARs. Objective evaluations provide readiness indicators and determine future training requirements.

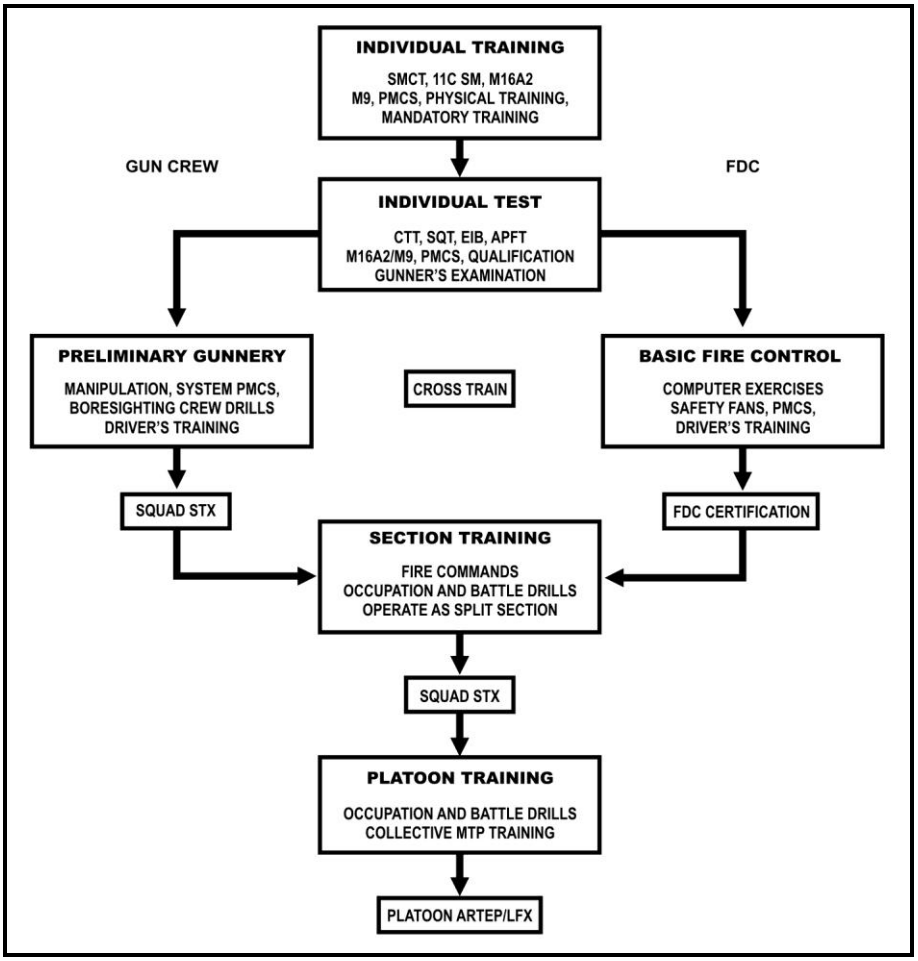


Figure 1-6. Integrated mortar platoon training strategy.

COMMON SOLDIER TASKS

1-43. Common Soldier tasks are found in STP 7-11B1-SM-TG, Skill Level 1, and STP 7-11B24-SM-TG, Skill Levels 2, 3, and 4. These manuals contain the common tasks that all Soldiers must know, regardless of MOS or duty position to help them fight, survive, and win in combat. Mastery of these common tasks is a prerequisite for individual training specific to mortars. The communications and land navigation common tasks are vital.

MOS 11C TASKS

1-44. STP 7-11C14-SM-TG, Skill Levels 1-4 for MOS 11C, contains individual tasks specific to mortarmen. The trainer's guide provides leaders with the information required to develop individual portions of a unit plan. Each 11C task is listed in this guide.

CROSS TRAINING

1-45. Casualties (whether in war or in training) can quickly render mortars ineffective if key personnel are lost. This fact makes cross training Soldiers outside of their assigned position in mortars essential.

COLLECTIVE TRAINING

1-46. Collective training includes squad, section, and platoon drills and exercises.

Squad Training

1-47. Squad-level mortar tasks are in the Infantry MTP. Training can be performed in garrison using devices or live ammunition. Once these tasks are mastered, an increased challenge is introduced by performing them under different conditions such as urbanized terrain, limited visibility or chemical, biological, radiological, and nuclear (CBRN). Cross training is accomplished at this level by rotating Soldiers among duty positions, such as squad leader, and FDC positions, while providing coaching.

1-48. The focus of squad-level training is the Drill. If individual proficiency is effectively sustained, new Soldiers can be readily integrated into the unit during collective training. Soldiers arrive at a unit proficient in specific tasks learned in the training base, such as ground mount 60/81-mm mortar operations. Once in the unit they must learn additional tasks (mortar carrier/MFCS) while training with their experienced peers and squad leaders. MCV battle and squad drills are included in Chapter 4 of this handbook. The foundation of squad training is sound individual training.

Section and Platoon Training

1-49. The core section, platoon tasks, collective tasks and other training products are located on the Digital Training Management System (DTMS). Infantry unit task lists and collective tasks are accessible through the DTMS, and are also posted to the Warrior University Web site (https://www.warrioruniversity.army.mil/login.html) Training usually consists of an exercise in the field: LFX, STX (either alone or with a rifle company), or field training exercise (FTX) as part of the battalion. LFXs may involve subcaliber or service ammunition. STXs and FTXs may incorporate live fire, dry fire, and TADSS in combination or separately.

1-50. The fire support team (FIST) must be a part of this training. An LFX must never take place without the FISTs normally associated with the battalion. Trainers may wish to integrate these artillerymen into the mortar unit to teach them the capabilities, limitations, and unique requirements of operating mortars.

The Mortar's Role in Task Force Operations

1-51. Mortars also play a vital role in overall task force operations. Collective training mainly involves leaders in an FTX. However, mortars must be considered along with other fire support assets when conducting a MAPEX, CFX, TEWT or CPX.

Collective Training Resources

1-52. Warrior tasks, battle drills, collective tasks and other training products are located on the Digital Training Management System (DTMS). Infantry unit task lists and collective tasks are accessible through the DTMS, and are also posted to the Warrior University Web site (https://www.warrioruniversity.army.mil/login.html).

Battle Drills. The first are battle drills (previously termed crew drills). Battle drills involve specific categories of collective tasks performed at the squad, section, or platoon level. They are standardized throughout the U.S. Army and may not be modified in training. The mortar unit is required to be proficient in all battle drills contained in the drill book because they are vital to the mortar's success in combat. Their focus is on the mechanical manipulation of the mortar such as small deflection changes and removing misfires. Full proficiency in battle drill tasks is a prerequisite to participating in fire support missions. Less critical drills are published in other sources such as training circulars or field manuals.

Survival Battle Drills. The second area encompasses those battle drills essential to combat survival such as React to Chemical Attack, React to Indirect Fire, and React to Nuclear Attack.

Mission Training Plan

1-53. The mission training plan (MTP) is a descriptive ARTEP document for training mortarmen to critical wartime mission proficiency. It gives the mortar platoon or section a clear description of "what" and "how" to train. This is achieved through comprehensive, detailed training and evaluation outlines (T&EOs); guidance on training exercises; and other related training management aids. While its focus is on collective training, the MTP also provides matrices that identify individual tasks and common 11C SM tasks.

TRAINING EVALUATION

1-54. Evaluation cannot be separated from effective training. It occurs during the top-down analysis when planners develop their training plan. Planners use various sources of information to assess their unit's individual and collective training status. Evaluation is continuous during training. Soldiers receive feedback through coaching and AARs. Leaders also assess their own training plan and the instructional skills of subordinate leaders. After training, leaders evaluate by sampling training or reviewing AARs. Much of this evaluation is conducted informally. Formal evaluations occur under the Individual Training and Evaluation Program and the Army Training and Evaluation Program (ARTEP) to assess individual and collective training respectively.

INDIVIDUAL TRAINING

Commander's Evaluation

1-55. Supported by the MOS 11C Soldier manuals and trainer guides, the commander's evaluation is conducted routinely at the unit level. Commanders select and evaluate individual tasks that support their unit mission and contribute to unit proficiency. This may be performed through local tests or assessments of Soldier proficiency on crucial mortar MOS tasks or common tasks. The evaluation is based on year-round constant evaluation by the chain of command.

Gunner's Examination

1-56. The gunner's examination is a continuation of the mortar-based drills in which a mortar man's proficiency as a gunner is established. The examination is contained in Chapter 5 of this handbook. The examination includes gunner tests, equipment, conditions, testing procedures, scoring, and administrative procedures. The gunner's success also depends on the collective performance of his assistants. So within these limitations, evaluators should try to standardize the examination. The battalion level training model requires the squad leader, gunner, and assistant gunner to pass the gunner's exam semiannually. All gunners must have a current qualification before participating in an LFX.

Fire Direction Control Certification

1-57. Fire direction control certification provides commanders with a means to verify that their FDC mortarmen have the knowledge and skills for their positions. Certification helps ensure that ammunition is expended wisely, and that training is conducted both safely and effectively. Mortarmen are certified when they receive a passing score on the two-part examination. (See FM 3-22.91, *Mortar Gunnery* for FDC certification.)

COLLECTIVE TRAINING

Army Training and Evaluation Program

1-58. The aim of collective training is to provide units with the skills required to perform unit-level tasks. ARTEPs provide the overall program for collective training. They prescribe the collective tasks a mortar unit must successfully perform to accomplish its mission and to survive in combat. Located in MTPs and drill books, collective training tasks include conditions and performance standards.

External Evaluation

1-59. The commander formally determines the status of his collective training through external evaluation. The external evaluation gives the commander an objective appraisal of this status by using mortar expertise found outside the normal chain of command. The external evaluation is not a test in which a unit passes or fails; it is a diagnostic tool for identifying training strengths and weaknesses. An external evaluation is not a specific training event; it is a means to evaluate a training event. Mortar units undergo external evaluations during an LFX, FTX, or a combination of the two. The unit may be evaluated alone, as part of its parent unit, or with other mortar units. The MTP provides guidance on planning, preparing, and conducting an external evaluation.

Evaluation of Forward Observer

1-60. Mortar fires can be no more effective than their spotting forward observers (FOs). It is therefore critical that FIST FOs are present and evaluated during an externally evaluated mortar LFX. If an FO fails to meet his performance standards, mortarmen should not be penalized. Only as a last resort should a fire mission be deleted from the evaluation. In the event of an FO failure, mortarmen should be given the opportunity to successfully complete the fire mission in the following ways:

1. Start the fire mission over. Though ammunition constraints during live-fire may not permit this, tasks can be repeated using devices, or less preferably, by dry fire.
2. Correct the call for fire or correction. Mortarmen should not have to use wrong firing data if an FO makes an incorrect call for fire or correction. This wastes valuable training ammunition. To avoid this, FO evaluators at the observation point can change a call for fire or correction to reflect proper procedures.

Chapter 2

OPERATIONAL PROCEDURES

Mortar ammunition and sighting accuracy make the Stryker MCV a formidable Infantry weapon. This chapter addresses the proper stowage of MCV mortar ammunition based upon battalion, RSTA, and company carrier configurations. It also discusses procedures for boresighting the 120-mm cannon (both manually and in digital mode), and emplacement procedures for the section and platoon using the Mortar Fire Control System.

Section I — MORTAR AMMUNITION

2-1. Though the 120-mm mortar system is the primary weapon of the MCV; mission, enemy, terrain and weather, troops and support available, time available and civil considerations (METT-TC) may dictate use of the 60-mm or 81-mm weapon system. FM 3-22.90, Mortars, and FM 3-22.91, Mortar Gunnery, cover 60-mm and 81-mm mortar ground-mounted installation, placement, and firing procedures. These manuals also cover other 120-mm mortar platform systems. This handbook covers only those things specific to MCV operations.

MORTAR STORAGE SPACE, 60-MM/81-MM

2-2. Example Load Plan, Chapter 6 of this handbook, has been extracted from TM 9-2355-311-10-3-1. Chapter 6 illustrates in graphic detail the storage location of the 60-mm (company load plan) and 81-mm (battalion load plan). Chapter 4 of this handbook, "Drills," covers storage and dismounting of the 60-mm/81-mm systems.

AMMUNITION STORAGE SPACE

2-3. The MCV is equipped with two ammunition racks capable of storing 120-mm, 81-mm, or 60-mm ammunition. The quantity of each type of ammunition stored onboard the vehicle is based on where the MCV is assigned. If the MCV is assigned to a RSTA squadron, it can store 60 rounds of 120-mm ammunition. At the Infantry battalion it can store 48 rounds of 120-mm, and 35 rounds of 81-mm ammunition. When assigned at the Infantry company level, it can store 48 rounds of 120-mm ammunition, and 77 rounds of 60-mm ammunition.

***Note*:** Orientation of the MCV's right versus left side is based on a rear vehicle view.

LEFT-SIDE AMMUNITION RACK

2-4. The left ammunition rack is used to store 120-mm ammunition only. It has six vertical compartments and six horizontal compartments. This rack can hold four rounds in each of the 12 compartments for a total of 48 rounds.

RIGHT-SIDE AMMUNITION RACK

2-5. The right ammunition rack can be configured to store 120-mm, 81-mm, or 60-mm ammunition.

1. When the rack is configured for 120-mm, it has four vertical compartments. It can hold three rounds in each of the four compartments for a total of 12 rounds.
2. When the rack is configured for 81-mm, it has one horizontal compartment and six vertical compartments. It can hold five rounds in each of the seven compartments for a total of 35 rounds.
3. When the rack is configured for 60-mm ammunition, it has two vertical compartments and nine horizontal compartments. It can hold seven rounds in each of the eleven compartments for a total of 77 rounds.

Notes:
1. All ammunition is stored in its original containers with seals unbroken.
2. HE ammunition can be stored in either the horizontal or vertical compartments.
3. WP ammunition must be stored in the vertical compartments only. WP ammunition must be stored in the vertical compartments only.
4. Illumination ammunition can be stored in either the horizontal or vertical compartments.
5. Load ammunition from the bottom compartment of the rack to the top compartment.
6. Unload ammunition from the top compartment of the rack to the bottom compartment.

SECURING AMMUNITION

2-6. All ammunition must be secured before moving the MCV. Ammunition is held in the ammunition compartments by retainer clips. However, it can fall out when traveling over rough terrain or when making sharp turns. Doors on the ammunition racks must be closed and secured. Straps on the vertical compartments must be hooked and tight.

WARNING

Ammunition may fall out of ammunition racks if not properly secured. Failure to secure ammunition prior to moving the MCV can result in damage to equipment or ammunition and/or injury to personnel.

120-MM AMMUNITION

2-7. To ensure ammunition is being correctly stowed and removed from ammunition racks, vehicle leaders should be present during the handling of 120-mm ammunition.

2-8. Stow and secure 120-mm ammunition in left-side horizontal rack. The following steps should be performed in order when stowing 120-mm ammunition (Figure 2-1).

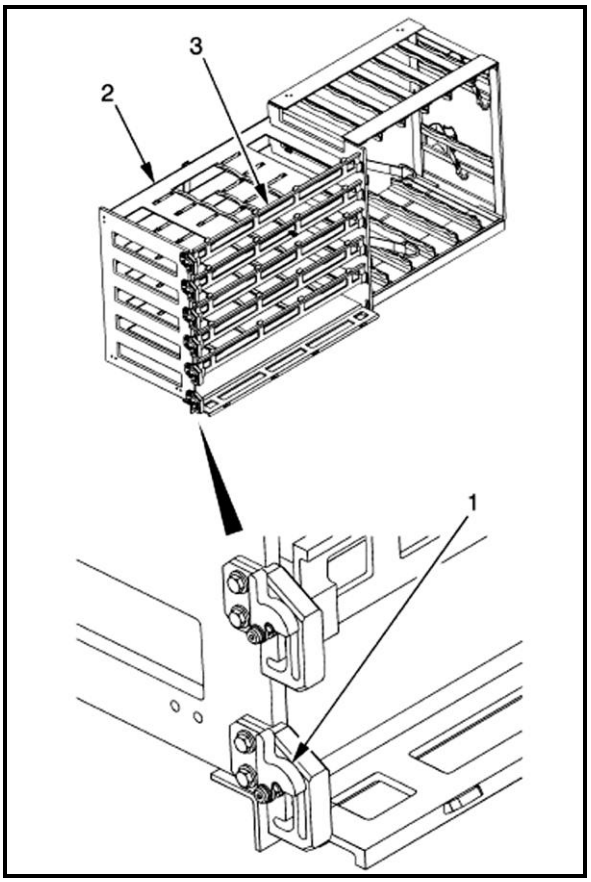


Figure 2-1. Left side 120-mm ammunition horizontal rack (stowage).

1. Push and hold latch (1) on left side of ammunition rack (2).
2. Grasp top of door (3) and pull up to clear internal locking device located inside of rack.
3. Pull door (3) out slightly and release latch.
4. Grasp top of door (3) with two hands and pull down to open position.
5. Load up to four rounds into compartment.
6. Push door (3) up toward closed position.
7. When door approaches closed position, grasp top of door, pull up to clear internal locking device, and continue closing door.
8. When door (3) is in the full closed position, push door down while making sure latch (1) snaps back into lock position. Ensure door is secure.
9. Repeat steps 1-8 for other compartments as required.

WARNING

Ammunition may fall out of the horizontal ammunition rack if not properly secured. Failure to secure ammunition before moving the MCV can result in damage to equipment or ammunition and/or injury to personnel.

REMOVE 120-MM AMMUNITION FROM LEFT SIDE HORIZONTAL RACK

2-9. Perform the following steps when removing 120-mm ammunition in the horizontal rack (Figure 2-2).

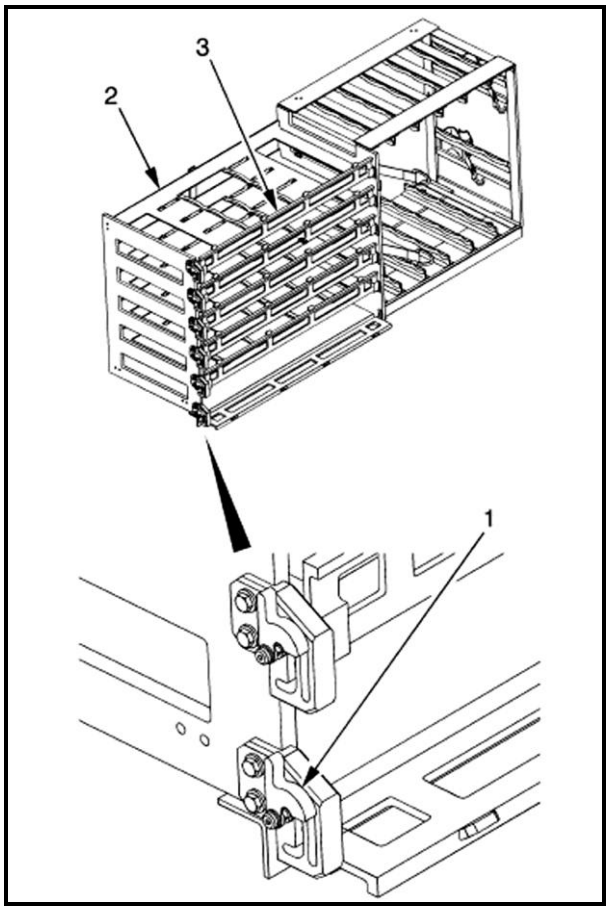


Figure 2-2. Left side 120-mm ammunition horizontal rack (removal).

1. Push and hold latch (1) on left side of ammunition rack (2).
2. Grasp top of door (3) and pull up to clear internal locking device located inside of rack.
3. Pull door out slightly and release latch (1).
4. Grasp door (3) with two hands and pull down to open position.
5. Remove one round from compartment.

***Note*:** Unload ammunition from the top compartment of rack to the bottom compartment.

6. Repeat step 5 as required until desired number of rounds are removed or compartment is empty.
7. Push door (3) up toward closed position.
8. When door (3) approaches closed position, grasp top of door, pull up to clear internal locking device, and continue closing the door.
9. When door is in fully closed position, push door down, and make sure latch (1) snaps back into the locked position. Ensure door is secure.
10. Perform steps 1-9 for other compartments as required.

STOW AND SECURE 120-MM AMMUNITION IN LEFT SIDE VERTICAL RACK

2-10. Perform the following steps when stowing 120-mm ammunition in the vertical rack (Figure 2-3).

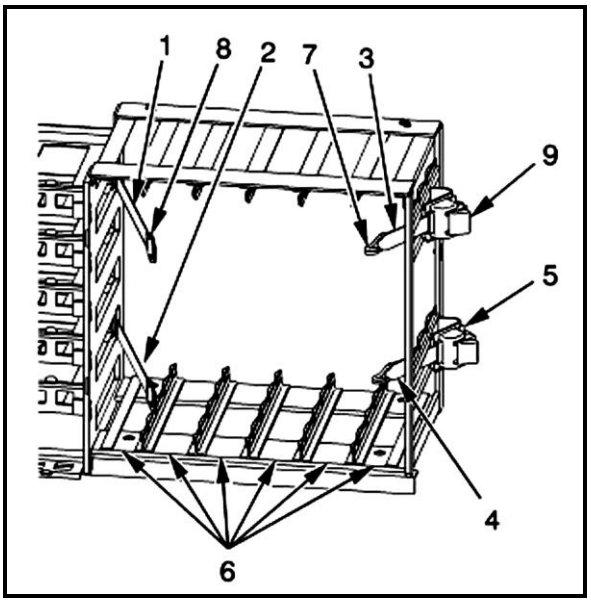


Figure 2-3. Left side 120-mm ammunition vertical rack (stowage).

1. Ensure fixed straps (1) and (2) are out of the way.
2. Ensure retractable straps (3) and (4) are fully retracted. If not, press release lever (5) and allow straps to retract.
3. Load up to four rounds in each vertical compartment (6) as required.

CAUTION

Make sure to route straps on inside of frame and around outermost ammunition. Straps routed on outside of frame will not secure ammunition and will cause strap to fray. Failure to properly route straps may result in damage to equipment.

4. Press release lever (5) and pull upper retractable strap (3) through frame of rack, around ammunition, and all the way toward upper fixed strap (1).

***Note*:** To ensure ammunition is held securely in place, make sure more rounds of ammunition are loaded into compartments located toward the center of the rack than compartments located toward either end of rack.

5. Insert hook on retractable strap (7) into loop on fixed strap (8).
6. Release both straps and allow retractable strap (3) to retract.
7. Operate ratchet handle until retractable strap (3) is snug.
8. Verify that ammunition is securely held in place by retractable strap. If not, repeat step 7.
9. Push ratchet handle (9) in to the stowed position.
10. Repeat steps 4-9 for fixed strap (2) and lower retractable strap (4).

WARNING

Ammunition may fall out of the vertical ammunition rack if not properly secured. Failure to secure ammunition before the MCV is moved can result in damage to equipment or ammunition and/or injury to personnel.

REMOVE 120-MM AMMUNITION FROM LEFT SIDE VERTICAL RACK

2-11. Perform the following steps when removing 120-mm ammunition in the vertical rack (Figure 2-4).

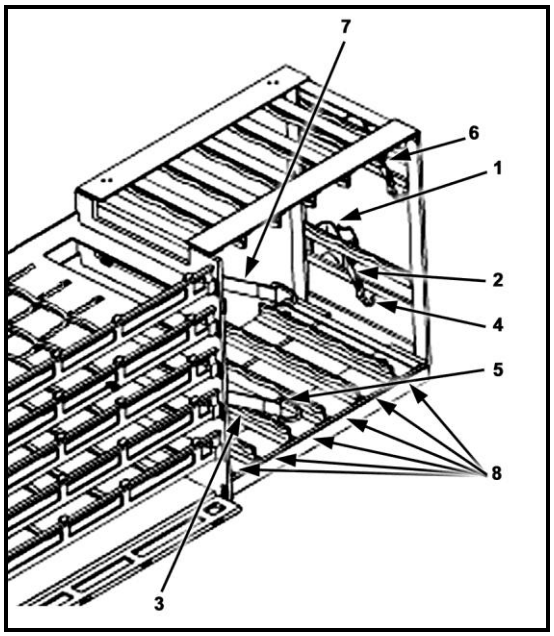


Figure 2-4. Left side 120-mm ammunition vertical rack (removal).

1. Press release lever (1) and pull retractable strap (2) to loosen.
2. Grasp lower fixed strap (3) and remove lower hook (4) from loop.
3. Release both straps and allow retractable strap (2) to retract.
4. Repeat steps 1-3 for upper retractable strap (6) and fixed strap (7).
5. Remove one round from desired compartment (8).
6. Repeat step 5 as required until desired number of rounds are removed.

***Note*:** To ensure ammunition remaining in ammunition rack is securely held in place, make sure more rounds of ammunition are left in compartments located toward the center of rack than compartments located toward either end.

STOW AND SECURE 120-MM AMMUNITION IN RIGHT SIDE VERTICAL RACK

2-12. Perform the following steps when stowing 120-mm ammunition in the vertical rack (Figure 2-5).

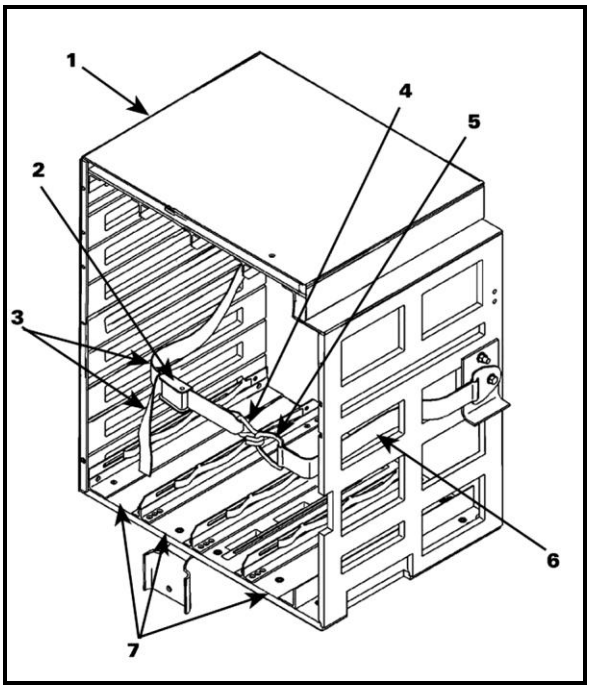


Figure 2-5. Right side 120-mm ammunition vertical rack (stowage).

1. Make sure that right ammunition rack (1) is configured for 120-mm ammunition. If not, notify field maintenance.
2. Press release lever (2) and adjust to lengthen strap (3).
3. Remove hook (4) of adjustable strap (3) from loop (5) on fixed strap (6).

Note: To ensure ammunition is held securely in place, make sure more rounds of ammunition are loaded into compartments located toward the center of rack than compartments located toward either end of rack.

4. Load up to three rounds in each vertical compartment (7) as required.
5. Ensure both straps are routed through opening on side of rack to inside of frame and around ammunition.

CAUTION

Make sure to route straps on inside of frame and around outermost ammunition. Straps routed on outside of frame will not secure ammunition and will cause the strap to fray. Failure to properly route straps may result in damage to equipment.

6. Press release lever (2) and adjust to lengthen strap (3) as required.
7. Attach hook (4) of adjustable strap (3) into loop (5) on fixed strap (6).
8. Pull adjustable strap (3) to tighten and retain stowed ammunition.
9. Verify that ammunition is securely held in place by straps. If not, repeat steps 7 and 8.

WARNING

Ammunition may fall out of the horizontal ammunition rack if not properly secured. Failure to secure ammunition before moving the MCV can result in damage to equipment or ammunition and/or injury to personnel.

REMOVE 120-MM AMMUNITION FROM RIGHT SIDE VERTICAL RACK

2-13. Perform the following steps when removing 120-mm ammunition in the vertical rack (Figure 2-6).

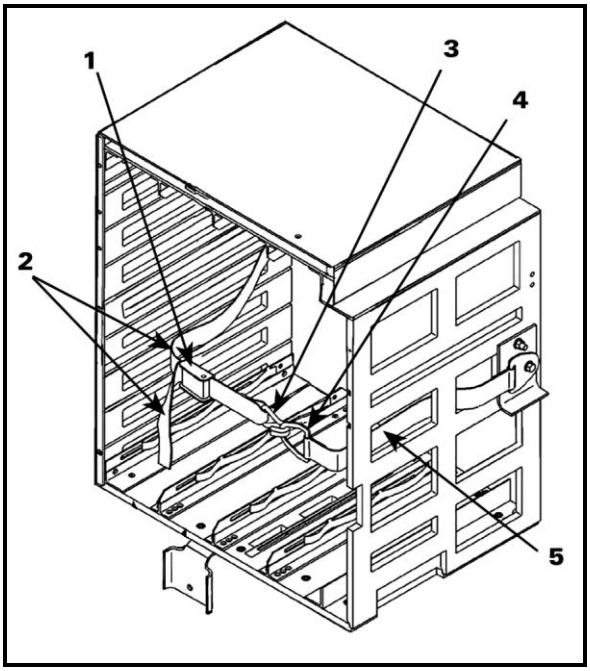


Figure 2-6. Right side 120-mm ammunition vertical rack (removal).

1. Press release lever (1) and expand adjustable strap (2) to loosen.
2. Remove hook (3) of adjustable strap (2) from loop (4) on fixed strap (5).
3. Remove rounds as required from compartments.
4. Attach hook (3) of adjustable strap (2) into loop (4) on fixed strap (5).

CAUTION

Make sure to route straps on inside of frame and around outermost ammunition. Straps routed on outside of frame will not secure ammunition and will cause strap to fray. Failure to properly route straps may result in damage to equipment.

5. Pull adjustable strap (2) to tighten until snug.
6. Ensure any remaining ammunition is securely held in place by straps. If not, repeat step 5.

WARNING

Ammunition may fall out of the horizontal ammunition rack if not properly secured. Failure to secure ammunition before moving the MCV can result in damage to equipment or ammunition and/or injury to personnel.

81-MM AMMUNITION

2-14. Vehicle leaders should be present during the handling of 81-mm ammunition to ensure ammunition is being correctly stowed and removed from ammunition racks.

STOW 81-MM AMMUNITION IN RIGHT AMMUNITION VERTICAL/HORIZONTAL RACK

2-15. Perform the following steps when stowing 81-mm ammunition vertical/horizontal in the rack (Figure 2-7).

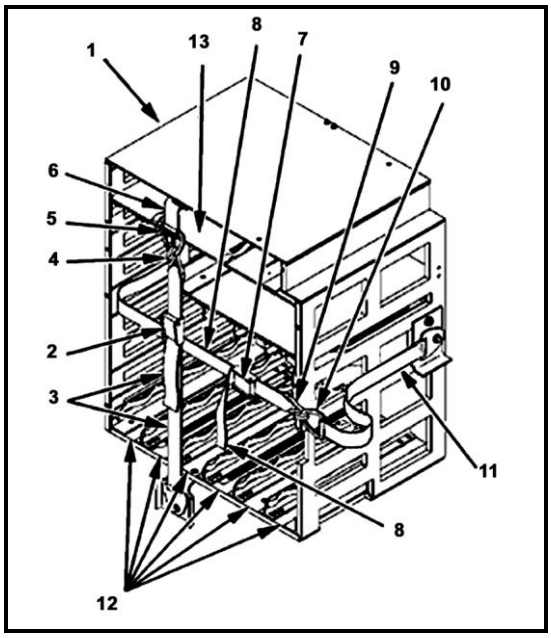


Figure 2-7. Right side 81-mm ammunition vertical/horizontal rack (stowage).

1. Make sure right ammunition rack (1) is configured for 81-mm mortar ammunition. If not, notify field maintenance.
2. Press release lever (2) and adjust to lengthen adjustable vertical strap (3).
3. Remove hook (4) of adjustable vertical strap (3) from loop (5) on upper fixed strap (6).
4. Press release lever (7) and adjust to lengthen adjustable horizontal strap (8).
5. Remove hook (9) of adjustable horizontal strap (8) from loop (10) on side fixed strap (11).

Note: To ensure that ammunition remaining in ammunition rack is securely held in place, make sure that more rounds of ammunition are left in compartments located towards the center of rack than compartments located towards either end.

6. Load up to five rounds in each of six vertical compartments (12) as required.

7. Load up to five rounds in horizontal compartment (13) as required.
8. Press release lever (7) and adjust to lengthen adjustable horizontal strap (8) as required.
9. Check both straps (8) and (11), ensuring they are routed through opening on side of rack to inside of frame and around ammunition.

CAUTION

Make sure to route straps on inside of frame and around outermost ammunition. Straps routed on outside of frame will not secure ammunition and will cause strap to fray. Failure to properly route straps may result in damage to equipment.

10. Install hook (9) of adjustable horizontal strap (8) into loop (10) on side of fixed strap (11).

CAUTION

81-mm ammunition stowage incorporates webbing straps with hooks that face toward the aisle. Use tape or adequate protection to cover the hook end to prevent a laceration to personnel.

11. Pull adjustable horizontal strap (8) to tighten and retain stowed ammunition.
12. Install hook (4) of adjustable vertical strap (3) into loop (5) on upper fixed strap (6).
13. Pull adjustable vertical strap (3) to tighten and retain stowed ammunition.
14. Check that ammunition is securely held in place by straps in vertical compartments (12) and horizontal compartment (13). If not, retighten straps as required.

***Note*:** Use a second webbing strap. Recommend using NSN 5340-21-913-8942 (70 inches in length), to adequately secure 81-mm ammunition in the rack.

WARNING

Ammunition may fall out of horizontal ammunition rack if not properly secured. Failure to secure ammunition before moving vehicle can result in damage to equipment or ammunition and/or injury to personnel.

REMOVE 81-MM AMMUNITION FROM RIGHT AMMUNITION VERTICAL/HORIZONTAL RACK

2-16. Perform the following steps when removing 81-mm ammunition from a vertical or horizontal rack position (Figure 2-8).

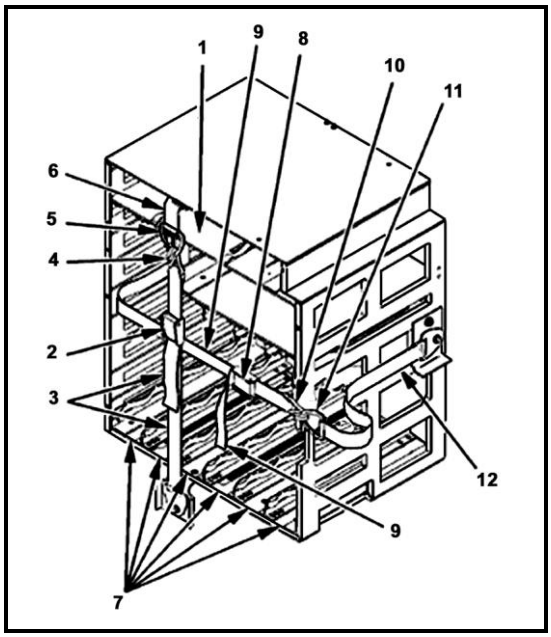


Figure 2-8. Right side 81-mm ammunition vertical/horizontal rack (removal).

1. To remove ammunition from horizontal compartment (1):
   - Press release lever (2) and adjust to lengthen adjustable vertical strap (3).
   - Remove hook (4) of adjustable vertical strap (3) from loop (5) on upper fixed strap (6).
   - Remove rounds as required from horizontal compartment (1).
   - If no additional rounds are required, install hook (4) of adjustable vertical strap (3) into loop (5) on upper fixed strap (6).
   - Pull adjustable vertical strap (3) to tighten and retain stowed ammunition.
2. To remove ammunition from vertical compartments (7):
   - Press release lever (8) and adjust to lengthen adjustable horizontal strap (9).
   - Remove hook (10) of adjustable horizontal strap (9) from loop (11) on side fixed strap (12).

Note: Ammunition in vertical compartment blocked by vertical strap will require vertical strap to be loosened and unhooked before removing rounds.

- Remove rounds as required from desired vertical compartments (7).
- If all ammunition is removed from rack, lock and secure straps.
- Ensure both straps (9) and (12) are routed to inside of frame and around ammunition.

CAUTION

Make sure to route straps on inside of frame and around outermost ammunition. Straps routed on outside of frame will not secure ammunition and will cause strap to fray. Failure to properly route straps may result in damage to equipment.

- If no additional rounds are required, install hook (10) of adjustable horizontal strap (9) into loop (11) on side fixed strap (12).

Note: To ensure that ammunition remaining in ammunition rack is securely held in place, make sure that more rounds of ammunition are left in compartments located towards the center of rack than compartments located towards either end.

- Pull adjustable horizontal strap (9) to tighten and retain remaining ammunition.

CAUTION

81-mm ammunition stowage incorporates webbing straps with hooks that face toward the aisle. Use tape or adequate protection to cover the hook end to prevent a laceration to personnel.

3. Check ammunition is securely held in place by straps in vertical compartments (7) and horizontal compartment (1). If not, rearrange ammunition and retighten straps as required.

WARNING

Ammunition may fall out of the horizontal ammunition rack if not properly secured. Failure to secure ammunition before moving the MCV can result in damage to equipment or ammunition and/or injury to personnel.

Note: Use a second webbing strap. Recommend using NSN 5340-21-913-8942 (70 inches in length) to adequately secure 81-mm ammunition in the rack.

60-MM AMMUNITION

2-17. Vehicle leaders should be present during the handling of 60-mm ammunition to ensure ammunition is being correctly stowed and removed from ammunition racks.

STOW 60-MM AMMUNITION IN RIGHT AMMUNITION VERTICAL/HORIZONTAL RACK

2-18. Perform the following steps when stowing or when removing 60-mm ammunition from the right vertical/horizontal rack (Figure 2-9).

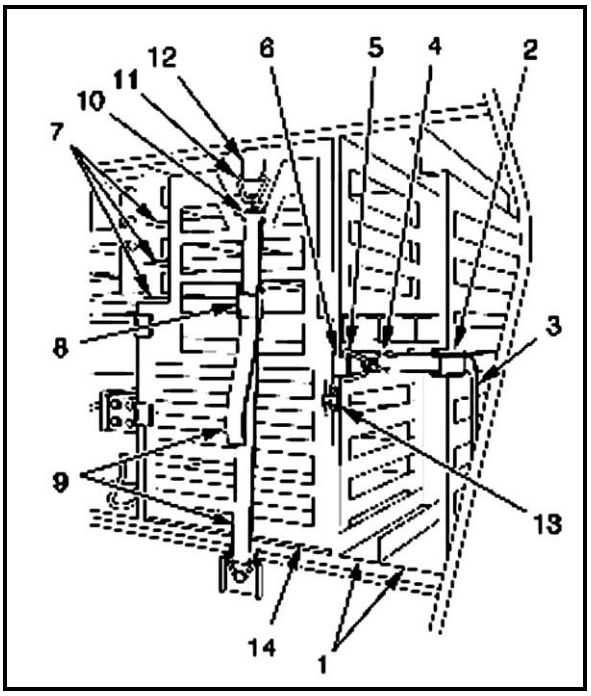


Figure 2-9. Right side 60-mm ammunition vertical/horizontal rack (stowage).

1. Make sure the right ammunition rack is configured for 60-mm ammunition. If not, notify field maintenance.
2. To stow 60-mm ammunition in vertical racks (1):
   - Press release lever (2) and adjust to lengthen adjustable vertical rack strap (3).
   - Remove hook (4) of adjustable vertical strap (3) from loop (5) on fixed strap (6).
   - Stow up to seven rounds of 60-mm ammunition into each of two vertical racks (1).

CAUTION

Make sure to route straps on inside of frame and around outermost ammunition. Straps routed on outside of frame will not secure ammunition and will cause straps to fray. Failure to properly route straps may result in damage to equipment.

   - Ensure all straps are routed to inside of frame and around ammunition.
   - Install hook (4) of adjustable vertical strap (3) into loop (5) on fixed strap (6).
   - Pull adjustable vertical strap (3) to tighten and retain stowed ammunition.

CAUTION

81-mm ammunition stowage incorporates webbing straps with hooks that face toward the aisle. Use tape or adequate protection to cover the hook end to prevent a laceration to personnel (see Figure 2-10).

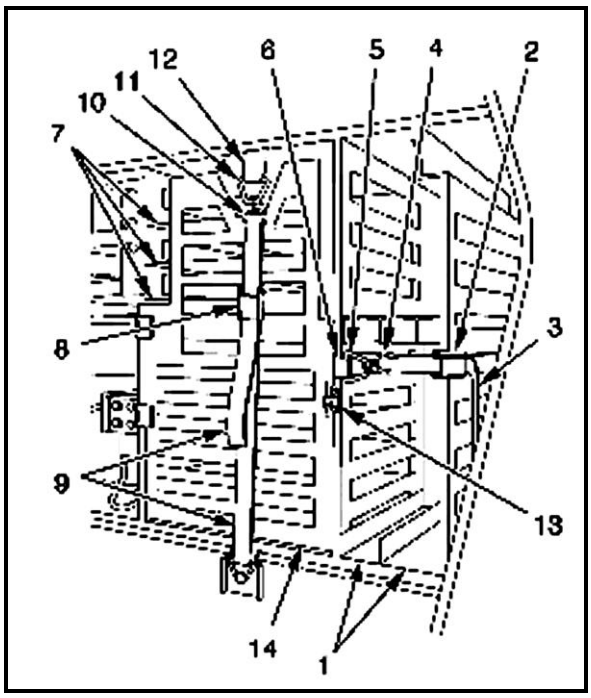


Figure 2-10. Right side 60-mm ammunition vertical/horizontal rack (stowage).

3. To stow 60-mm ammunition in horizontal racks (7):
   - Press release lever (8) and adjust to lengthen adjustable horizontal rack strap (9).
   - Remove hook (10) of adjustable horizontal rack strap (9) from loop (11) on fixed strap (12).
   - Lift door latch (13) and open door (14).
   - Stow up to seven rounds of 60-MM ammunition into each of nine horizontal racks (7).
   - When all ammo required for horizontal racks is stowed, close door (14) and lock door latch (13).
   - Install hook (10) of adjustable horizontal rack strap (9) into loop (11) on fixed strap (12).
   - Pull adjustable horizontal rack strap (9) to tighten.
4. Ensure vertical rack strap (3) and horizontal rack strap (9) are fully tightened. If not, retighten straps as required.

WARNING

Ammunition may fall out of the horizontal ammunition rack if not properly secured. Failure to secure ammunition before moving vehicle could result in damage to equipment or ammunition and/or injury to personnel.

REMOVE 60-MM AMMUNITION FROM RIGHT AMMUNITION VERTICAL/HORIZONTAL RACK

2-19. Perform the following steps when removing 60-mm ammunition from the vertical/horizontal rack (Figure 2-11).

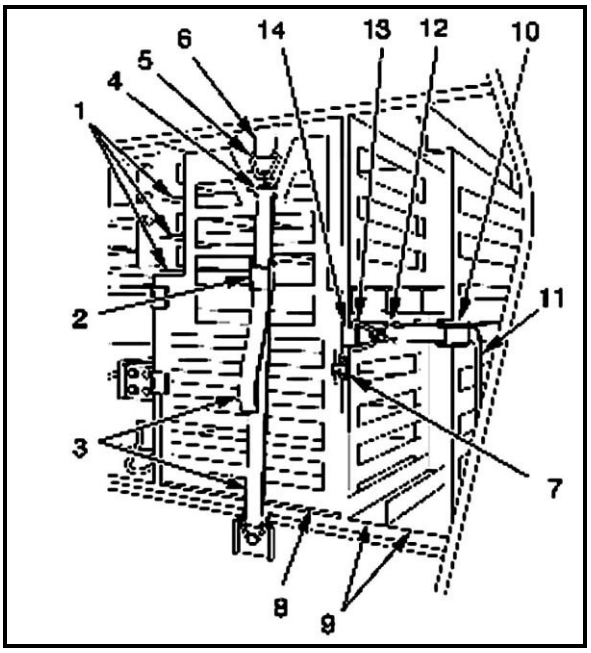


Figure 2-11. Right side 60-mm ammunition vertical/horizontal rack (removal).

1. To remove 60-mm ammunition from horizontal racks (1):
   - Press release lever (2) and adjust to lengthen adjustable horizontal strap (3).
   - Remove hook (4) of adjustable horizontal rack strap (3) from loop (5) on fixed strap (6).
   - Lift door latch (7) and open door (8).
   - Remove rounds as required from any of nine horizontal racks (1).
   - When all ammo required has been removed, close door (8) and lock door latch (7)•
   - Install hook (4) of adjustable horizontal rack strap (3) into loop (5) on fixed strap (6).
   - Pull adjustable horizontal rack strap (3) to tighten.
2. To remove 60-mm ammunition from vertical racks (9):
   - Press release lever (10) and adjust to lengthen adjustable vertical rack strap (11).
   - Remove hook (12) of adjustable vertical strap (11) from loop (13) on fixed strap (14).•
   - Remove rounds as required from any of two vertical racks (9).
   - When all ammo required has been removed, install hook (12) of adjustable vertical strap (11) into loop (13) on fixed strap (14).
   - Pull adjustable vertical rack strap (11) to tighten and retain remaining stowed ammunition.

Note: To ensure that ammunition remaining in ammunition rack is securely held in place, make sure that more rounds of ammunition are left in compartments located towards the center of rack than compartments located towards either end.

3. Check that ammunition is securely held in place by straps in vertical racks (9) and horizontal racks (1). If not, retighten straps as required.

WARNING

Ammunition may fall out of the horizontal ammunition rack if not properly secured. Failure to secure ammunition before moving the MCV could result in damage to equipment or ammunition and/or injury to personnel.

***Note*:** Use a second webbing strap. Using NSN 5340-21-913-8942 (70 inches in length) is recommended to adequately secure 81-mm ammunition in the rack.

Section II — BORESIGHT AND SIGHT CALIBRATION OF 120-MM MORTAR

2-20. This section addresses the manual and digital boresight procedures using the M45 series boresight for the RMS6-L 120-mm mortar. Boresighting is a vital accuracy enhancing measure that must be conducted during every long halt, in assembly area procedures, and in consolidation and reorganization.

MANUAL BORESIGHT

2-21. In preparation for the manual calibration of the M45 boresight of the MCV's equipped 120-mm mortar, the vehicle should be positioned on flat level terrain. The mortar must be oriented onto an aiming point at least 200 meters away. It must also have a clearly defined vertical line, (Figure 2-12), and must be placed into action with the mortar barrel assembly in the center of traverse.

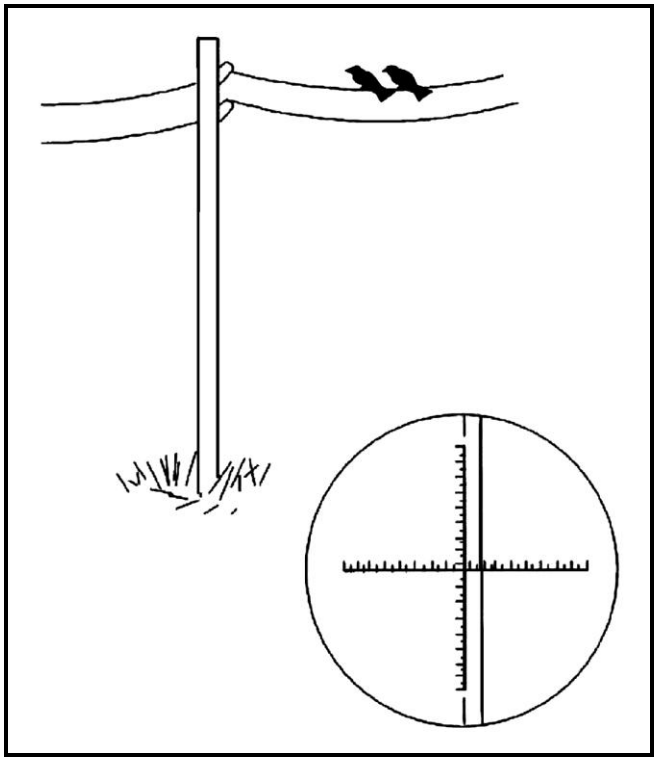


Figure 2-12. Example distant aiming point for boresight.

2-22. For complete instructions on operation of the M67 Sight unit, refer to TM 9-1015-250-10, Operators Manual for Mortar, 120-mm.

MANUAL BORESIGHT SET-UP

2-23. The following set-up procedures are required to boresight the 120-mm mortar manually.

1. Install the M67 sight unit (Figure 2-13) and index a deflection of 3200 mils and an elevation of 800 mils.

2. Place the elbow telescope eyepiece parallel to the ground, and align index marks on the telescope and eyepiece and lock the eyepiece in place using the wingnut on the loop clamp.

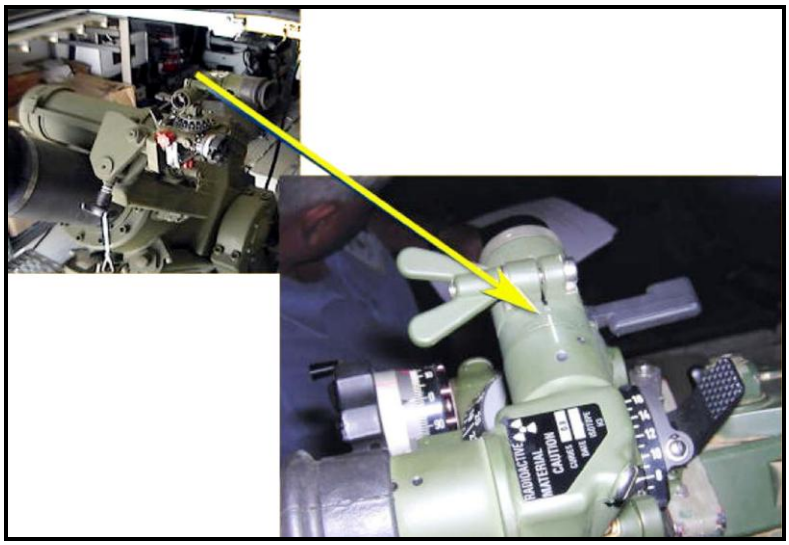


Figure 2-13. M67 Sight unit.

3. Remove cant, if present, by turning the cant correction (cross-level) knob (Figure 2-14) until the bubble in the cross-level on M67 sight is centered.

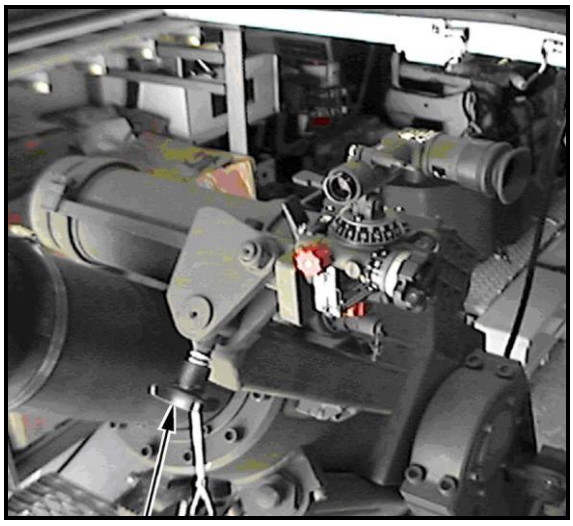


Figure 2-14. Cant correction (cross-level knob).

4. Release the telescope lock and move the telescope vertically as necessary until the aiming point is visible.

5. Look through the elbow telescope and direct driver to maneuver the vehicle until the vertical crosshair is within 20 mils of the distant aiming point. Do not use the traversing mechanism and ensure that the deflection and elevation are correctly set.

6. Remove the blast attenuator device (BAD) (Figure 2-15). Inspect the cannon to ensure mounting surface is free of any burrs or projecting paint imperfections that would prevent the boresight device from being mounted properly.

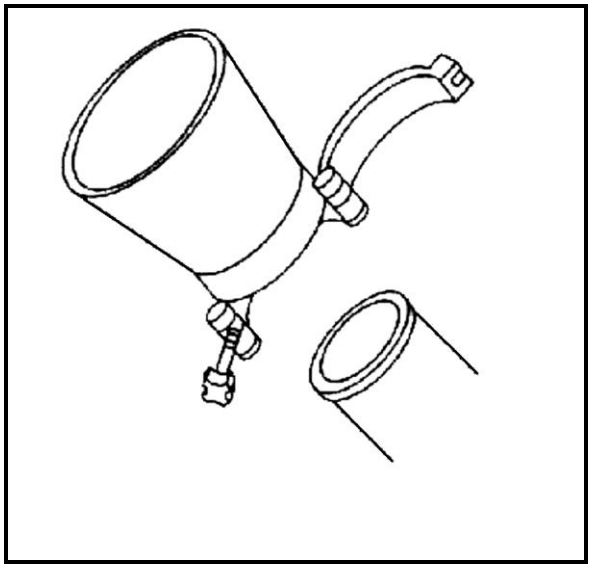


Figure 2-15. Blast attenuator device.

SET THE ELEVATION FOR BORESIGHT

1. Remove the M45A1 boresight device and mounting straps from the carrying case and place the boresight on top of the mortar barrel assembly just below and against the upper stop band with the elbow telescope in the direction of the gunner (Figure 2-16).

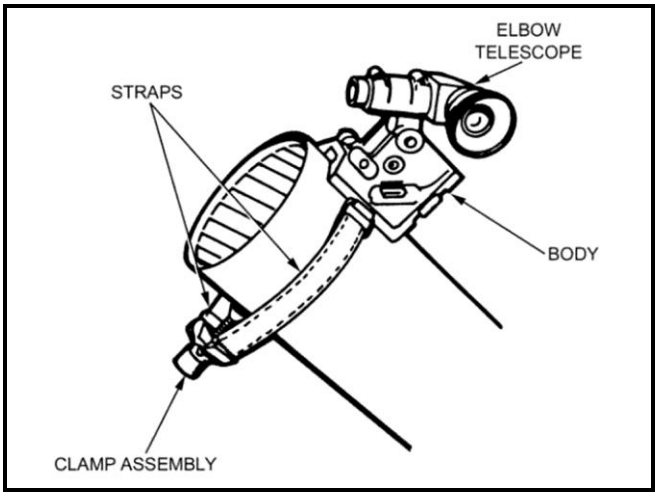


Figure 2-16. M45 Boresight on cannon.

2. Center the cross-level bubble by rotating the boresight slightly on the outside diameter of the cannon.

Note: Loosening the clamp screw and lightly tapping the boresight body will allow slight movements around the cannon. When the cross-level bubble centers, tighten the clamp screw.

3. Elevate or depress the cannon until the boresight elevation bubble is centered (Figure 2-17). If necessary, cross-level the boresight. The mortar is now set at 0800 mils elevation. The vertical hairline of the boresight should be within 20 mils of the aiming point. If not, repeat steps 1 through 3 using the boresight. Complete all steps above, so the vertical hairline of the boresight is within 20 mils of the aiming point.

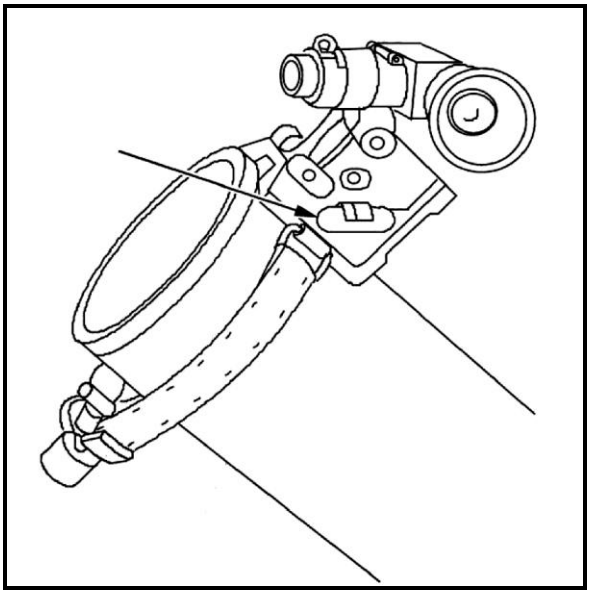


Figure 2-17. M45 Boresight elevation bubble.

***Note*:** Always sight along the left edge of the aiming point.

4. Check cross-level vial on the M67 sight unit. Center the bubble by turning the tilt correction (cross-level) knob until the bubble is centered.

5. If necessary, repeat steps 1 through 4 until the bubbles in the cross level and elevation vials of the M67 sight, and cross-level and elevation vials of boresight, are centered.

2-24. The reading on the course elevation scale of the M67 sight should be 800 mils and the reading on the fine elevation micrometer scale should be zero. If adjustment is necessary, proceed as indicated below:

1. Lock the fine elevation micrometer knob using the red elevation micrometer locking knob. Loosen the two elevation micrometer knob set screws and slip the elevation micrometer scale until the 0 mark on the micrometer scale coincides with the index arrow on the housing. Tighten the two screws to secure the micrometer scale.

2. Once the micrometer knob has been properly indexed at zero, check the reading on the coarse elevation scale. If 800 mils is not precisely in line with the index arrow, unlock and rotate the micrometer knob to achieve proper alignment. The micrometer knob scale should read +/- 20 mils of the zero. If the M67 sight unit exceeds the 20 mil tolerance allowed, the sight must be turned in for calibration. Movement of the coarse elevation scale is not authorized.
3. Ensure all bubbles are level and adjust as necessary.
4. The mortar is now sighted for elevation.

SET THE DEFLECTION FOR BORESIGHT

1. Unlock the turntable azimuth lock (Figure 2-18).Traverse the mortar no more than 20 mils from the azimuth lock position and align the vertical hair line of the boresight on the left edge of the original aiming point.

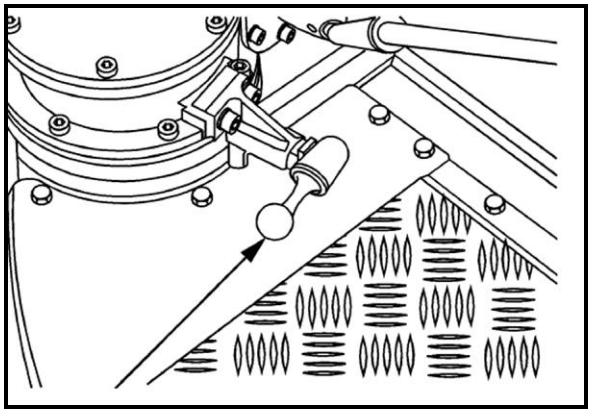


Figure 2-18. Turntable azimuth lock.

2. Adjust the boresight and the M67 sight unit to keep the cross-level bubble since the mortar may cant as it is traversed. It may also be necessary to center the elevation bubble on both instruments.
3. Rotate the deflection micrometer knob until the M67 sight unit's vertical hair line is aligned on the left edge of the aiming point.
4. The coarse deflection scale should read 3200 mils. The deflection micrometer scale should read 0. If adjustment is necessary, proceed with steps a through c below:

a. Lock the deflection micrometer knob using the red deflection micrometer locking knob. Loosen the two deflection micrometer knob set screws and slip the red line on the deflection micrometer control dial to align with the red arrow on the dial pointer. Recheck, and if necessary, adjust the sight picture. Then tighten the two screws to secure the control dial. Once again, push the black deflection micrometer scale toward the body of the M67 sight unit and rotate the micrometer scale to align the 0 with the black arrow on the dial pointer.

b. Gently push down on the deflection coarse scale and rotate to align the 3200 mil graduation with the index arrow on the sight unit body. If the red line on the dial pointer and the 3200 mil graduation are in alignment, the deflection setting is complete. If the red line on the dial pointer and the 3200 mils graduation is more than 20 mils out of alignment, it must be adjusted.

***Note*:** To check the alignment, align the 3200 mil graduation with the red line on the dial pointer. Measure the mil difference on the deflection micrometer knob by unlocking and rotating the deflection micrometer knob until the 3200 graduation is in alignment with the index arrow and reading the mil difference from 0.

---

c. If necessary, with the deflection micrometer knob and coarse scale correctly indexed to 3200 mils and locked, loosen the dial pointer set screws and rotate the red line on the dial pointer until it is in alignment with the 3200 mil graduation. Tighten the two screws to secure the dial pointer. Unlock the deflection micrometer knob.

5. Recheck and level all bubbles. Ensure all data is precisely set, control dial and dial pointer are within tolerances, both sight pictures are identical on the aiming point, and the turntable is no more than 20 mils from center. If any or all of these conditions are not met, repeat the necessary boresight procedures and recheck.

CORRECTING FOR CANT

1. To insure proper alignment, remove and place the boresight in position underneath the cannon. Center the boresight cross-level bubble and check the vertical crosshair to see if it is still on the aiming point. If cant exists, the vertical crosshair of the boresight will not be on the aiming point. This indicates that the true axis of the bore lies halfway between the aiming point and where the boresight is now pointing.
2. To correct this error, look through the boresight. Traverse the mortar onto the aiming point while keeping all bubbles level on both the boresight and sight unit. Using the deflection micrometer knob, place the vertical crosshair of the sight back onto the aiming point. Determine the mil difference from the original 3200 mils deflection and rotate the micrometer one half the mil difference back in the direction of 3200 mils. Lock the red deflection micrometer knob and continue to follow the steps outlined above in 4 (a) to adjust the deflection micrometer knob back to 0.
3. Ensure all bubbles are level and the boresight retains the correct sight picture.
4. Remove and store the M45 boresight and M67 sight unit in their carrying cases.
5. Install BAD.
6. Manual boresight is complete.

DIGITAL BORESIGHT

2-25. For the Mortar Fire Control System (MFCS) software to properly compute the boresight values, the mortar trunnions must be leveled. In a tactical environment, this is most easily accomplished using a gunner's quadrant. To make the process easier to perform, the vehicle should be parked on a slight incline, roughly 20 to 50 mils, with the front of the MCV higher than the rear. The incline may be measured with the gunner's quadrant placed on top of the mortar's traversing mechanism gearbox, or traversing gear ring, and aligned with the fore and aft axis of the carrier. The "line of fire" indicated on the gunner's quadrant (Figure 2-19) should point toward the front of the vehicle.

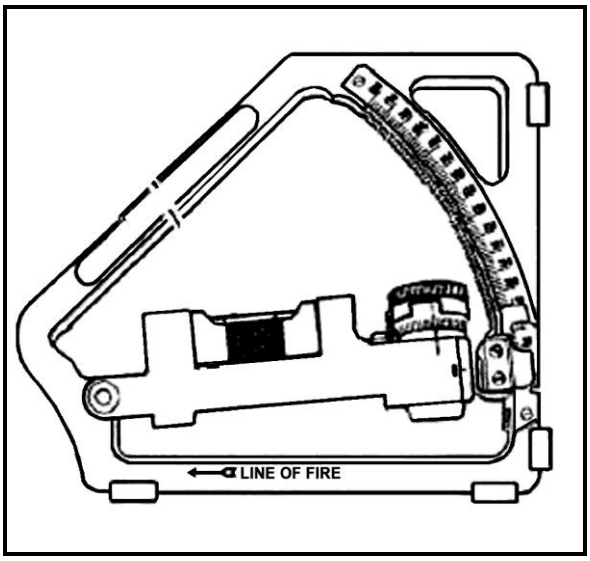


Figure 2-19. Gunner's quadrant sight.

Note: When using the gunner's quadrant, be sure the mating surfaces are free of any burrs, projections, or paint that would prevent the quadrant from seating properly. The gunner's quadrant must be held against the three registration pins on the seating pads to achieve an accurate reading.

MANUAL BORESIGHT SET-UP

1. Ensure the MFCS is fully initialized and the navigation subsystem is fully aligned.
2. Record the current Easting, Northing, and Altitude position data. This information may be required at the end of the boresight procedure.
3. Elevate the weapon to roughly 0800 mils as indicated by the gunner's quadrant placed on the mortar's elevation seats. (As the turntable is not level, the elevation will change as the weapon is traversed.)
4. Set the gunner's quadrant to zero mils +/- any correction value determined during the end for end test. The correction value should be recorded on the outside of the quadrant case.
5. Place the gunner's quadrant on the mortar's 0800 mil cross-level seats and traverse the weapon to center the bubble. When moving the cannon, always make the last turn of the traversing hand wheel in the direction of the most resistance.

***Note*:** For this and subsequent steps, keep crew movement and vehicle motion to a minimum.

6. When the bubble is centered, remove and re-seat the gunner's quadrant on the cross-level seats and verify the bubble is still centered. If not, repeat the prior step. If the bubble cannot be centered, relocate the vehicle to a more suitable position and repeat the prior step.
7. On the Commander's Interface, select the pointing device (PD) control button and then select the boresight tab.

BORESIGHT AT 0800 MILS

1. Set the gunner's quadrant to 0800.0 mils, +/- any correction value it may have.

2. Place the gunner's quadrant on the mortar's elevation seats. Elevate or depress the cannon to center the bubble. When elevating the cannon always make sure the last turn of the hand wheel moves the cannon up. If 0800.0 mils is overshot, lower the elevation to below 0800.0 mils and increase upward movement to center the bubble.

3. When the bubble is centered, remove and reseat the gunner's quadrant on the seats at least two times and verify the bubble is centered both times. Consistency of this measurement is critical for boresight. Do not proceed to the next step until an accurate and consistent 0800.0 mil elevation (+/- any correction value) is achieved.

4. Set the gunner's quadrant to zero mils.

5. Place the gunner's quadrant on the mortar's 800 mil cross-level seats and verify the bubble is still centered. If not centered, traverse the weapon in the same direction needed to center the bubble.

6. When the bubble is centered, remove and reseat the gunner's quadrant on the 800 mil cross-level seats and verify the bubble is still centered.

7. On the Commanders' Interface, select the ON DAP AT 800 MILS button on the boresight tab.

8. Record the azimuth displayed in the upper right hand corner of the CI.

BORESIGHT AT 1300 MILS

1. Using the current elevation value, in the upper right hand corner of the CI, elevate the cannon slightly less than 1300 mils (approximately 1290 mils).

2. Set the gunner's quadrant to 1300.0 mils +/- any correction value it may have.

3. Place the gunner's quadrant on the mortar's elevation seats (coarse scale closest to the elevation seats). Elevate the cannon to center the bubble. When elevating the cannon, always make sure the last turn of the hand wheel moves the cannon up.

4. When the bubble is centered, remove and reseat the gunner's quadrant on the seats at least two times and verify the bubble is centered both times.

5. Set the gunner's quadrant to zero mils.

6. Place the gunner's quadrant on the mortar's 1300 mil cross-level seats and verify the bubble is still centered. If the bubble is not centered, traverse the weapon in the same direction needed to center the bubble.

7. When the bubble is centered, remove and reseat the gunner's quadrant on the cross-level seats and verify the bubble is still centered. If not, repeat steps 1 through 7. Do not proceed to the next step until an accurate and consistent zero mil cross-level measurement is achieved.

8. Compare the azimuth currently displayed in the upper right hand corner of the CI to the previously recorded azimuth. The difference between the two should not exceed three mils.

9. On the CI, select the ON DAP AT 1300 MILS button on the PD boresight tab.

10. Read and record the azimuth, elevation, and roll values displayed in the New Boresight Corrections window at the bottom of the PD boresight tab.

11. Select the Save Corrections button on the PD boresight tab. PD OUT should be displayed in the upper right hand corner of the CI.

12. Set the PD Power Switch on the PDA to OFF. Ensure the PLGR or DAGR is operational and after ten seconds switch the PD Power to ON.

***Note*:** If the PLGR or DAGR is not tracking the required number of satellites, the PD will not begin aligning and a manual position update will be required, or you may wait to obtain the correct number of satellites so the PD will align. Allow no movement on the vehicle during alignment.

---

13. Select the PD Status tab and verify that the PD has restarted (by watching the countdown at the top right of the screen). If it has not restarted, select Position Update and enter the current Easting, Northing, and Altitude position data recorded during boresight set-up and press Send Update.

14. When the alignment countdown ends, select the bore sight tab.

15. Verify that the azimuth, elevation, and roll values displayed in the current boresight correction window at the top of the PD boresight tab match the recorded values. If not, the values were not retained in the PD and the process must be repeated.

16. Digital boresight is now complete.

Section III — NAVIGATION AND EMPLACING THE PLATOON OR SECTION

2-26. The mortar platoon is normally employed by section when it needs to cover wide frontages. Each section is positioned so it can provide fires within the area of responsibility of a part of the battalion. Depending on the range to the target and the separation of sections, more than one section may be able to mass fires on the same target. When employed by section, each section has an FDC. There are two fundamental procedures for navigation when emplacing the Stryker Mortar Platoon or Section using the Mortar Fire Control System. These procedures are known as the Waypoint method and Fire Area method. This section addresses both methods from the receipt of the movement order from the FDC, through the emplacement process.

EMPLACING THE PLATOON/SECTION USING WAYPOINT METHOD

2-27. When a deviation of a straight line distance and direction to a destination is desired, one or more waypoints are established and their grid coordinates are entered in the Mortar Fire Control System Commander's Interface (CI) as a waypoint. When a way point is selected as a destination, the AN/PSN-11 or AN/PSN-13 provides steering indications, azimuth, and range information to the Driver's Display (DD), to the waypoint. Offset distance from this course line is shown.

2-28. Upon receipt of a movement order using the waypoint method from FDC, transmitted through plaintext message or voice, the Squad Leader selects *Nav/Emplace* button (1) on the control button area and clicks the *Nav* tab (2) (Figure 2-20).

1. Navigating to a Waypoint. Squad leader selects Type by clicking the down arrow and choosing Waypoint (3),and enters the received Easting, Northing and Altitude (Alt). Zone, Hemisphere and Datum are auto-filled.

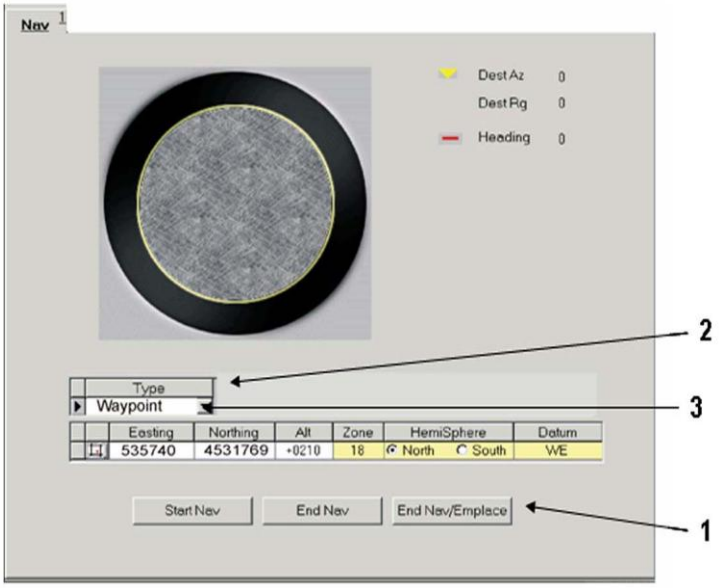


Figure 2-20. Navigation screen.

2. Click Start Nav (4) (Figure 2-21). The CI displays the destination azimuth (DestAZ), destination range (DestRG) and heading to the waypoint. The DD is activated and will display "Steer To" arrows indicating the direction to turn toward the designated waypoint. The destination range and current position will update continuously until the carrier approaches the specified area. Upon movement, the MFCS Gun Status "Operationally Moving" (OPMOV) will be sent to the FDC.

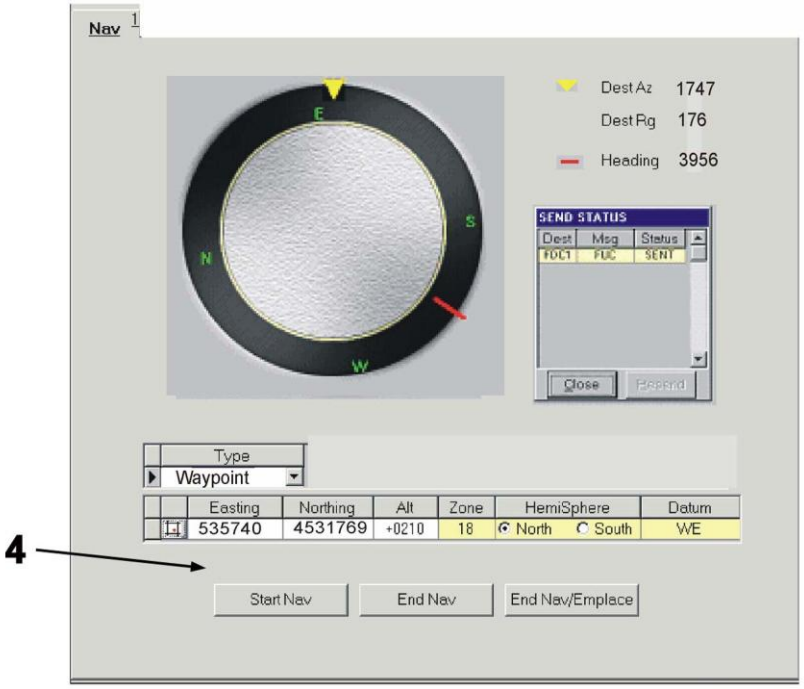


Figure 2-21. Start navigation.

3. The driver will maneuver the vehicle left or right as necessary until the DD indicator is within a minimum of 20 mils and a maximum of 100 mils of the waypoint. When the vehicle/gun is within 30 meters or less of the waypoint, the DD indicator will show "Arrived". The CI will NOT indicate arrival to the waypoint (Figure 2-22). When the destination is reached, the Squad Leader clicks End Nav. This will send the FDC an Operationally Stationary (OpSta) status and current location of the gun. At the waypoint, the squad leader will accomplish the task given or await further orders.

***Note*:** If the Pointing Device is aligned, a position update will be sent to the FDC every 2,000 meters traveled.

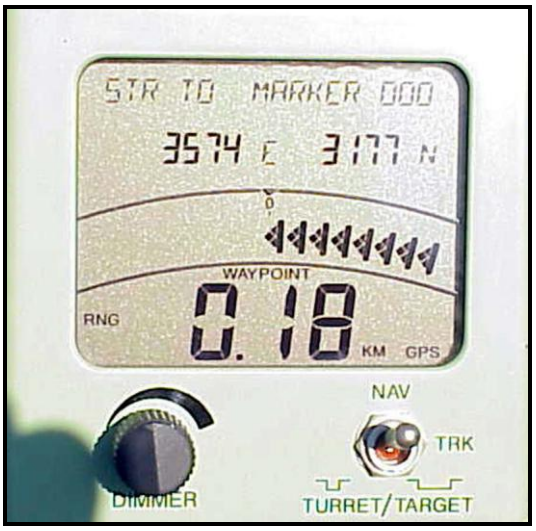


Figure 2-22. Navigation instructions on driver's display.

EMPLACING THE SECTION USING FIRE AREA METHOD

NAVIGATION TO FIRE AREA

2-29. Upon receipt of a movement order from FDC, transmitted through plain text message or voice, the squad leader selects the Nav/Emplace button on the control button area and clicks the Nav tab. The following screen is displayed (Figure 2-23).

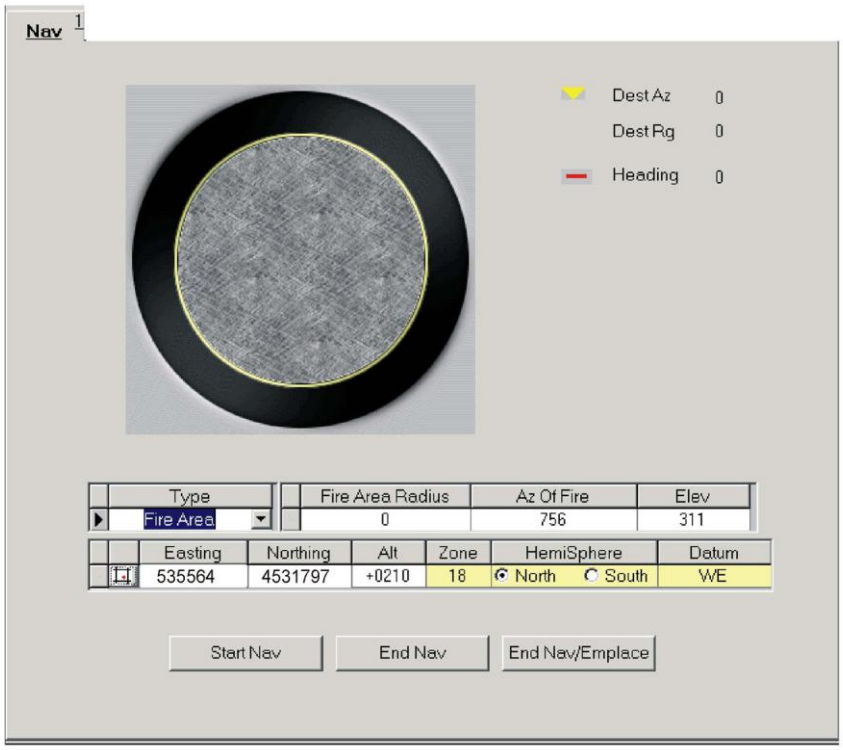


Figure 2-23. Navigation to fire area.

1. Squad leader enters Type by clicking the down arrow and choosing Fire Area. Enter received Fire Area Radius, Azimuth of Fire (AZ of Fire) and Elevation (Elev).

***Note*:** If the Fire Area Radius entered in the CI was more than 30 meters, the CI will indicate "ARRIVED" before the DD does. This is because the radius is not changeable in the DD.

---

2. Enter received Easting, Northing, and Altitude (Alt), Zone. Hemisphere and Datum will auto fill.

3. Click Start Nav. Upon movement, the MFCS Gun Status "Operationally Moving" (OPMOV) will be sent to the FDC. The following DD screen is displayed (Figure 2-24).

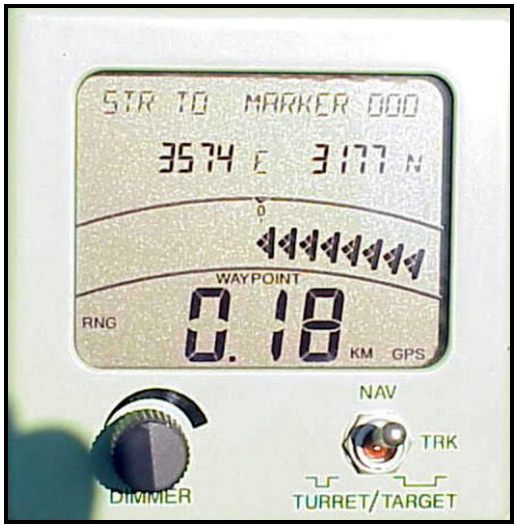


Figure 2-24. Driver's display during navigation.

Note: The CI displays destination azimuth (DestAZ), destination range (DestRg) and Heading. The DD displays "Steer To" arrows indicating the direction to turn. The destination range and current position will update continuously until the vehicle approaches the specified area.

---

4. When the vehicle/gun is within 30 meters or less of the fire area, the DD indicator will show "Arrived". If the Fire Area Radius of 30 meters was entered, the Squad Leader's CI will also indicate "ARRIVED".

***Note*:** If the Fire Area Radius entered in the CI was more than 30 meters, the CI will indicate "Arrived" before the DD does. This is because the radius is not changeable in the DD.

---

5. The driver will maneuver the vehicle left or right until the DD indicator is within a minimum of 20 mils and a maximum of 100 mils of the firing area.
6. The driver will pull into position, assuring that the turntable is centered over the firing position. Lock the vehicle into position, shut off the vehicle, and assume the duties of an ammunition bearer.
7. The squad leader selects End Nav. This will transmit Operationally Stationary (OpSta) status and current location to the FDC.

Note: Current position, shown in yellow on the Position screen in Setup and which has also been sent to the FDC is your locked-in current position. The position shown in the upper right hand corner of the CI may slightly change due to PLGR drift and may differ from the locked-in position.

---

8. Select *End Nav/Emplace*. The Emplace screen will be displayed.
9. To emplace, if not already in the Emplace screen, select the Emplace tab. The entered *AZ of Fire* and *Elev* in *Emplace At* from the movement order will be displayed in *Emplace At*. The

actual AZ, EL, and RL will be displayed on the CI as well as the Gunner's Display (GD) and will update when the gun tube is within 1 mil of the commanded AZ and EL.

10. Select Start Emplacing.
11. The gun crew places the mortar into action from the traveling mode.
12. Once in position, select Emplaced, located at the bottom of screen. This will put gun status at OpRdy. The status of gun will be transmitted digitally to the FDC. The gun is ready to receive a Fire Mission.

Chapter 3

FIRE MISSIONS USING THE MORTAR FIRE CONTROL SYSTEM

The Mortar Fire Control System (MFCS) is a revolutionary improvement in mortar capability that seamlessly links mortar fires in the future digital battlefield. The MFCS (Heavy) provides an on-board fire control system that includes a fire control computer, position navigation system, and gun pointing system. The MFCS allows mortar crews to set-up and fire in one minute or less, down from the current eight minutes and accuracy is increased by a factor of four. This chapter consists of three sections: (1) Parts of a standard fire mission: (2) Basic fire missions: and (3) Special missions that details specific missions such as registration, illumination, coordinated illumination and the final protective fire FPF.

Section I — STANDARD FIRE MISSIONS

3-1. This section discusses the feature of a standard digital and manually generated MFCS fire mission. It includes the sequence of actions used by the MFCS operator during a fire mission, and common actions performed throughout the operation. The steps common to all basic and manual fire missions are covered fully.

STANDARD FIRE MISSION FEATURES

3-2. The MFCS provides a standard set of steps and screens to view the fire mission data for grid, polar, shift from a known point, and quick fire missions. The sequence of actions from the initial call for fire (CFF) to the end of mission (EOM) is standard, though some steps may be omitted or repeated for all CFF, regardless of the type of equipment supporting the FDC. The screens are used for missions received digitally as well as missions requiring manual input of commands from the forward observer (FO). The MFCS also utilizes common actions to process fire missions and transmit commands. These common actions are found throughout the text and explained in detail below. Only the procedure name is used hereafter. The example fire command describes, in general, the steps common to all fire commands. Specific mission procedures are detailed further in the text. Other missions, (registration, illumination, coordinated illumination, and FPFs) also use the standard set of screens and the same common actions. They are described separately in Section III of this chapter. Grid, polar, shifts from a known point and quick fire missions received digitally are processed using the same steps. Once the date for the initial CFF and later adjustments are entered, manual fire missions are processed in the same manner.

SEQUENCE OF ACTIONS FROM THE INITIAL CFF TO EOM

3-3. Fire missions are composed of four basic components: an initial CFF; adjustment to the initial data to bring the rounds onto the target; a fire for effect (FFE); and an EOM. The sequence can be stopped at any time with an EOM from the fire support element (FSE) or FSO.

- The initial fire mission (CFF) can be new or an established target.
- The fire is adjusted onto the target. This may be omitted if the initial impact hits within the target area.

- The FSO or FSE then calls for a FFE.
- An EOM is sent from the FSE or FO and the mission is either saved or deleted. Sequence of Screens.

3-4. Most fire missions require the MFCS operator to record data, make changes, and approve data listed on a common set of screens in a standard sequence. Table 3-1 lists the steps, sequence of screens, and primary actions taken by the operator on each screen from the start of a mission to its end. The operator's options such as denying the mission (MTO DENY), are explained in the specific section on the action.

USE OF SCREENS IN A NEW CALL FOR FIRE

3-5. Table 3-1 illustrates the order in which the MFCS operator uses screens to review and adjust data. The same order is used for adjustments, FFEs, and special missions.

Table 3-1. MFCS steps, sequence of screens, and operator actions.

STEP	SCREEN	ACTION
New Call for Fire	1. New CFF Screen	- Receive fire mission - Accept or deny mission
	2. Mission Data Screen	- Review and make adjustments - Record data
	3. Solution View Screen	- Review and adjust gun orders - Review and adjust selected guns - Review errors and warnings
	4. Safety Data Screen	Review and record safety data
	5. Plot View Screen	Review key mission locations
	6. Solution View Screen	- Final review and adjustment of gun orders - Select guns - Review errors and warnings - Send the gun orders
	7. Mission Status Screen	Monitor the mission and the status of each gun
Subsequent Adjustments (May be Repeated)	Message View Screen	- Acknowledge and review subsequent adjustment messages - Process or delete
	Repeat screens 2 through 7 as mentioned above	
Fire for Effect	Message View Screen	Acknowledge and review subsequent adjustment messages
	Repeat screens 2 through 7 as mentioned above	
End of Mission Not Saved	Message View Screen	Receive EOM and confirm not save request
	New CFF Screen with data from same mission	Delete mission
End of Mission, Saved	Message View Screen	Receive EOM, confirm save request, and save the mission
	New CFF Screen	Displays data from same mission

EXAMPLE MISSION DATA SCREEN

3-6. Figure 3-1 displays the mission data screen. It is one of several screens on which the operator can view the current mission data. The mission data screen is similar to the other view screens and illustrates the format of every fire mission view screen. The control button area displayed to the right is used to select the MFCS functions. The tab area, located at the top of the screen, displays the types of missions (Manual, New CFF, or a previously saved mission) available. The working button area, located at the bottom of the screen contains buttons to accept, modify, or refuse data shown in the working area. The working area can have up to four subareas: (1) The message screen. (2) The gun status area. (3) The fire command fields. (4) The view buttons areas. The message area features the current message from the FSE, FO, or another unit. The gun status area displays the status of each gun controlled by the FDC and which guns are assigned to the current mission. The fire command fields show the various components of the fire command. The view area button provides the operator with the means to select different fields for viewing data.

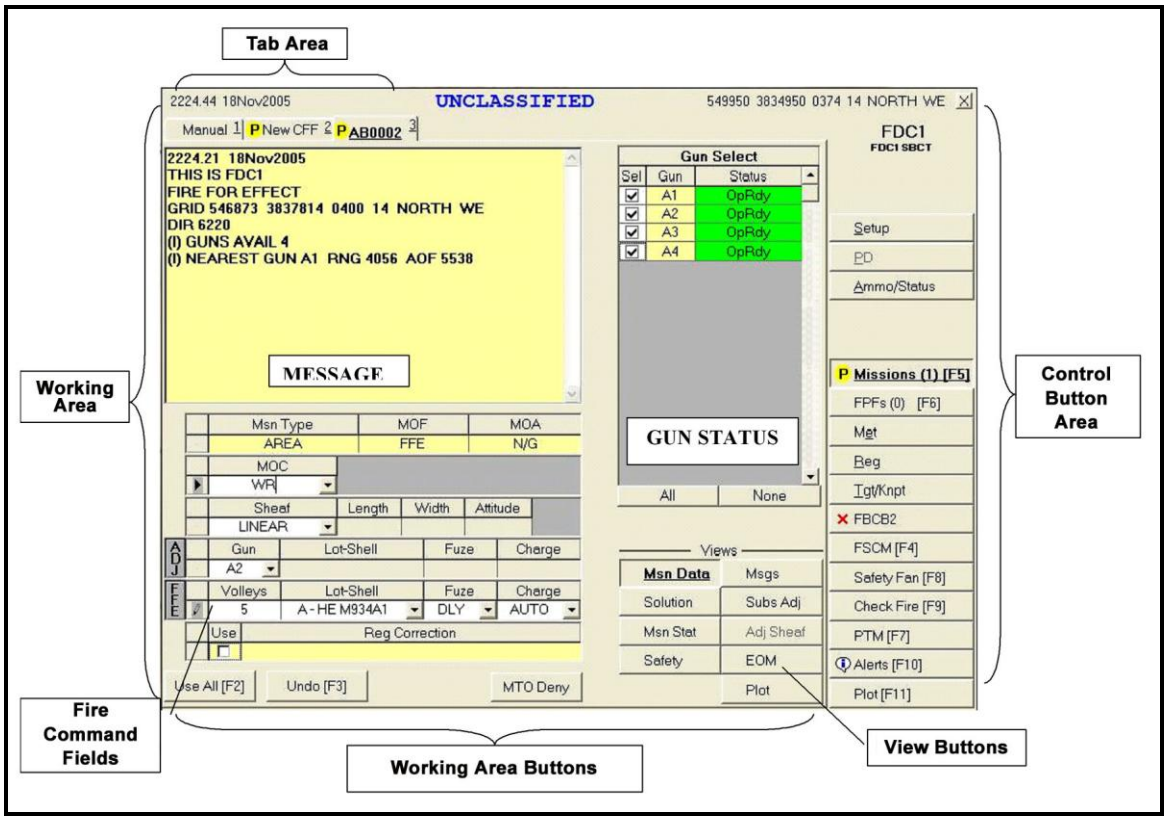


Figure 3-1. Mortar Fire Control System (MFCS) example mission data screen.

DIGITAL AND MANUAL FIRE MISSION TABS AND SCREENS

3-7. The MFCS uses tabs for missions and views to display mission and related data. Table 3-2 lists the tabs and screens typically used during both digital and manual fire missions. They are also used in special missions described in Section III of this chapter.

Table 3-2. Example mission data screen.

Tabs or Screen	Example	Information and Actions
New Call for Fire Tab	Figure 16-2	- Receive the new CFF - Accept (Process) the fire mission - Refuse (MTO DENY) the fire mission
Manual Call for Fire Tab	Figure 16-12	Manually designate and perform grid, polar, shift from a known point, or quick fire missions
Mission Tab	Figure 16-1	- Receive the CFF for a previously saved mission - Accept (Process) the fire mission - Refuse (MTO DENY) the fire mission
Mission Data Screen	Figure 16-3	- Displays target number - CFF - Mission data - The operator reviews data and makes adjustments
Solution View Screen	Figure 16-4	- Displays Gun Orders - Errors and Warnings - Selected guns - Operator sends orders to guns
Mission Status Screen	Figure 16-7	Operator monitors mission
Safety Data Screen	Figure 16-5	- Displays safety data - Operator reviews and records data
Messages Screen	Figure 16-8	Receives subsequent messages
Subsequent Adjust Screen	Figure 16-6	- Displays adjustment data - Operator reviews and adjust data
EOM Screen	Figure 16-11	- Not save the mission - Save as a target - Save as a known point
Plot Screen	Figure 16-6	Displays a digital plot of the mission with icons for key data
Manual Subsequent Adjust Screen	Figure 16-14	Manually perform a subsequent adjustment
Manual EOM	Figure 16-15	- Manually record mission as a target, known point - Not save the mission

COMMON ACTIONS

3-8. The operator of the MFCS uses the same commands repeatedly throughout the fire mission. These commands are usually done by clicking a button in the working button area of the screen or in response to a query in a message box. Commands include OpACK, MTO ACCEPT or DENY, PROCESS or DELETE, SELECT THE GUNS TO FIRE THE MISSION, CONFIRM GUN ORDERS, and ACCEPT OR MODIFY DATA.

ACKNOWLEDGING RECEIPT (OPACK)

3-9. Clicking on the OpACK button acknowledges receipt of a mission. When turned on it deactivates the audio alarm. The term "acknowledge receipt by clicking the OpACK button" is used throughout this chapter to indicate this action.

RECORDING DATA

3-10. Data is recorded throughout the process to maintain a record and preserve data should the MFCS fail. Data is transcribed onto DA Form 2399 (Computer's Record) or DA Form 2188-R (Data Sheet). The term "Record data" is used throughout this chapter to indicate this action.

MTO ACCEPT OR MTO DENY

3-11. The MFCS uses MTO (Message to Observer) ACCEPT to accept the mission and MTO DENY to refuse the mission. If the operator selects MTO DENY the DELETE button becomes visible and when clicked deletes the mission. If there is an error beyond FDC control, the only choice is MTO DENY. The terms "Click MTO ACCEPT" to accept the mission or "Click MTO DENY" to refuse the mission are used throughout this chapter to indicate these actions.

PROCESS OR DELETE

3-12. There is usually a choice to process or delete a fire mission. The operator can click PROCESS to continue with a mission, or DELETE to stop a mission. The terms "process" or "deny" are used throughout this chapter to indicate these actions.

SELECTING THE GUNS TO FIRE THE MISSION

3-13. Guns for the mission are pre-selected by the software and are checked in the SEL box in GUN SELECT. The operator has the option to modify these selections by clicking in the SEL box to select or deselect any OpRDY gun. There is also an option to select all or none of the guns listed by clicking ALL or NONE. The term "select guns" is used throughout this chapter to indicate this action.

ACCEPTING OR MODIFYING DATA

3-14. If required, the operator makes adjustments to the mission data. To undo any changes, he clicks UNDO CHANGES and the data fields re-display the original data. If any changes are made, the operator clicks USE ALL to accept all the changes. If no changes are made, the operator clicks USE ALL. The term "modify data if necessary" is used throughout this chapter to indicate this action.

Section II — BASIC FIRE MISSIONS

3-15. This section details how the MFCS is used to conduct digital and manual fire missions using grid or polar coordinates or a shift from a known point to locate the target. It also explains how the MFCS records RPs, targets, and known points. The operator can use the MFCS' GUI, with its tabs and buttons and/or the keyboard to navigate throughout the commands and screens to process, conduct, and record fire missions.

BASIC DIGITAL MISSIONS

3-16. The MFCS can process up to six active missions at a given time. Basic new fire missions are received digitally from the FSE or FSO. The FSE or FO identifies the location of a target using grid coordinates, polar plots, or shifts from a known location. Once a mission has been fired it can be saved and designated as a target or known point. The following are examples of a new CFF received digitally with the FO using grid coordinates to locate the target. The process is the same when using the polar or shift from a known point methods of target location. Except for the initial CFF screen, the adjustment of fires, FFE, and previously fired missions are conducted in the same manner.

RECEIPT OF A FIRE MISSION

3-17. Upon receipt of a fire mission, the MISSIONS button in the control button area is highlighted. When enabled the audio alarm sounds. The operator clicks the MISSIONS button and the NEW CFF tab appears. The operator can click MTO DENY to deny the mission. If the operator clicks PROCESS the Mission Data screen appears (Figure 3-2).

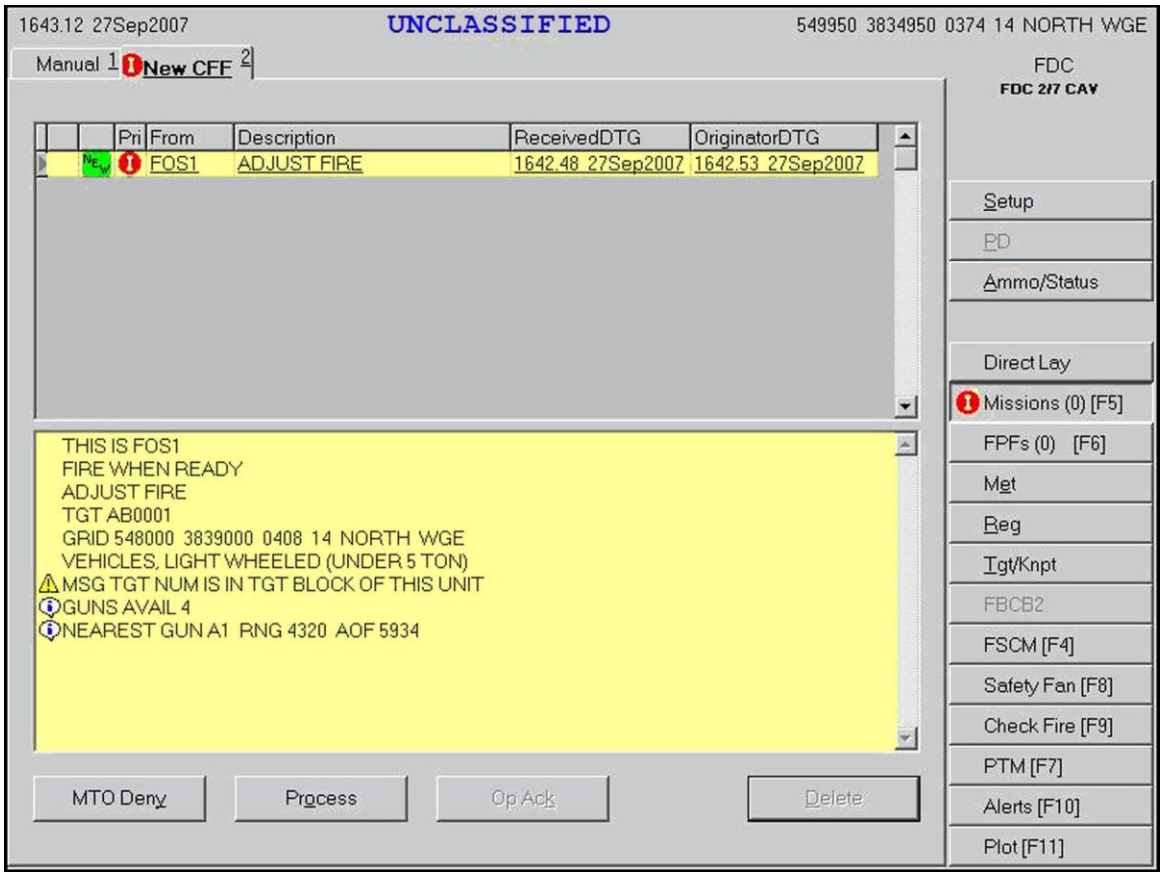


Figure 3-2. MFCS new call for fire screen.

MISSION DATA VIEW

3-18. The Mission Data screen automatically generates a new target number and the mission data view. It allows the operator to review and record mission data and make any necessary adjustments. Adjustments include the selection of guns to fire the mission and other mission data such as method of control, type of sheaf, and fuze-shell combinations. Once satisfied, the operator clicks USE ALL (if any changes were made), or SOLUTIONS (Figure 3-3).

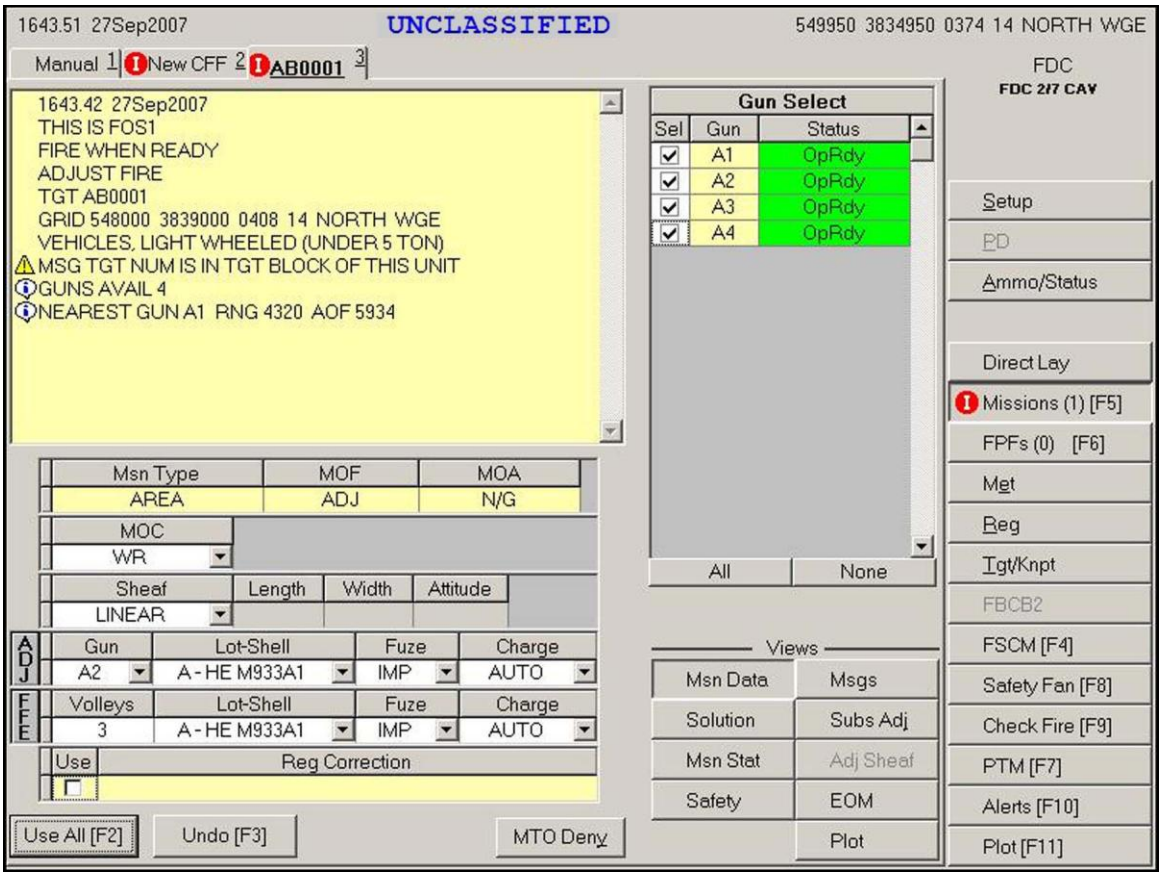


Figure 3-3. MFCS mission data view screen.

SOLUTION

3-19. The Solution screen displays the gun orders, the guns selected, and any errors and warnings. This screen allows the operator to review the gun status and to make changes to the gun selection based on any errors and warnings received. It provides for MTO DENY and is the screen from which gun orders are sent (Figure 3-4).

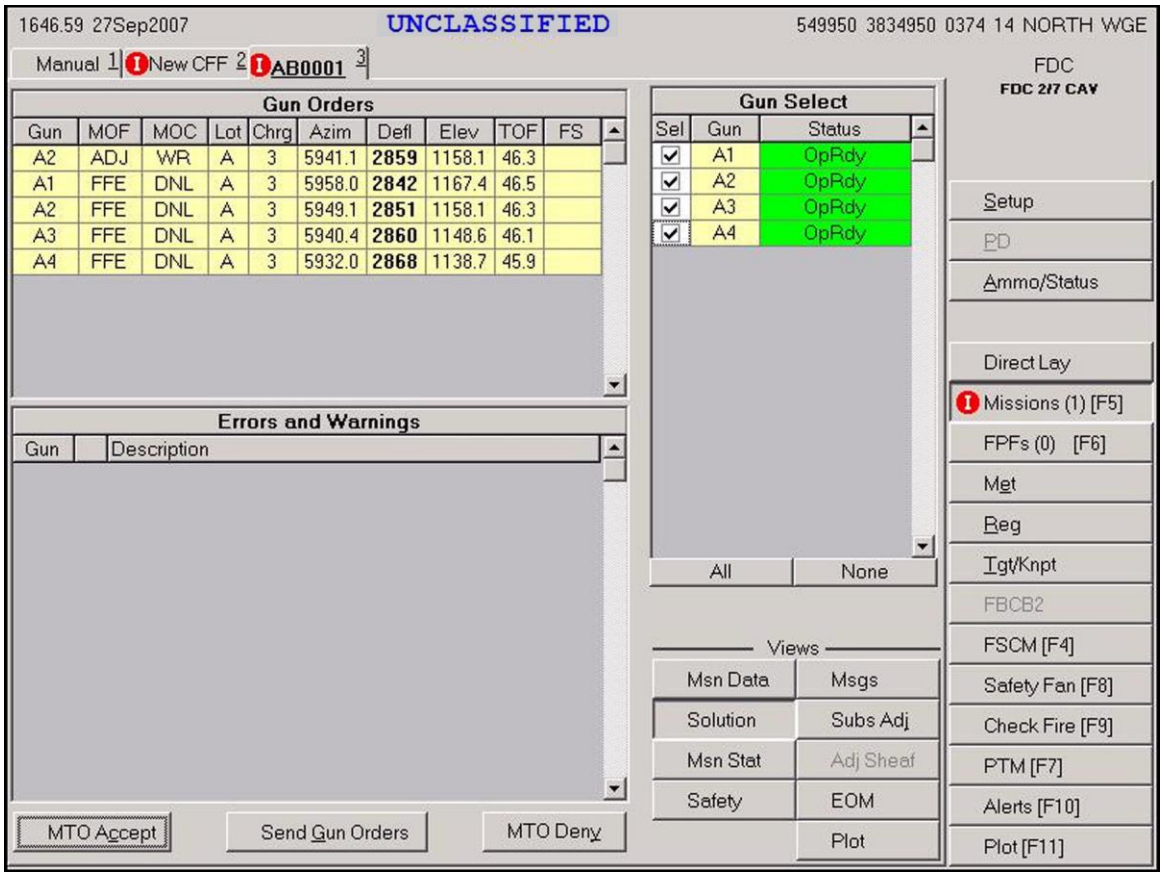


Figure 3-4. MFCS solution view screen.

SAFETY DATA

3-20. Prior to sending the gun orders, or at any time, the operator reviews and records the safety data by viewing the Safety Data screen (Figure 3-5).

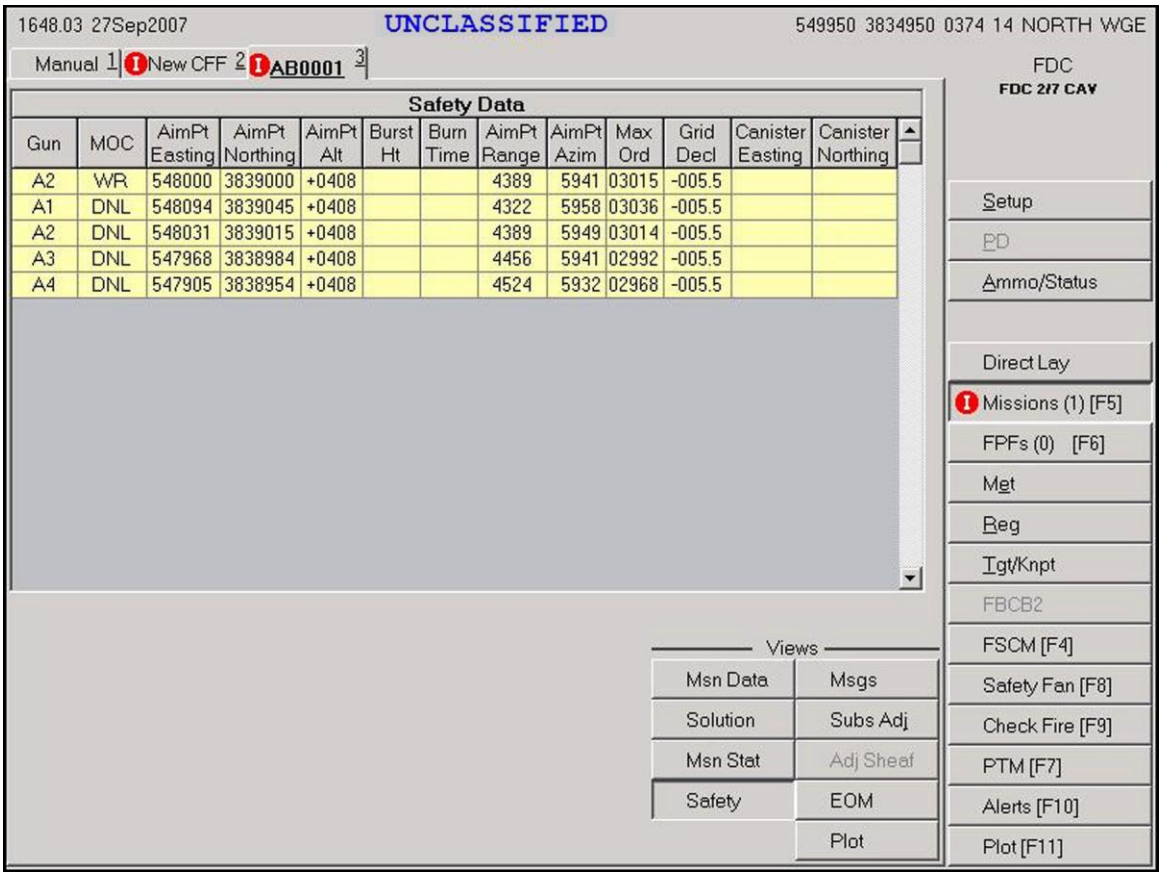


Figure 3-5. MFCS safety data screen.

PLOT VIEW SCREEN

3-21. The plot screen is available at any time during the mission (Figure 3-7). The digital plot screen displays burst points, canister points; fire support coordination measures (FSCMs), known points, stored targets, targets, units, waypoints, and friendly units. The operator can select the display by selecting or deselecting from the list above the LEGEND button (the default shows all items checked). To obtain information on a particular icon on the plot, the cursor is placed over the icon. Icon information varies depending on the icon type. Click the SOLUTION button to return to the Solution screen (Figure 3-6).

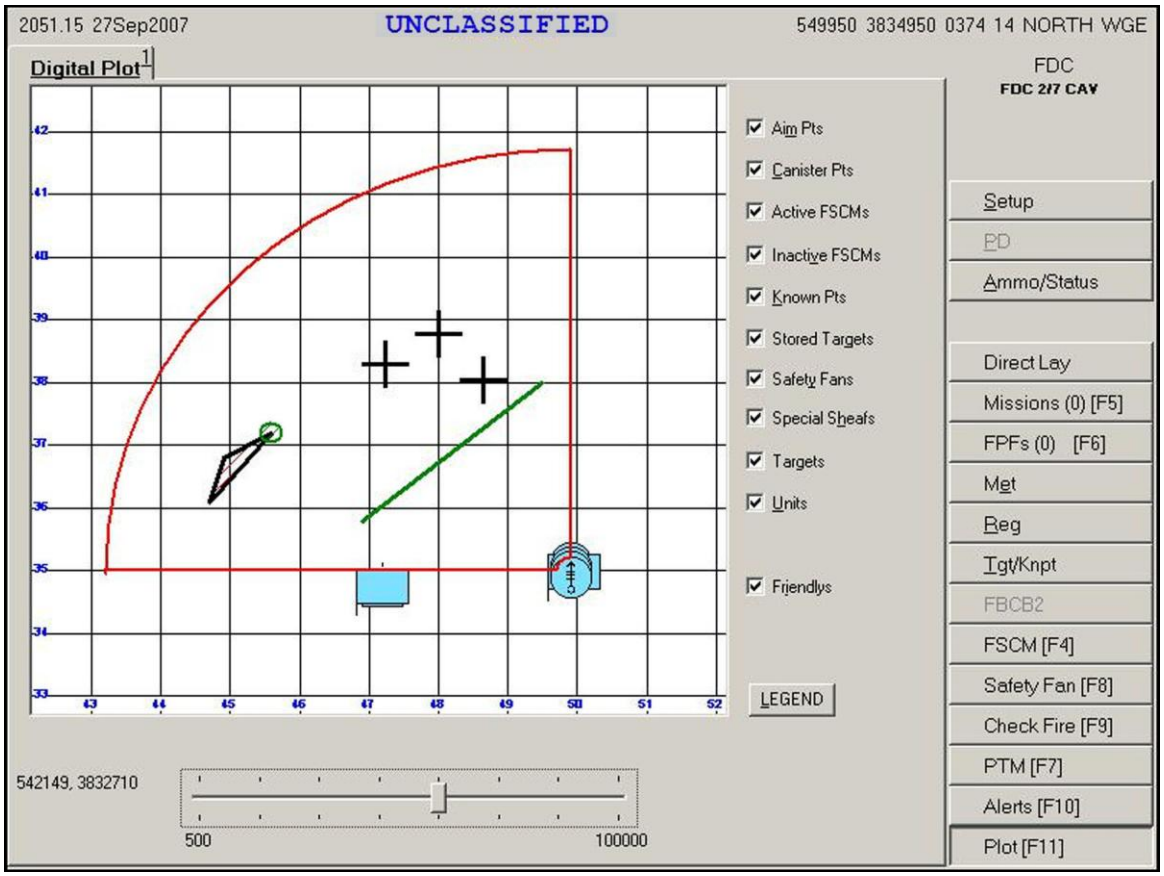


Figure 3-6. MFCS plot view screen.

SOLUTION VIEW SCREEN

3-22. Once satisfied with the data, the operator clicks the SEND GUN ORDERS button. A message box is displayed to confirm the order. The operator clicks YES to confirm. A Send Status box is then displayed showing the destination and status of the message to the guns. Status will show MACK (machine acknowledgement), Retry, (system is retrying), or Failed (did not reach destination). The Mission Status screen is then displayed (Figure 3-7).

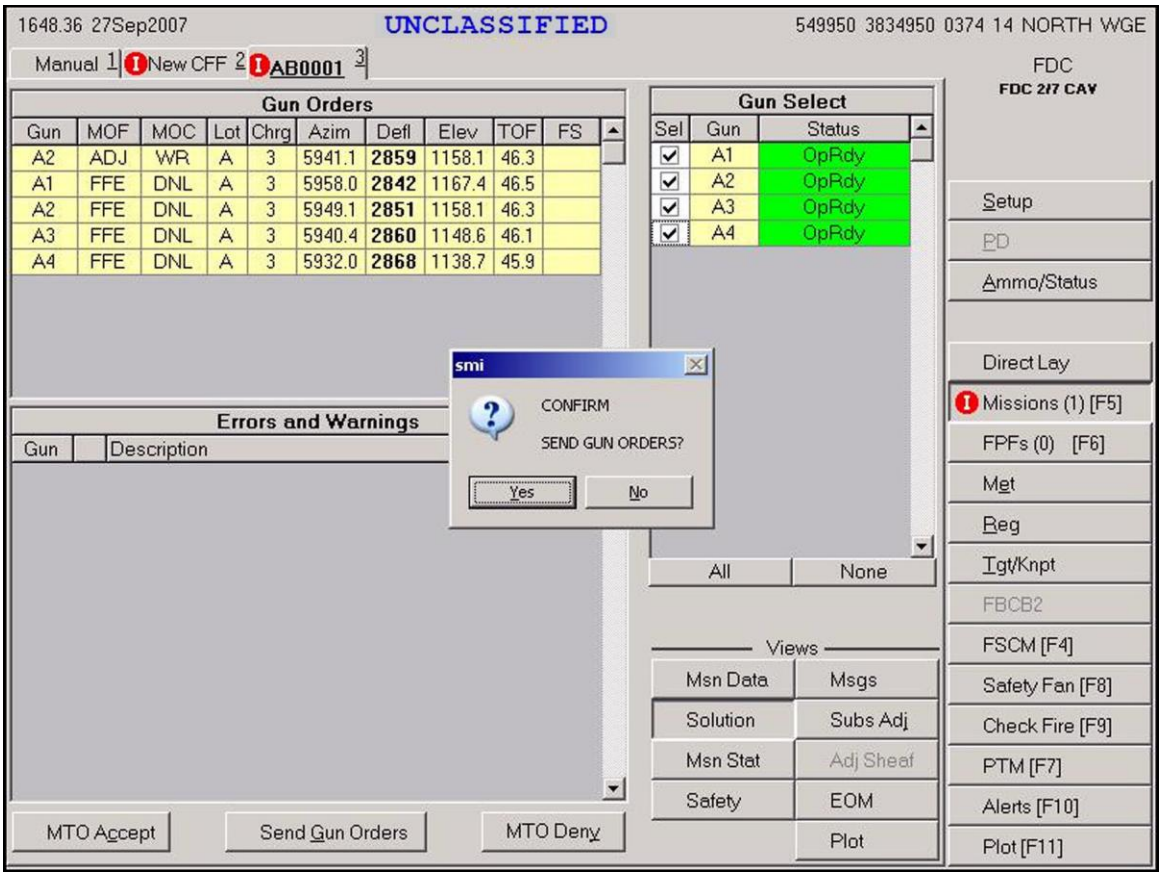


Figure 3-7. MFCS solution view screen.

MISSION STATUS

3-23. When the operator sends gun orders, the mission status is shown and the words "Gun Orders Sent" are displayed. The mission is monitored from this screen. The guns' status (Ready, Shot, Rounds Complete, and Abort) is updated and sent automatically to the FSE or FO. On receiving "Shot," a check appears in the check box and the box turns green. The time of flight and a red splash sign is also displayed. If a gun aborts the mission, a check appears in the abort box and a reason is displayed (Figure 3-8).

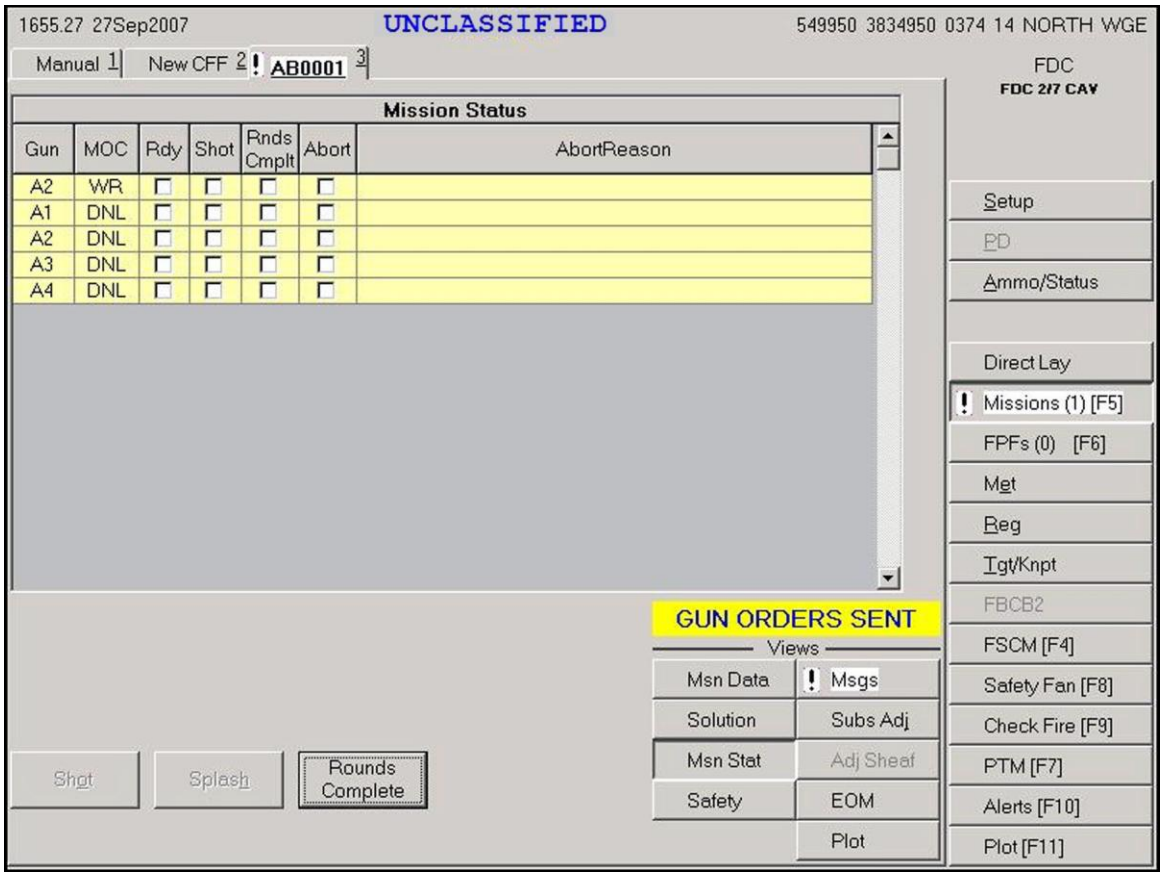


Figure 3-8. MFCS mission status screen.

SUBSEQUENT ADJUSTMENT, MESSAGE VIEW SCREEN

3-24. The operator waits for subsequent messages by selecting the Messages screen. There are two main subsequent messages: Adjust Fire and FFE. The FSE or FO can order a FFE or continues to make adjustments. For subsequent adjustments, the operator can choose to process, modify the data, or delete the adjustment. Upon receipt of "Adjust Fire," the operator records the data and clicks OpACK to deactivate the audio alarm. When PROCESS is selected, the Mission Data screen appears (Figure 3-9).

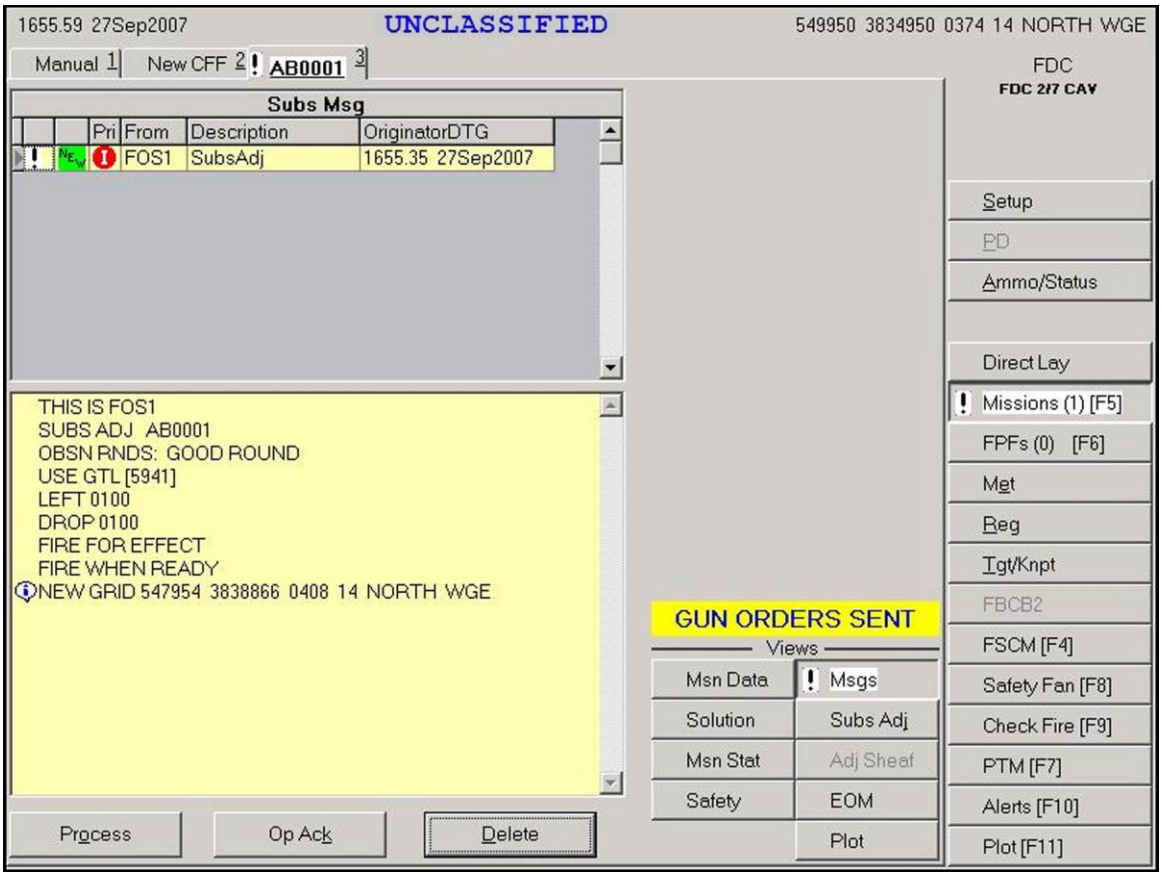


Figure 3-9. MFCS messages screen.

SUBSEQUENT ADJUST-ADJUST FIRE SCREEN

3-25. Adjustments can be made several times until an FFE or EOM is ordered. The operator continues to review and modify data on the Mission Data, Solution, and Safety screens. He also controls the mission on the Mission Status screen (Figure 3-10).

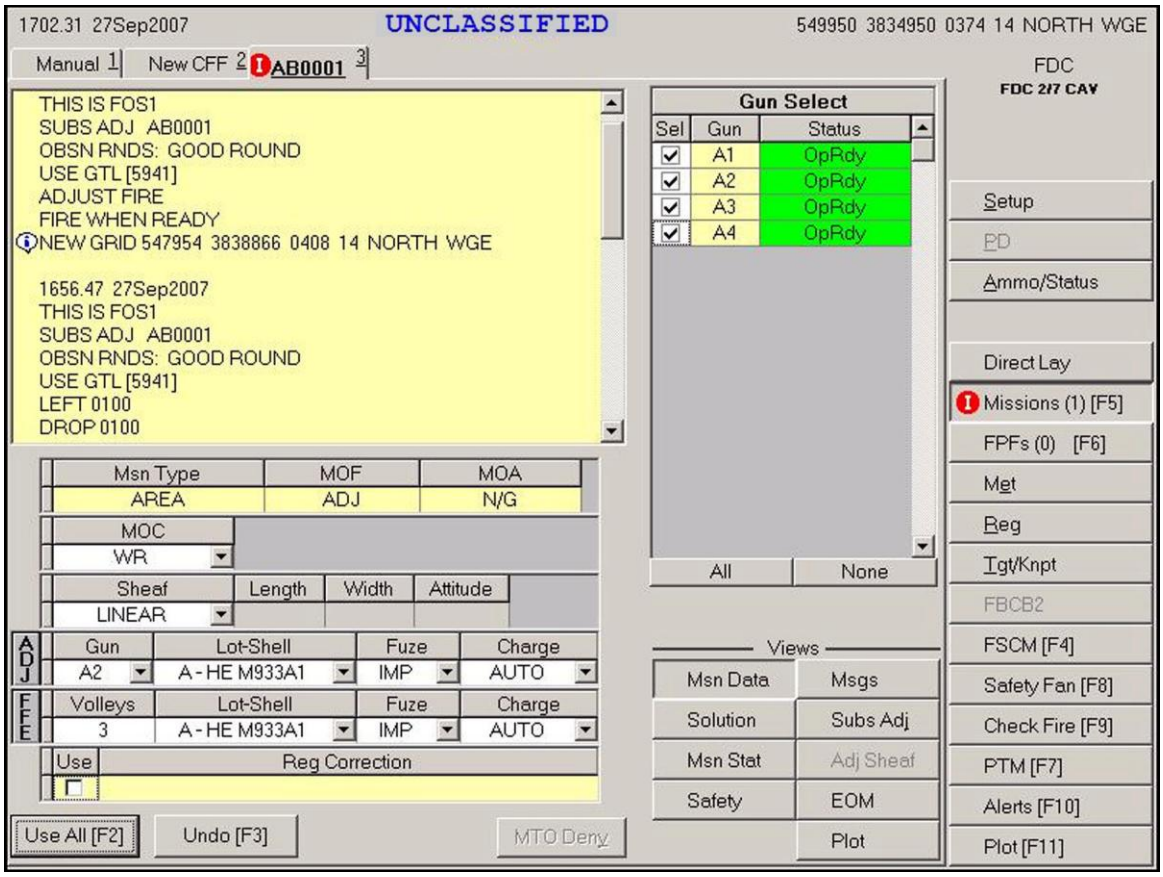


Figure 3-10. MFCS mission data view screen.

SUBSEQUENT ADJUST-FIRE FOR EFFECT

3-26. The screen in Figure 3-11 appears when a FFE command is received. The operator records the data and clicks OpACK to deactivate the audio alarm. He can choose PROCESS or DELETE. If he chooses PROCESS, the Mission Data screen appears. Data adjustments can include the selection of guns to fire the mission and other mission data such as, method of control, type of sheaf, and fuze-shell combinations. Once satisfied, the operator clicks USE ALL (if he made any changes) or SOLUTIONS. A solution screen appears. The operator can also check the Safety screen. If the method of control is "At My Command" there will be additional buttons for READY and FIRE on the Mission Status screen. When the gun sends "Ready" the READY button will gray out and a green check will appear in the RDY box in Mission Status. The FDC operator will then click the FIRE button. A check appears in the ROUNDS COMPLETE box when the gun sends it. The operator then waits for subsequent messages by going to the Message screen.

END OF MISSION

3-27. The operator can end any active mission or receive an EOM at any point in the mission. The Message screen displays the request for an EOM from the FO. If the operator does not need to save or record the mission, he clicks PROCESS. The New CFF tab for the fired mission appears and the operator clicks DELETE (Figure 3-11).

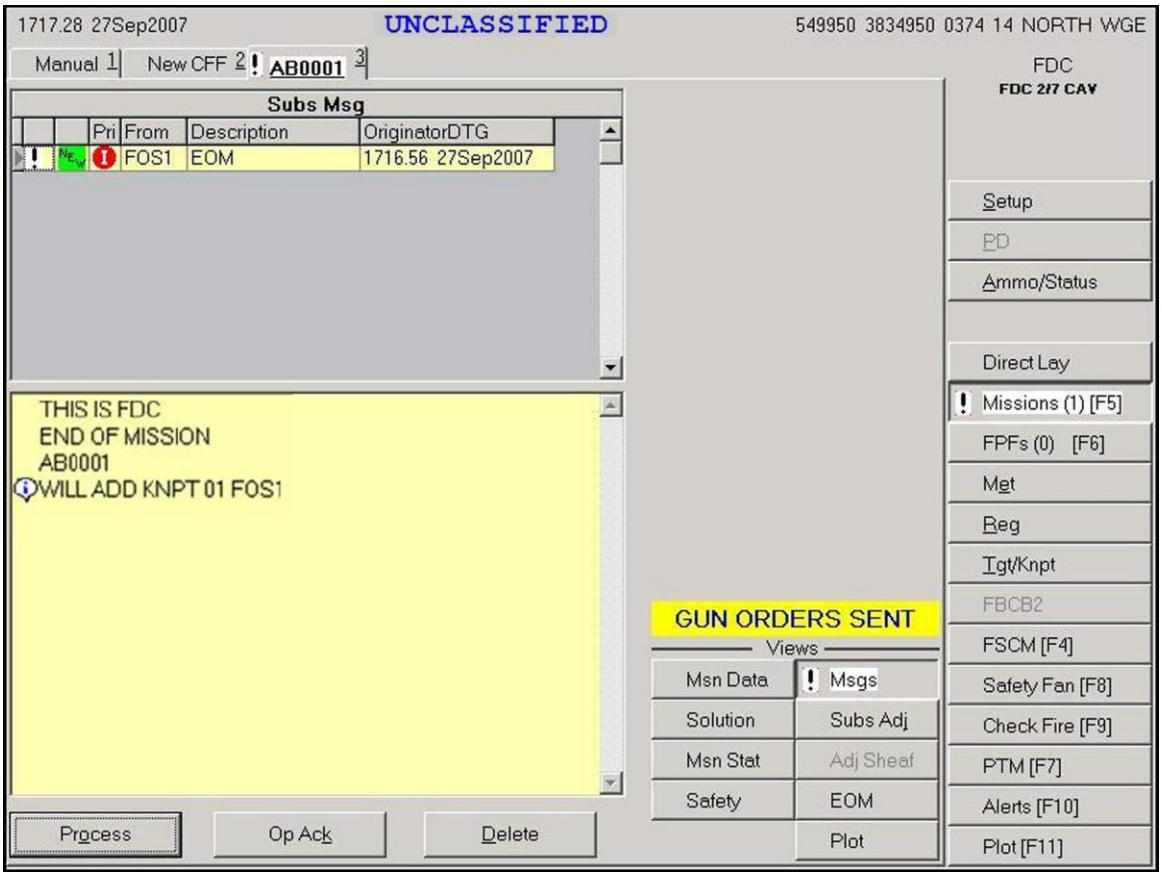


Figure 3-11. MFCS end of mission message screen view.

SAVE DATA

3-28. When the operator receives an EOM from the FSE or FSO with instructions to record the mission, he can save it as a known point or as a target. A box appears over the screen and the operator completes the information required. He then clicks PROCESS and deletes the mission. The operator can also use the EOM button to do the same (Figure 3-12).

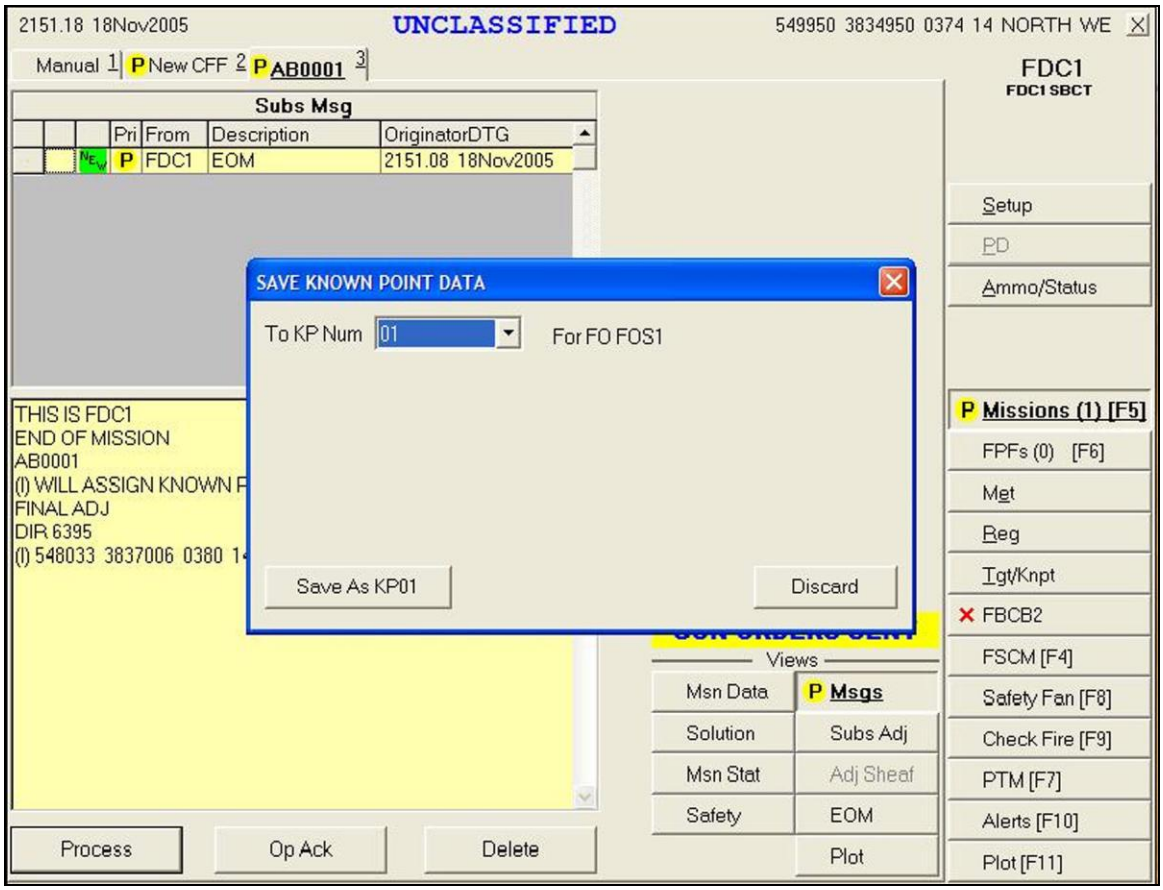


Figure 3-12. MFCS save data screen.

MANUAL MISSIONS

3-29. Manual missions are fire missions in which the FDC does not receive the data digitally from the FSE or FO. A fire mission can be received by voice radio or by other means from the FO or from a unit. On the Manual Mission screen, the operator selects the type of mission (grid, polar, shift from a known point, or quick fire) and enters the required data into the displayed fields. Once the type of mission and the initial firing data are entered, a manual fire mission is processed in the same manner (except for commands from the FO) as normal (digital) missions with the operator following the same steps already described. To adjust fire, the operator clicks on the Subsequent Adjust screen, enters corrections sent in by the observer and the MFCS calculates the necessary gun orders. This paragraph uses a grid mission to explain the steps involved in a manual mission.

Note: For a manual fire mission, commands from the FO have to be entered into the MFCS. After the data has been entered however, the operator uses the same procedures and sequence of screens described in paragraphs 3-16 through 3-25 to process missions.

MANUAL CALL FOR FIRE

3-30. The operator selects the MISSIONS button in the control button area and the MANUAL tab. This screen allows the user to select one of the four types of missions: grid, polar, shift from a known

point, and quick fire. (Again, a grid mission is used as an example.) The operator enters data common to all types of missions and data required for specific types (Figure 3-13).

Note: Common for all missions–the operator enters EASTING, NORTHING, and ALT. The ZONE, DATUM, and HEMISPHERE fields are then auto-filled. At the bottom of the screen, he also selects the type of round and the method of fire.

- **Polar Missions.** The following data is entered for a polar mission:
  - Choose the OBS (observer) from the pick list.
  - Enter direction (DIR). Use four digits from 0000 to 6399.
  - Enter distance (DIST). Use four digits from 0000 to 9999.
  - Enter the vertical interval (VI) between the observer and the target. Use a "+" for up (up is also the default setting) or a "-" sign for down, and four digits from 0000 to 9999. The VI can be missing.
- **Shift Missions.** Enter the following, in addition to the common data items for a shift from a known point mission.
  - Choose the OBS (Observer) from the pick list.
  - Choose the KNPT (Known Point) from the pick list.
  - Enter DIR. Use four digits from 0000 to 6399.
  - Enter the lateral displacement direction of Right or Left, and then the lateral displacement distance within a range of 0000 to 9999.
  - Enter the range displacement direction of Add or Drop and enter the range displacement distance within a range of 0000 to 9999.
  - Enter the VI (Up/Down) between the observer and the target. Use a "+" for up (Up is also the default setting) or a "-" sign for down, and four digits from 0000 to 9999. The VI can be missing.
- **Quick Fire.** Select the target number (TARGET) from the pick list and then HE FFE or IL FFE from the bottom of the screen
- **Select Ammunition and MOF.** After selecting the desired ammunition/mission combination, the New CFF tab is displayed. The operator uses the same procedures to process the New CFF as described in paragraphs 3-16 through 3-25 digital CFF and adjust fire.

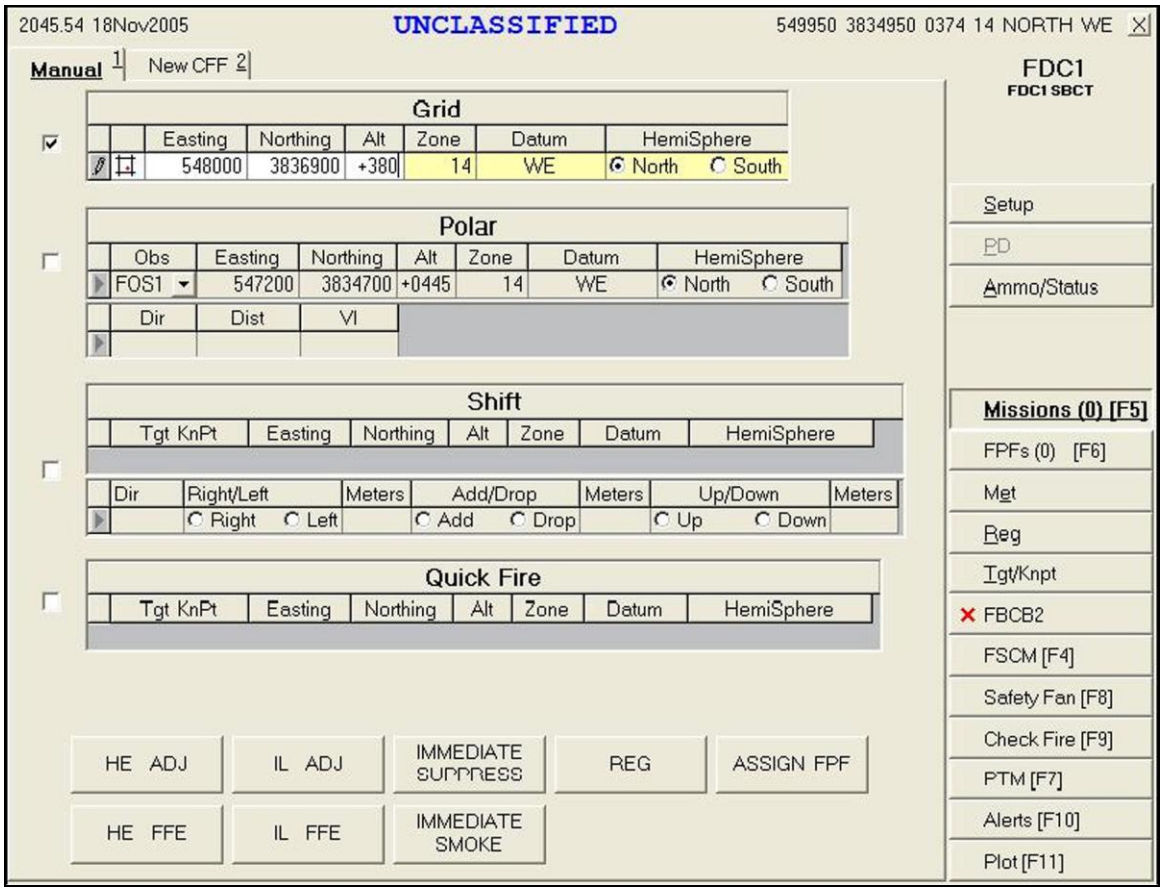


Figure 3-13. MFCS manual call for fire screen.

MANUAL-ADJUST FIRE

3-31. The operator waits for any subsequent messages by selecting the Messages screen. If there is a request from the FO to adjust fire, the operator enters the data from the message into the MFCS. To do this, he clicks the subsequent ADJUST button in the Mission Status screen. The user enters the FO adjustment and the MFCS calculates the gun orders (Figure 3-14).

- The next steps to process the manual-adjust fire mission are the same as described for the digital subsequent adjustments listed in paragraph 3-24.This step may be repeated until the operator receives an FFE or an EOM.
- At the FFE command, the operator uses the same procedures described in paragraph 3-25.

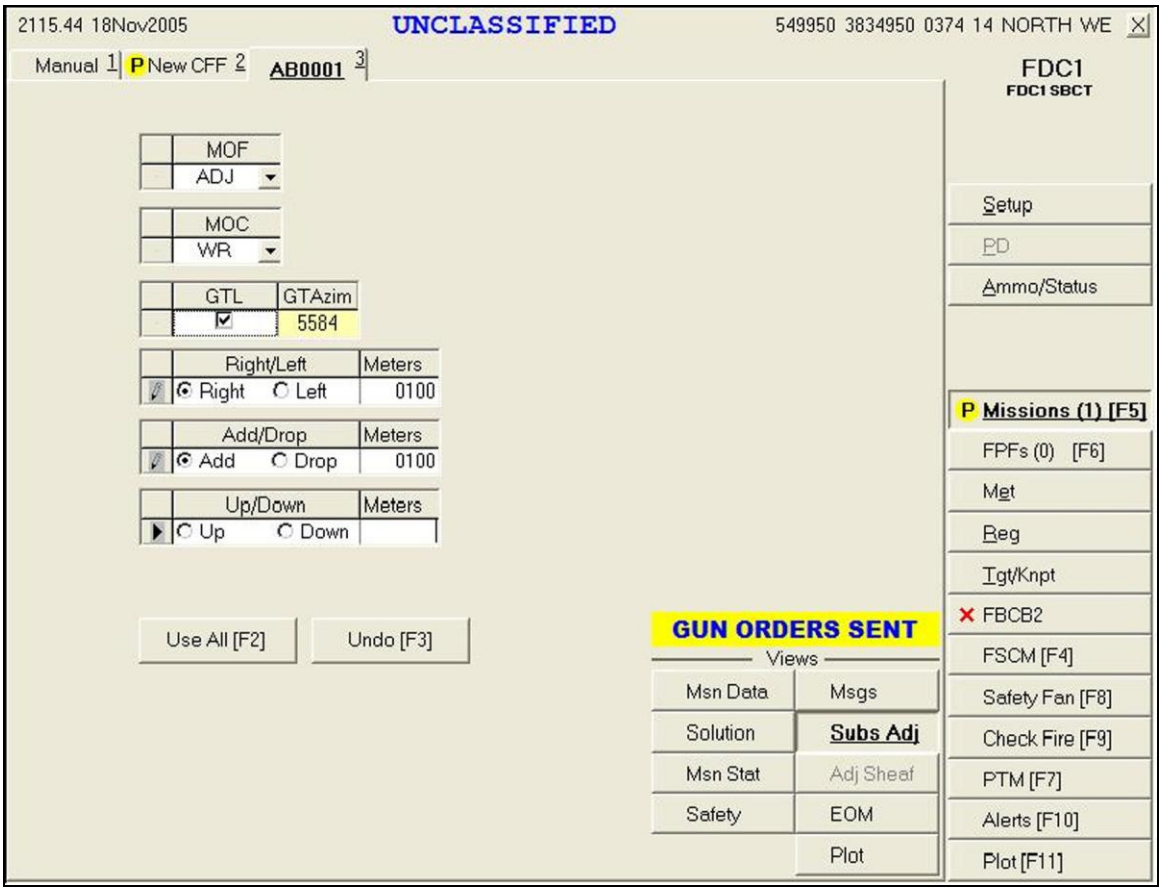


Figure 3-14. MCFS manual adjust fire screen.

MANUAL-END OF MISSION

3-32. To end the mission, click the EOM button. Select one of the three options: EOM-No Save, EOM-Record as a Target, and EOM-Record as a Known Point (Figure 3-15).

EOM-No Save. If the operator does not need to save or record the mission, he clicks PROCESS. The New CFF screen appears with the same mission and the operator clicks DELETE.

EOM-Record as Target. The Subsequent Message screen is displayed stating, "End of Mission with Known Point". The operator clicks PROCESS and the New CFF with the same mission is displayed. He then clicks DELETE.

EOM-Record as Known Point. On the EOM screen, the operator selects the controlling FO and then clicks USE ALL. A message box is displayed over the screen and the operator selects the known point number and clicks the SAVE AS button.

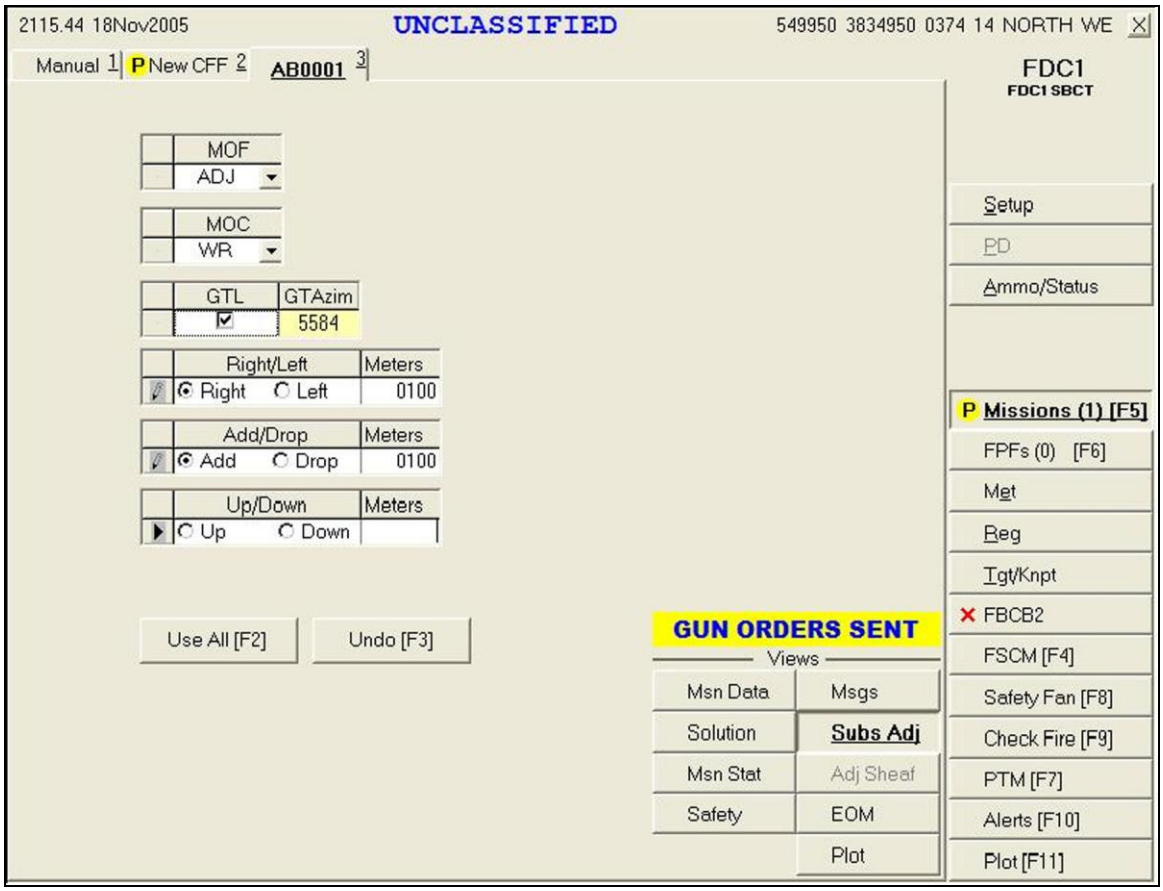


Figure 3-15. MFCS manual end of mission screen.

Section III — SPECIAL MISSIONS

3-33. This section continues to discuss the types of MFCS fire missions. In addition to the fire missions discussed in Section I, the MFCS operator can process special fire missions, which include registration, illumination, coordinated illumination, and FPFs. Each special mission has a button in the control button area.

REGISTRATION POINT

3-34. A registration point (RP) is a terrain feature or other designated point on which fire is adjusted for the purpose of obtaining corrections to firing data. The MFCS provides procedures for entering, updating, and storing RP data. The FSE or FDC determines whether the mission should be saved as an RP.

FIRING THE REGISTRATION

3-35. A registration fire mission is conducted the same way as a normal digital mission from the FSE or FO or as a manual mission. A grid mission must be fired before it can be saved as an RP.

SAVING THE REGISTRATION AFTER A NORMAL DIGITAL MISSION

3-36. At the end of a grid mission, the FSE or FO sends an EOM. The RP number is recorded when the SAVE REGISTRATION DATA box is displayed, the RP number selected, and the SAVE AS RP button is

clicked. The range correction factor and azimuth correction factor are also displayed. The data can also be discarded by pressing the DISCARD button (Figure 3-16).

MANUAL REGISTRATION

3-37. On the Manual screen, the operator enters the same data as a manual grid mission (see paragraph 3-30). He selects Registration (REG) at the bottom of the screen and processes the mission the same as described in paragraphs 3-30 and 3-31. The mission can be saved manually and recorded as a known point by following the instructions in paragraph 3-32.

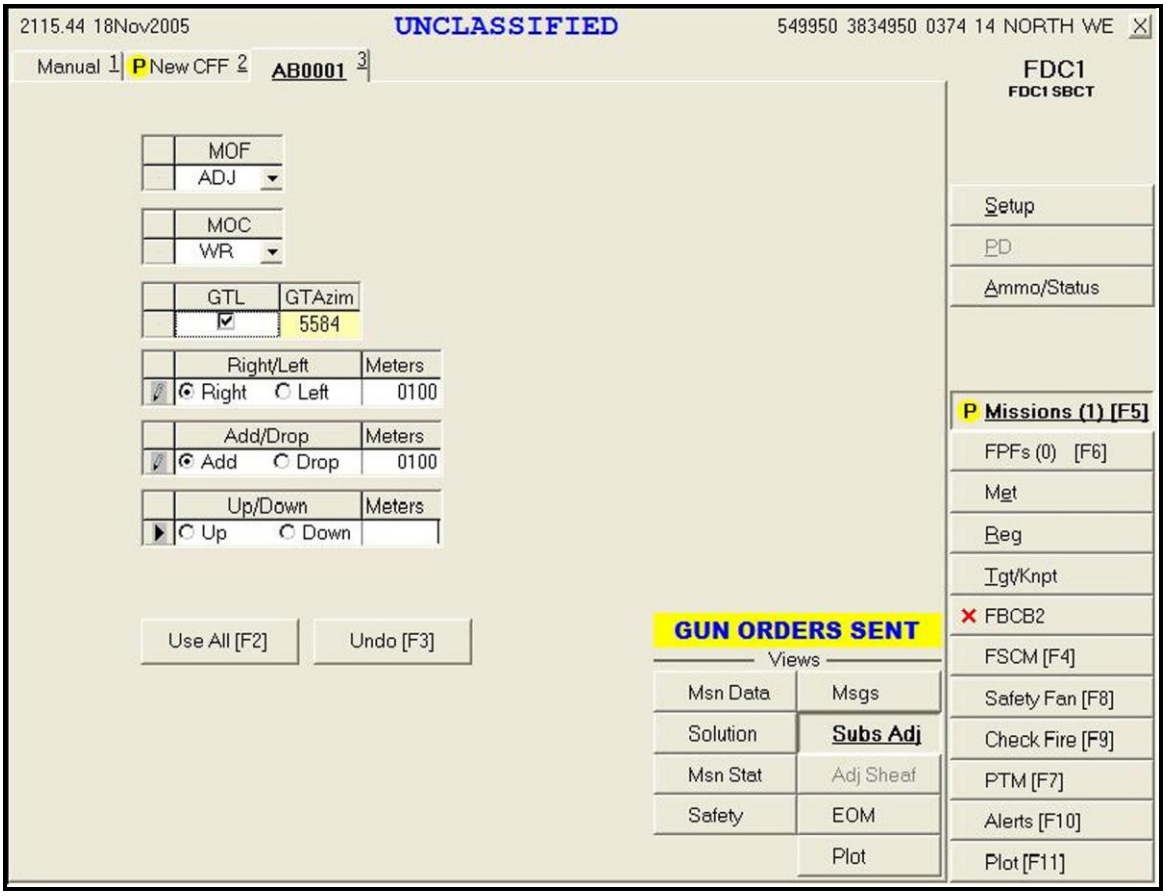


Figure 3-16. MFCS save registration screen.

REGISTRATION SCREEN

3-38. When the REG button in the control panel area is selected, the registration screen (Figure 3-17) is displayed. This screen displays the data for one to sixteen stored RPs. The plot portion of the screen includes icons showing registration points, firing points, and units. To view a specific RP, the operator uses the following procedures:

- Click on the index box in front of the desired RP at the top left of the screen. Information will auto-fill into the fields.
- To zoom in on a point in the plot, move the slider control to the right of the plot area within a range of 200 to 100,000 meters. If the operator leaves this screen, and later returns, the slider control resets to its default position at the center of the slider control. The program does not allow the operator to zoom or recenter beyond the map mod specified in the geographic reference (GEOREF).

- To center on a particular point, double-click on the point.
- To obtain information on a particular icon on the plot, place the cursor over the icon.
- To enter or update data, enter the appropriate information and click USE ALL. This also updates the plot screen.
- To undo changes that have not been committed to the database, click UNDO CHANGES.
- To delete an RP, highlight the RP to be deleted and click DELETE RP. All fields are cleared and the plot screen is deleted.

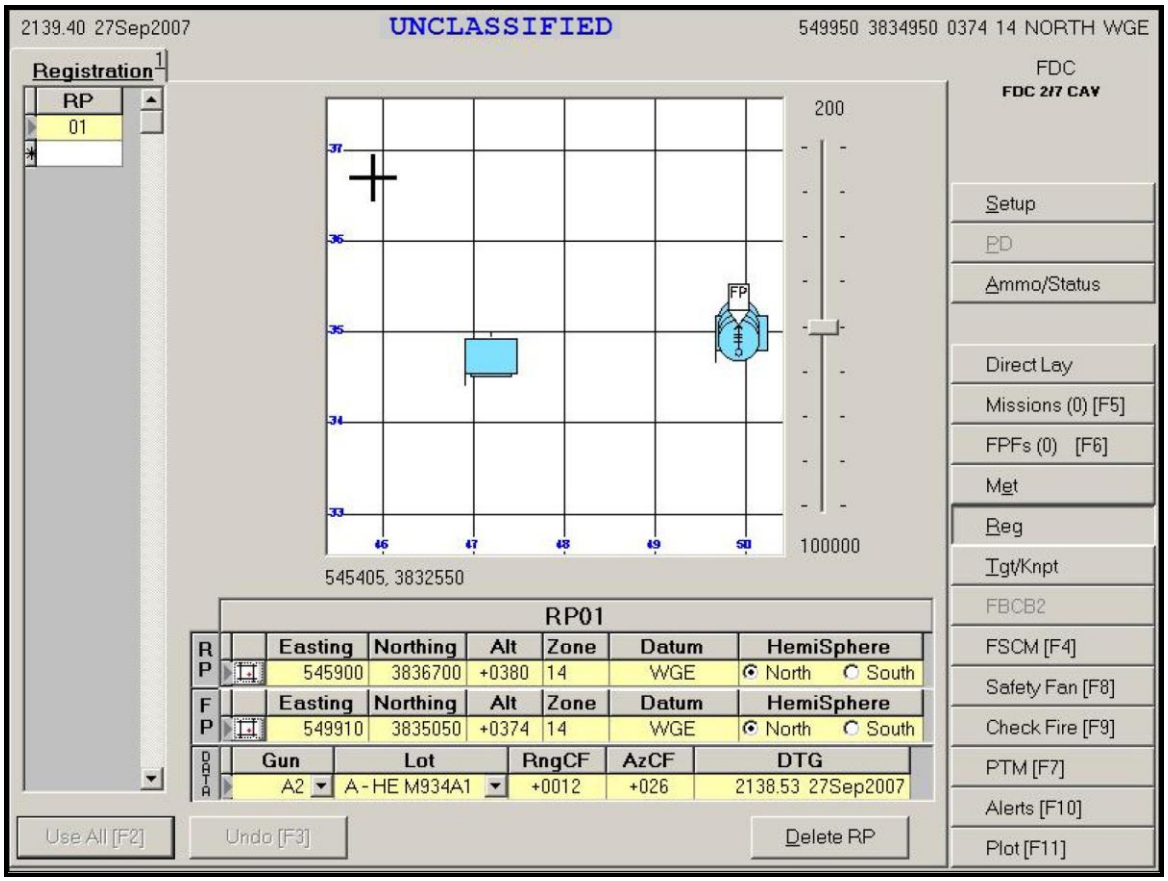


Figure 3-17. MFCS registration screen.

TARGET/KNOWN POINT

3-39. The MFCS provides procedures for viewing and entering up to 50 targets and 50 known points. The procedures for both are essentially the same except that known points must be assigned to a designated observer. When the TGT/KNPT button is selected, the operator can choose either the TGTs or KNPTs tab.

TARGETS

3-40. When the operator chooses TGTs the screen in Figure 3-18 appears.

- All of the targets designated at the EOM are listed.
- Targets can also be entered or edited manually by the operator. To manually enter or edit a target, use the following procedures:
  - Enter the two alpha characters (AA to ZZ) and target number prefix followed by a four digit (0000 to 9999) target number (for example, AA0027).

- Enter EASTING, NORTHING, ALTITUDE (ALT), ZONE and choice of datum and hemisphere.
- Click USE ALL when completed. Click UNDO CHANGES to undo all changes. A whole target is deleted by highlighting the index box in front of the entry you want to delete and clicking DEL.

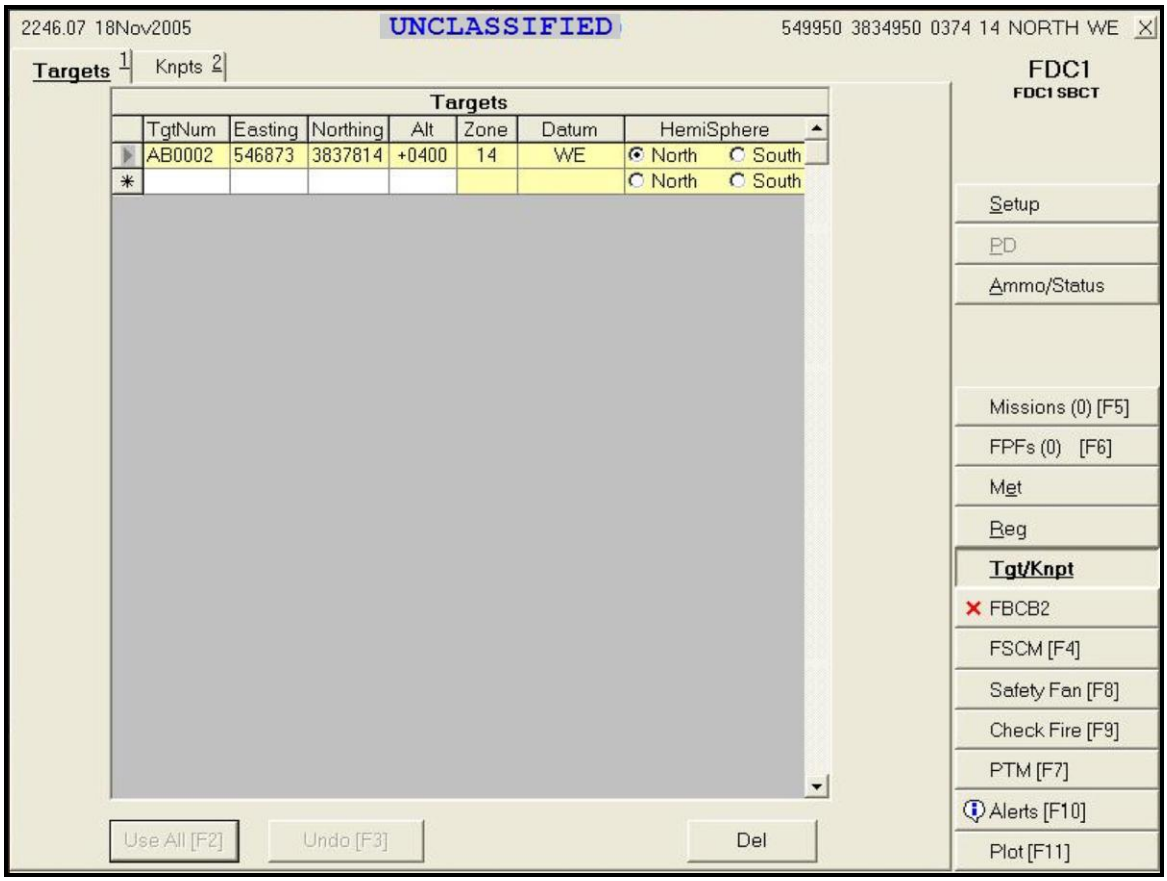


Figure 3-18. MCFS targets screen.

KNOWN POINTS

3-41. Known points are received digitally at EOM and a dialogue box is displayed to enter the required data. A known point must be associated with an observer. Known points can also be entered manually by the operator through performing the same actions described above for targets, except that the KNPT is a two-digit number from 00 to 99. An observer (OBS) is also chosen from the pick list. Once the data is reviewed and the necessary changes made, the operator clicks USE ALL to save the information (Figure 3-19).

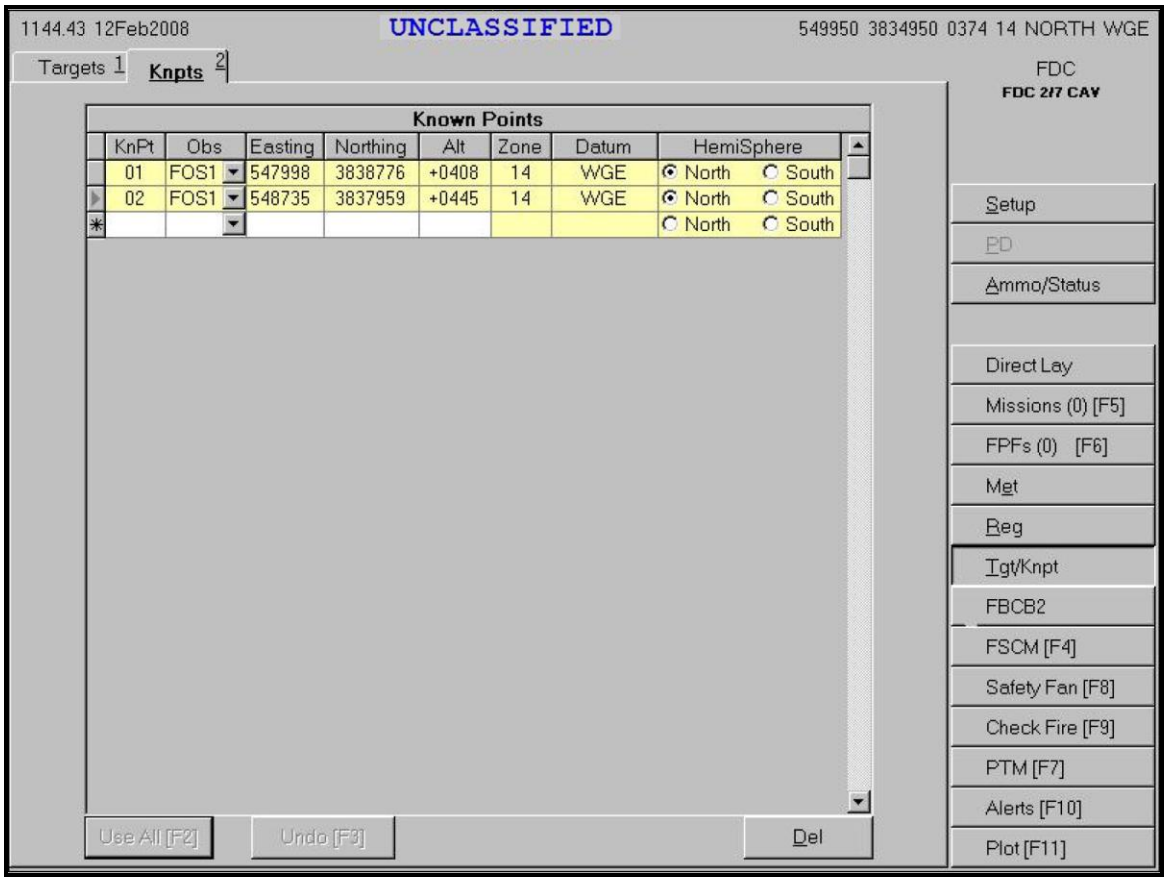


Figure 3-19. MFCS known points screen.

ILLUMINATION MISSION

3-42. Illumination missions are used to reveal the location of enemy forces hidden by darkness. The grid method to locate targets is used to illustrate the procedures in this and the following paragraphs. The same methods, however, apply for locations determined through polar and shift from a known point methods. (Shift missions are converted by the FO prior to being sent to the FDC, but the location is not as precise.)

ILLUMINATION PROCEDURES

3-43. The procedures for an illumination mission are generally the same as the ones described for a digital CFF described in paragraphs 3-19 through 3-28. Therefore, only the general procedures, sequence, and differences in the procedures are described below.

New Call for Fire Screen. Upon receipt of a fire mission, the MISSIONS button in the control button area is highlighted. Click the MISSIONS button. The screen displays the mission data on a NEW CFF screen. The operator can accept the mission by clicking on the PROCESS button or refuse it by clicking on the MTO DENY button. If there is an error beyond FDC control, the only choice will be MTO DENY. The Mission Data screen is displayed when the PROCESS button is clicked (Figure 3-20).

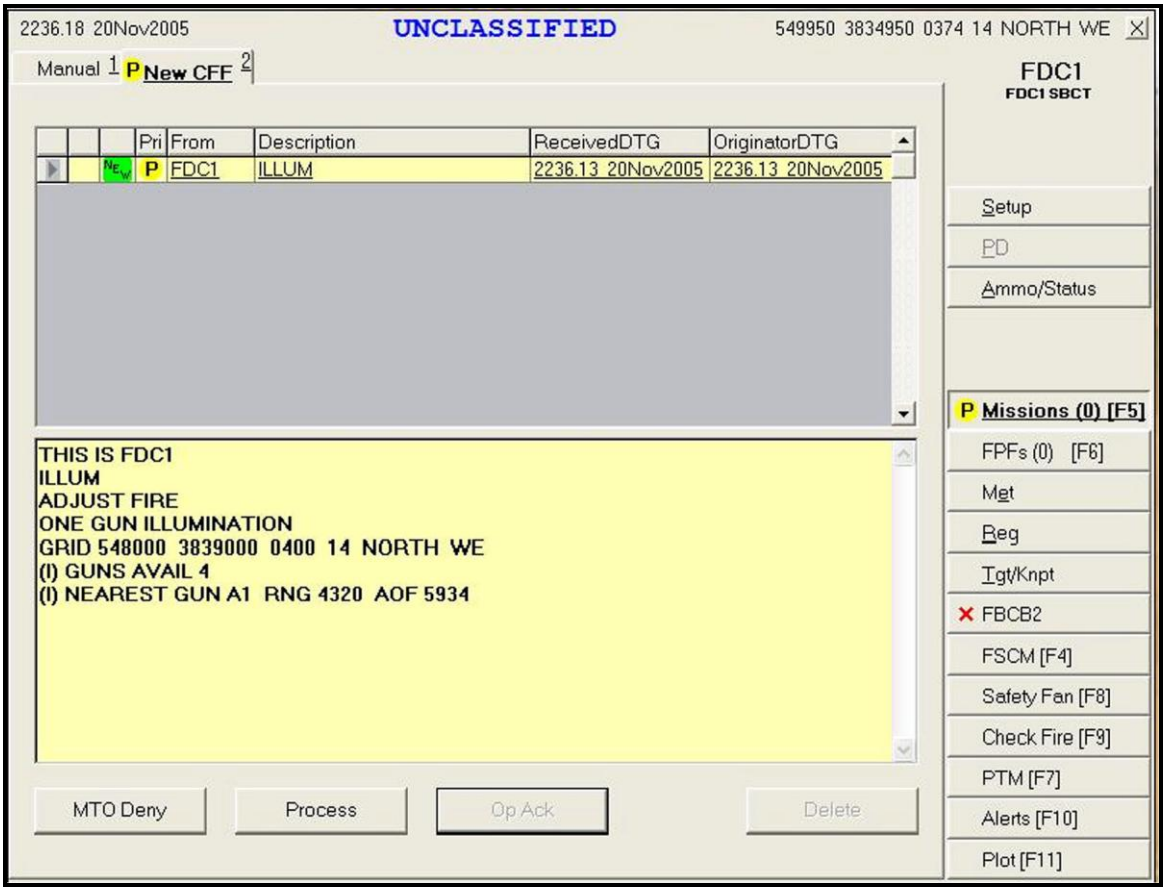


Figure 3-20. MFCS new call for fire screen.

Mission Data View Screen. The Mission Data screen (Figure 3-21), presents mission data and a new target number. It allows the operator to review mission data and make any necessary adjustments. Guns for the mission are preselected and the operator has the option to modify the selection by selecting or deselecting any OpRDY gun. In a one-gun illumination mission, when deselecting one gun and then selecting another, the ammunition and sheaf selections in the FIRE COMMANDS fields automatically change to an HE round and linear sheaf. The operator must reselect the correct shell and the sheaf will automatically default to "1 GUN IL." If necessary, make adjustments to mission data. Change MOC (Method of Control) from WR (When Ready) to AMC (At My Command). The user then clicks the USE ALL button to display the solution screen.

Note: It is recommended to use a two-gun lateral sheaf for an area target and a two-gun illumination for a point target sheaf. The standard coverage for a 120-mm mortar illumination is 1,500 meters.

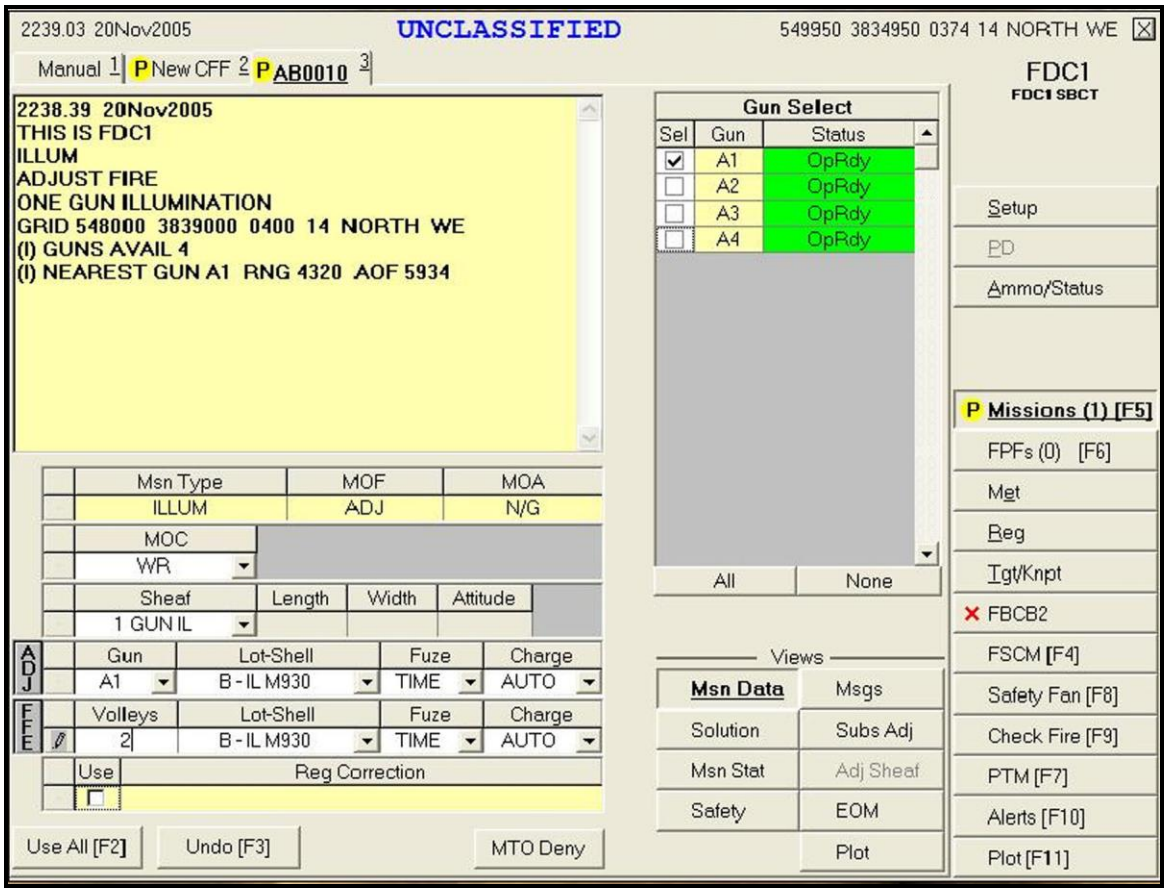


Figure 3-21. MFCS mission data view screen.

Solution View Screen. This screen from which gun orders are sent shows gun orders, the selected guns, and any errors and warnings. It allows the operator to review gun status and to change gun selection based on errors and warnings received. The operator reviews, changes, and records the mission data. The operator can either accept (MTO ACCEPT) or refuse (MTO DENY) the mission. If errors are indicated that cannot be corrected, the operator can continue the mission if authorized. The operator can change gun selection based on errors and warnings (Figure 3-22).

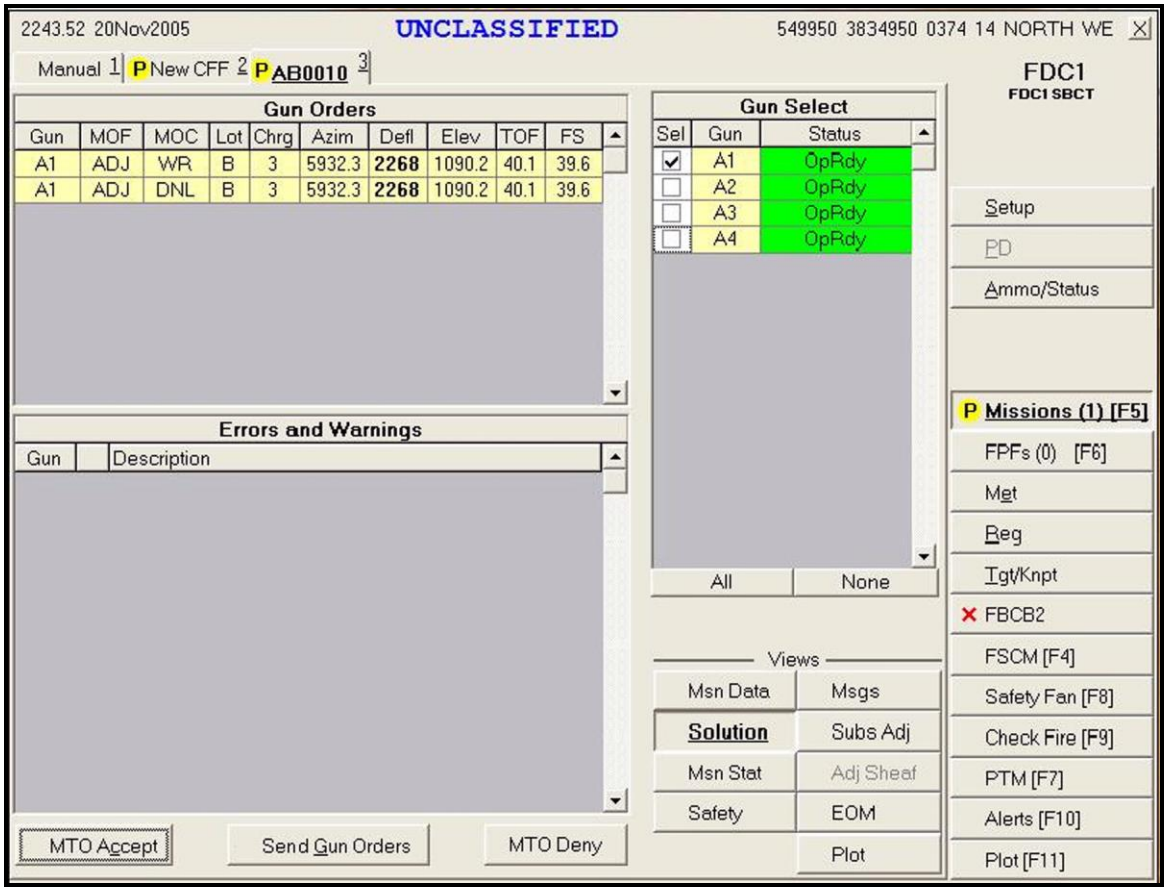


Figure 3-22. MFCS solution view screen.

Safety Data View Screen. Before sending gun orders, or at any time during the mission, the operator can check safety data by clicking the SAFETY DATA button. The screen (Figure 3-23) includes the location and altitude of burst and the impact point of the canister. The PLOT button is available to review the plot at any time during the mission.

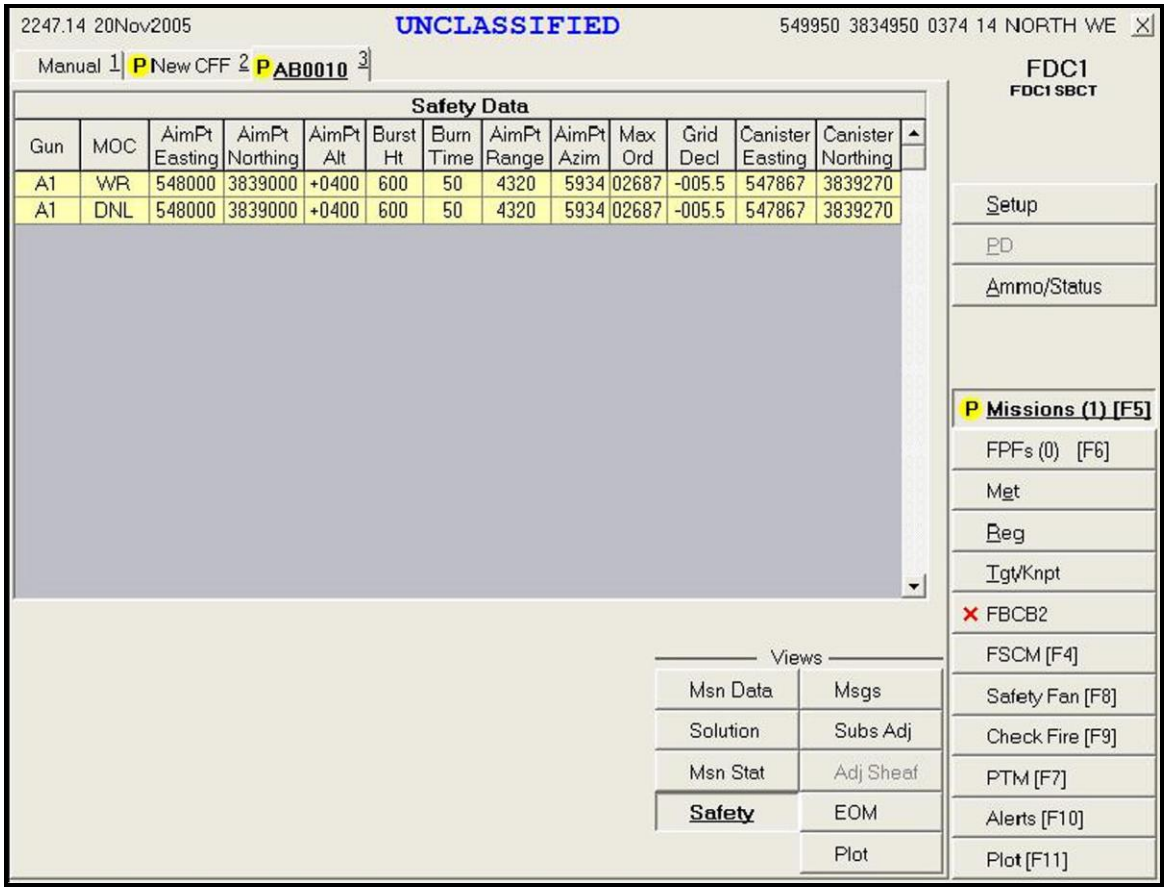


Figure 3-23. MFCS safety data view screen.

Solution View Screen. Once the operator is satisfied with the mission and safety data, he returns to the solution screen and clicks the SEND GUN ORDERS button. He also confirms the order by clicking YES in the box with the message "Confirm Send Gun Orders Yes/No." A SEND STATUS box is then displayed showing the destination and status (Figure 3-24).

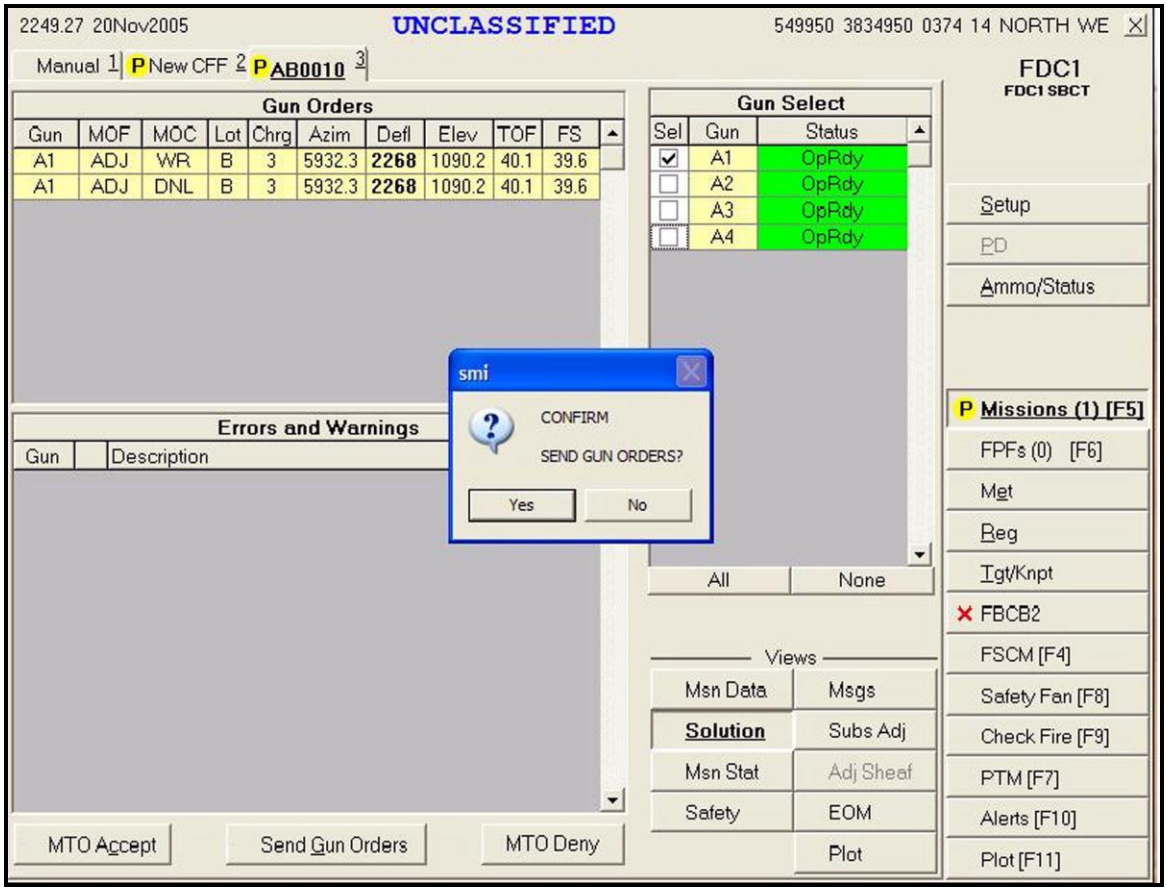


Figure 3-24. MFCS solution view screen.

Mission Status Screen. When the operator sends gun orders, the Mission Status screen is available and the words "Gun Orders Sent" are displayed in the VIEWS section. The FIRE button is displayed because the method of control was AMC. When the guns send the "Ready" message, the READY button is grayed out and the operator can click the FIRE button when required or ordered from the FO or FSE. The mission is monitored from this screen. Ready, Shot, Rounds Complete, and Abort fields are checked off as applicable when the gun(s) send them. This information is automatically transmitted to the FSE or FO (Figure 3-25).

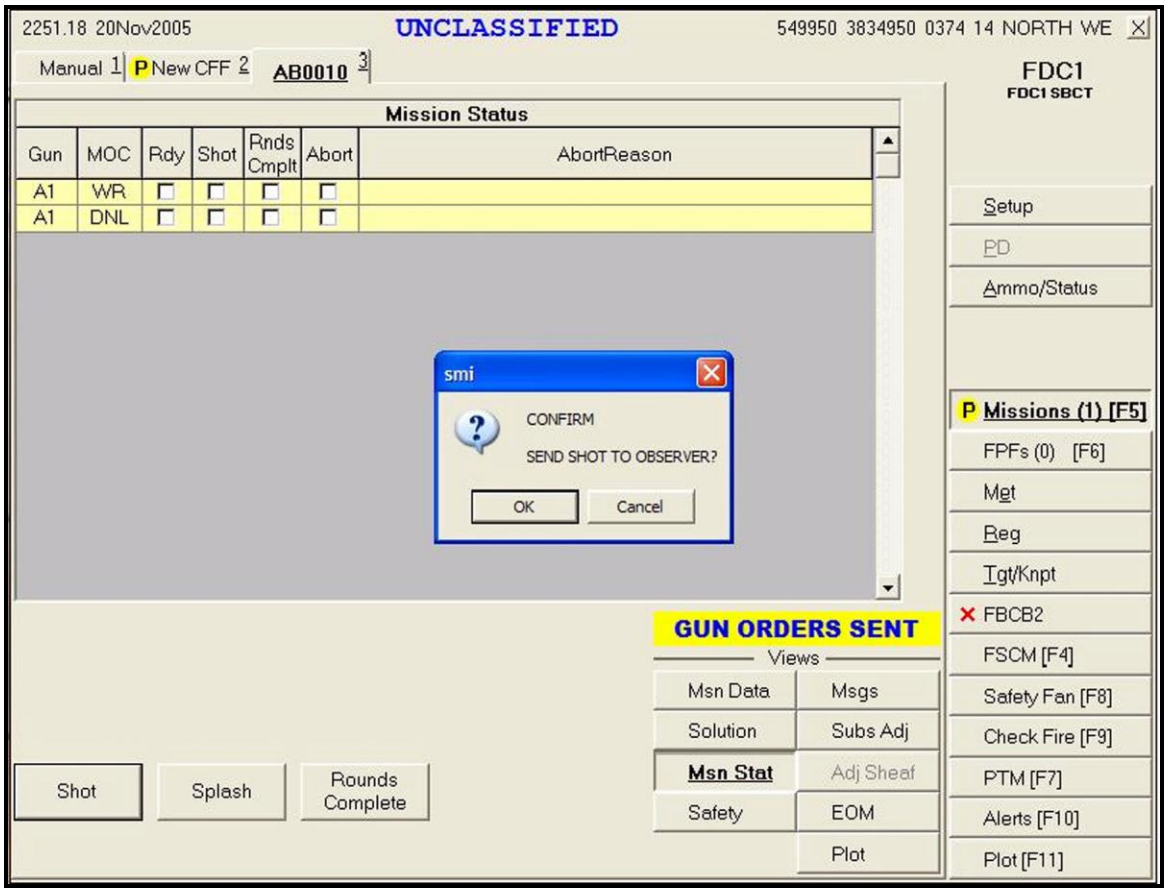


Figure 3-25. MFCS mission status screen.

Subsequent Messages Adjust Fire. By clicking the MSGS (Messages) button, the operator waits for subsequent messages from the FSE or FO. Upon receipt of the adjust fire message, data is recorded and the operator acknowledges receipt. The operator has a choice to PROCESS or DELETE the adjustment. When PROCESS is selected, the Mission Data screen is displayed. The operator makes the necessary adjustments to the data and clicks the SOLUTION button or USE ALL (Figure 3-26).

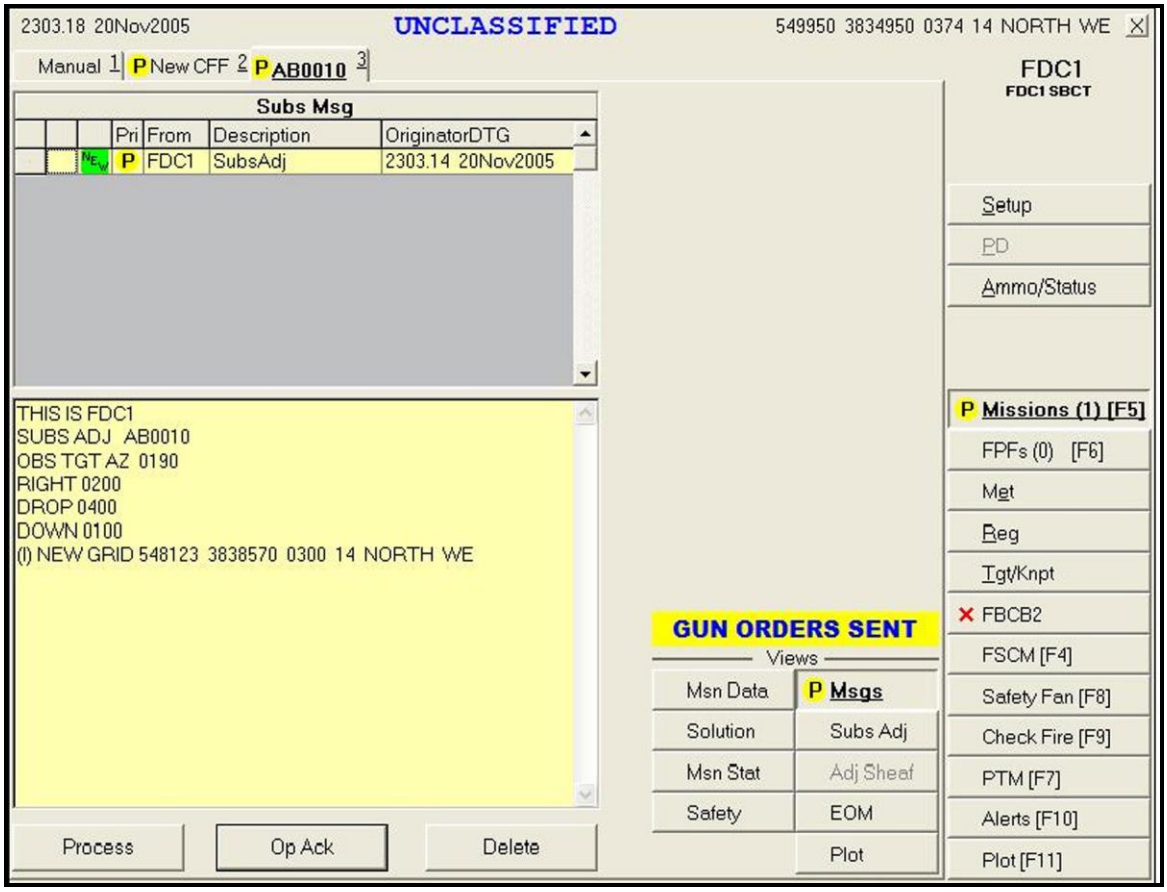


Figure 3-26. MCFS message view screen.

- To complete the illumination mission, the operator continues adjustments to the illumination until he receives an EOM message or another mission such as "coordinated illumination" from the FSE or FO.
- The FSE or FO contacts the FDC to "Mark Illumination" and the operator records the mark time. The MFCS operator also sends a plain text message to the illumination gun to inform the squad leader that the illumination has been marked and that he needs to maintain a minimum of three to five rounds with the current data.
- The mission stays open in case corrections are needed later.

COORDINATED ILLUMINATION MISSION

3-44. Illumination fires are often coordinated with HE fires to both expose and kill or suppress the enemy. This mission is essentially two separate fire missions with the operator alternating between the illumination fire mission and the HE fire mission. This action is done by clicking on the tabs for each mission. The type of round and fuze combination used with illumination depends on the type of target. For example, HE is used for troops in open areas; WP is used for a suspected POL point. There are three

parts to a coordinated illumination mission: (1) adjustment of the illumination and ordering its fire during an HE adjustment and FFE, (2) the adjustment of the HE, (3) the coordination of illumination and HE fires.

ADJUSTMENT AND FIRE OF THE ILLUMINATION

3-45. The adjustment and firing of the illumination is identical to the one described in paragraph 3-42. Illumination is fired and, if necessary, adjusted throughout the coordinated illumination mission. Once the illumination is adjusted, a subsequent adjust message for FFE is received for the illumination gun mission and is processed through to Mission Status without adjustments. During the HE adjustment and FFE, the operator receives subsequent messages from the FO to fire illumination in coordination with the HE. He does this by alternating between the ILLUMINATION MISSION tab and the HE MISSION tab. After the illumination is adjusted, the method of control for both fires is changed from WR to AMC.

HIGH-EXPLOSIVE ADJUSTMENT

3-46. The adjustment of the HE is identical to the one described in paragraph 3-16, Basic Digital Missions.

1. Upon receipt of a fire mission, the MISSIONS button in the control button area is highlighted. The operator clicks the MISSIONS button and a new CFF tab appears. The operator has the option to accept (PROCESS) the mission or refuse (MTO DENY) the mission. If the mission is acceptable, he records the data and clicks PROCESS.
2. The screen now displays the mission data. The operator processes the mission the same way and uses the same screens as a regular HE adjustment except for the method of command. The method of command is changed from WR to AMC. After any other adjustments to the data, he clicks USE ALL and the SOLUTION screen appears.
3. This screen displays Gun Orders and Solution Errors and Warnings. It allows the operator to review gun status and to change gun selection based on errors and warnings received. It also provides for MTO ACCEPT or MTO DENY and is the screen from which gun orders are sent.
4. Before sending the gun orders, the operator checks the safety data by clicking the SAFETY DATA button (he can also check the plot screen). He reviews and records the safety data and clicks the SOLUTION button to return to the Solution screen.
5. When ready, the operator clicks SEND GUN ORDERS and confirms the order. A Send Status box is now displayed showing destination and status.
6. The Mission Status screen appears with the words "GUN ORDERS SENT" displayed. The mission is monitored from this screen. Gun status is checked off as completed and messages are automatically sent to the FO or FSE. When the adjusting HE gun sends a status of "ready," the operator begins coordinating the fires of the illumination and the HE.
7. A subsequent adjust message is received for the illumination gun mission. The operator processes the mission without adjustment and clicks the FIRE button.
8. The operator waits for the appropriate mark time and clicks the FIRE button for the HE mission.
9. The operator continues to perform the steps above until the subsequent Adjust-FFE or EOM message is received. Fire for Effect

3-47. On receipt of the subsequent Adjust-FFE message the operator records the data and can either process or delete the mission. Selecting PROCESS displays the MISSION DATA screen.

1. The operator performs the same reviews and decisions on this screen. The method of command is changed from WR to AMC. When complete, he clicks either USE ALL or SOLUTION buttons.
2. At the Solution screen, the operator reviews and records data. He also checks the Safety Data and Plot screens. He then clicks the SOLUTION button to return to the Solution screen. When satisfied, the operator clicks SEND GUN ORDERS and confirms the order. He then waits for all guns to report a "Ready" status.

3. Subsequent Adjust message is received for the illumination gun mission. The operator processes the mission without adjustment and clicks the FIRE button.
4. The operator waits for the splash signal and then the appropriate mark time. He then clicks FIRE for the HE mission.
5. When each gun reports rounds complete, a check appears in its RNDS COMPLT box. The operator then responds to any subsequent messages.
6. When the EOM message is received, the HE mission can be saved as a target. The operator discards or saves the mission the same as described in paragraphs 3-27 and 3-28. He can save it manually by following the instructions in paragraph 3-32.
7. The operator also ends the illumination mission, but does not save it.

CALL FOR FIRE FROM FSE OR FO – ILLUMINATION AND COORDINATED ILLUMINATION POLAR MISSION

3-48. Missions are conducted the same way as a grid mission. The NEW CFF screen has the POLAR method checked.

CALL FOR FIRE FROM FSE OR FO – ILLUMINATION AND COORDINATED ILLUMINATION SHIFT MISSION

3-49. These missions are also conducted the same way as a grid mission. The FO automatically converts a shift mission to a grid mission before the FDC receives it. The location is not as precise as a regular grid mission, since the last digit of the direction, lateral displacement distance, and range displacement distance are automatically changed to zero. The NEW CFF screen has the SHIFT method checked.

MANUAL ILLUMINATION AND COORDINATED ILLUMINATION MISSIONS

3-50. Procedures for a manual mission are similar to a digital mission initiated by the FSE or FO. The only differences are that the operator must manually initiate the CFF, manually click SUBS ADJ whenever a subsequent adjust is warranted, and manually click EOM to end the mission. Otherwise, procedures and screens are the same. (See paragraph 3-29 for details on manual missions).

FINAL PROTECTIVE FIRES

3-51. An FPF is an immediately available prearranged barrier of fire designed to impede enemy movement across defensive lines or areas. The MFCS can store up to three FPFs at a time. If an active mission is in progress, and an FPF order is received, the FPF mission has the higher priority.

***Note*:** This paragraph uses a grid mission to illustrate the process to receive, adjust, save, and fire an FPF. Missions using polar or shifts from known points to locate the FPF are conducted the same way.

NEW CALL FOR FIRE

3-52. Upon receipt of a fire mission, the MISSIONS button in the control button area is highlighted and the audio alarm sounds, if enabled. Click the MISSIONS button and the NEW CFF tab appears. The message contains the following text: "Assign FPF." If the mission is acceptable, click PROCESS (Figure 3-27).

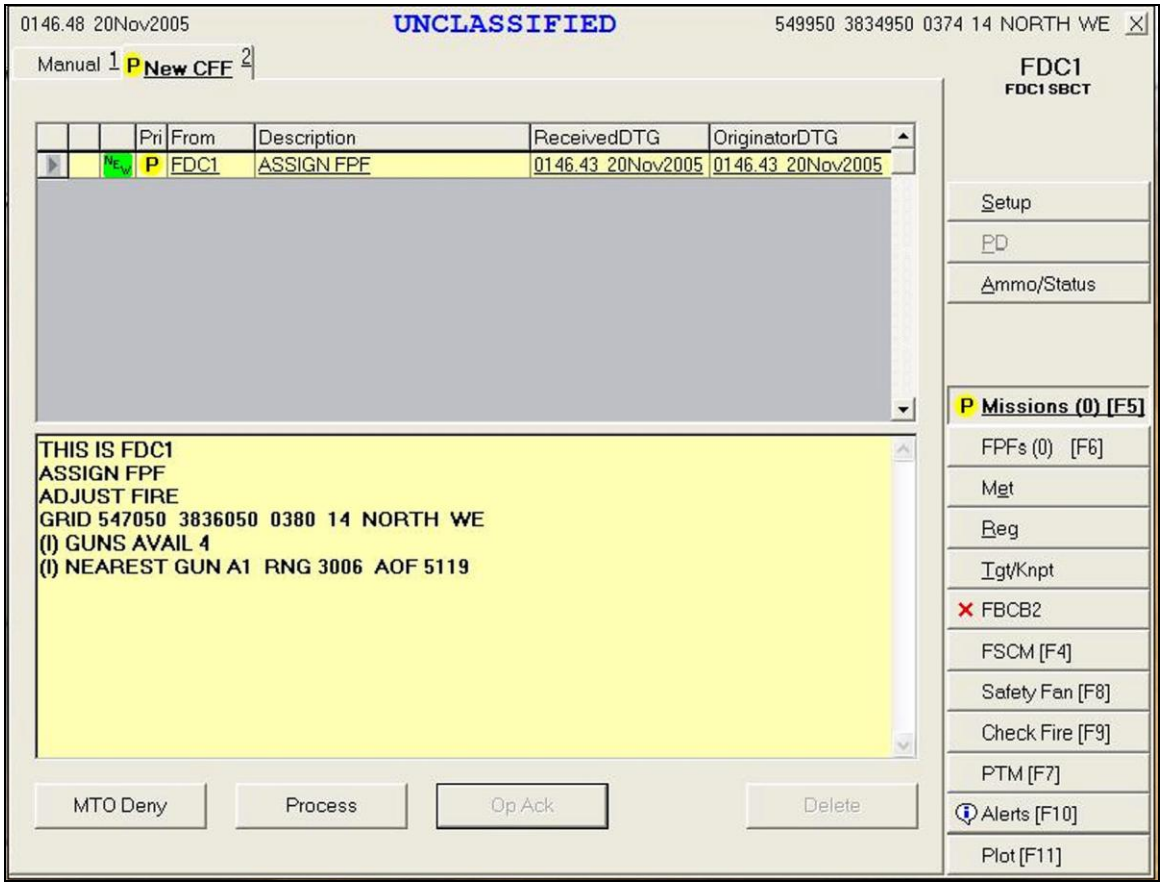


Figure 3-27. MCFS new call for fire view screen.

MISSION DATA

3-53. When PROCESS is selected, the Final Protective Fire (FPF) button in the control button area is selected. The screen then displays a new FPF target number tab and the MSN DATA view screen (Figure 3 -28). Guns for the mission are preselected by the software, but can be modified by the operator. If necessary, the operator makes adjustments to the mission data. The method of fire (MOF) is adjust; the method of attack (MOA) is "DANGER CLOSE". Both selections are auto-filled and read-only. The method of control (MOC) is AMC. SHEAF defaults to LINEAR, but the preferred sheaf for an FPF is SPECIAL. For a special sheaf, the system allows the operator to enter length, width, and attitude. Based on the attitude of the target, the operator ensures that the adjusting gun is the one closest to the FPF. Since the FPF mission is also danger close, the preferred fuze to adjust is DELAY. In the ADJ section, choose DLY for fuze, if available. The USE box is checked automatically when a registration correction is available. If a registration correction is available, there is a choice to use REG CORRECTION. If the operator decides not to use it, he clicks the check in the USE box to deselect it. If no changes are made, he selects the SOLUTION button or clicks USE ALL to display the Solution screen.

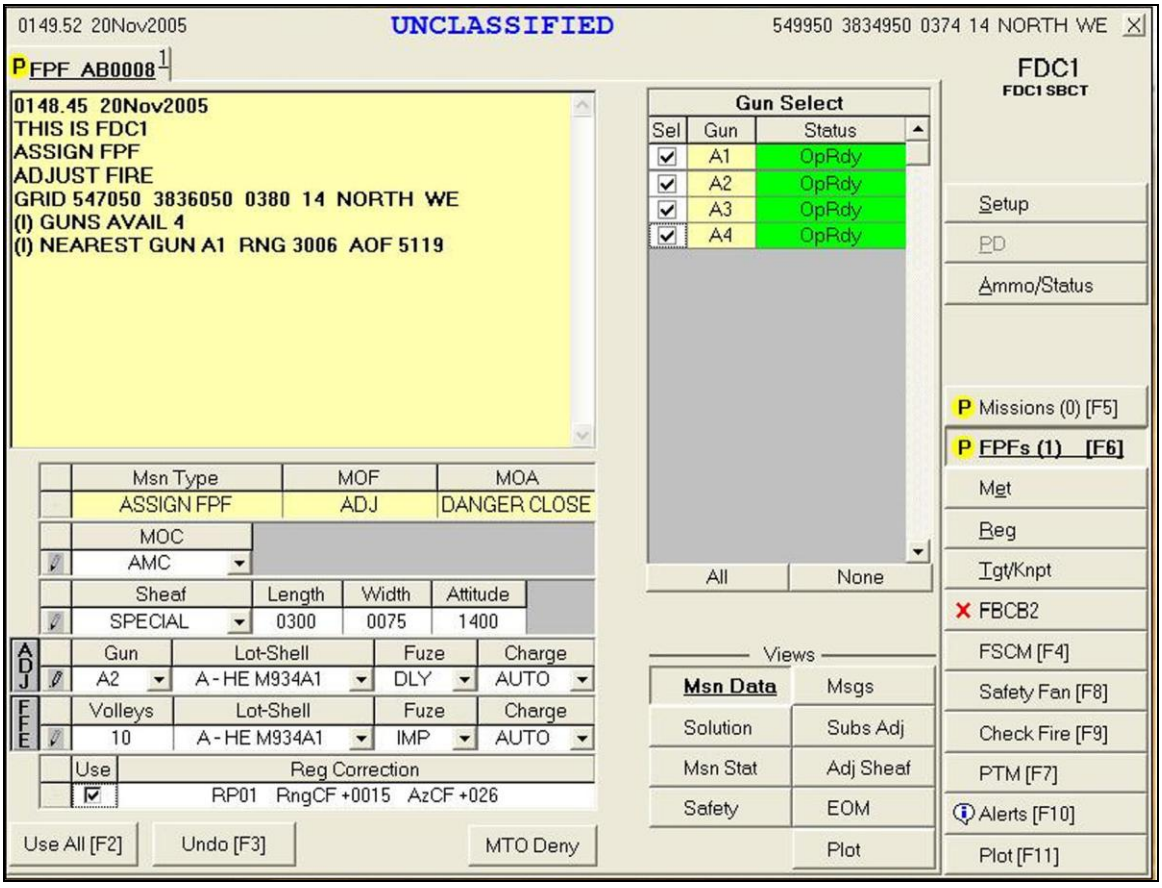


Figure 3-28. MFCS final protective fire data view screen.

SOLUTION

3-54. In this step, the operator can review gun status and change gun selection based on errors and warnings received. He also checks the safety data.

Final Protective Fire Solution View Screen. The Solution screen shows gun orders, selected guns, and any errors and warnings. It also allows the operator to accept (MTO ACCEPT) or refuse (MTO DENY) a mission, and is the screen from which gun orders are sent. The operator reviews the screen and records data. If errors are indicated that cannot be corrected, the operator's only choice is MTO DENY. If warnings are indicated that cannot be corrected, the operator can continue the mission if authorized. The operator can change gun selection based on errors and warnings if necessary. If MTO ACCEPT is selected, a green check is displayed before MTO ACCEPT, and MTO DENY is shaded (Figure 3-29).

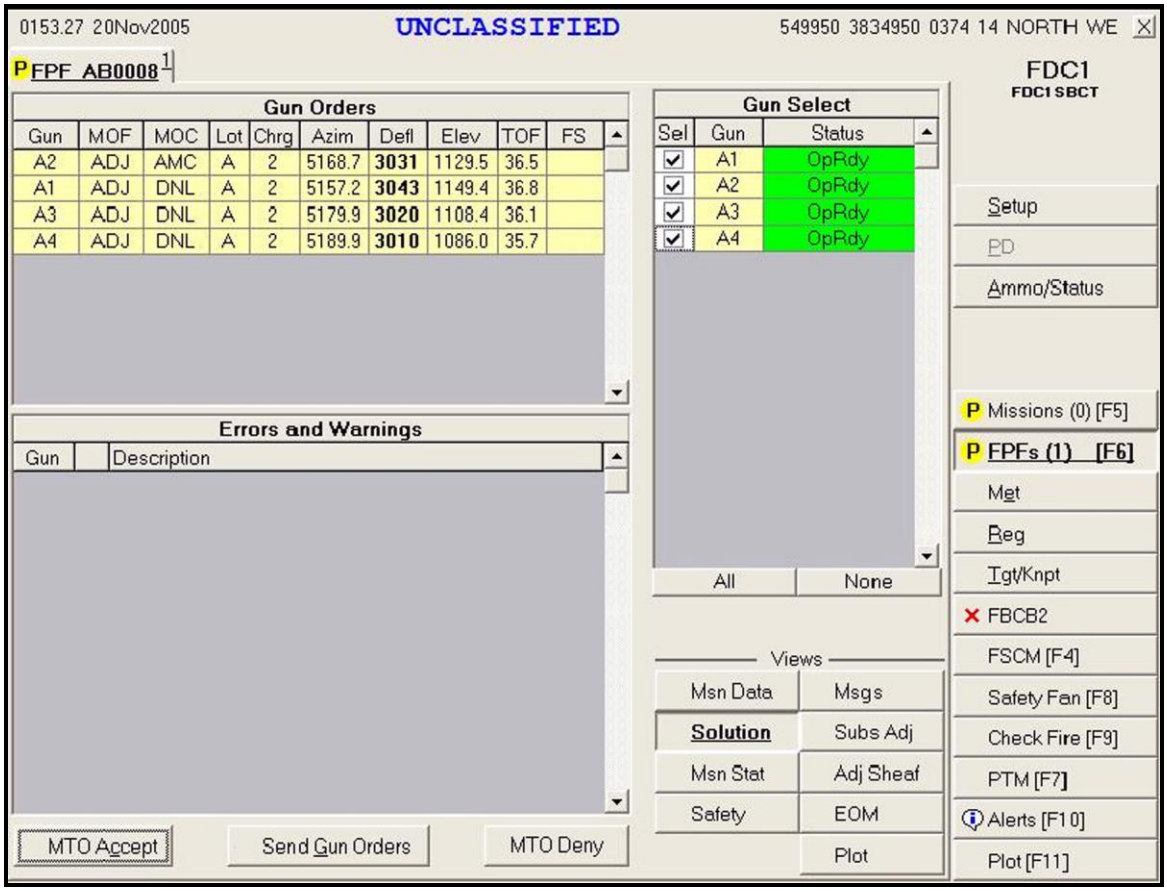


Figure 3-29. MCFS final protective fire solution view screen.

Safety Data View Screen. Before sending gun orders, the operator checks the safety data by clicking on the SAFETY DATA button. This screen allows a check of safety data. The operator reviews and records the safety data, and, when satisfied, clicks the SOLUTION button (Figure 3-30).

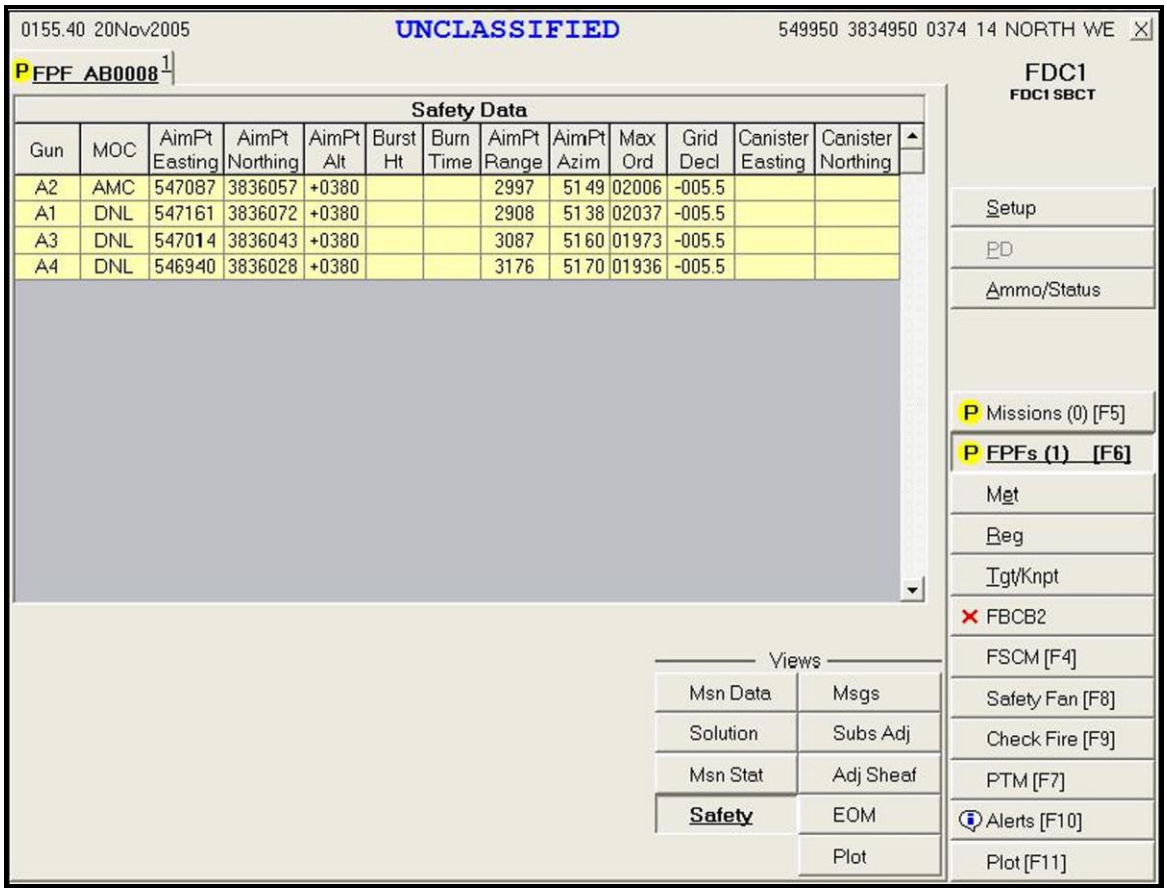


Figure 3-30. MFCS safety data view screen.

***Note*:** The plot screen is available to review the plot at any time during the mission.

Solution View Screen. The operator clicks SOLUTION to return to the Solution screen. The MOC for the adjusting gun is AMC; "Do Not Load" (DNL) is the MOC for the other guns. When satisfied, the operator clicks SEND GUN ORDERS and confirms them. A SEND STATUS box is then displayed showing destination and status Figure 3-31).

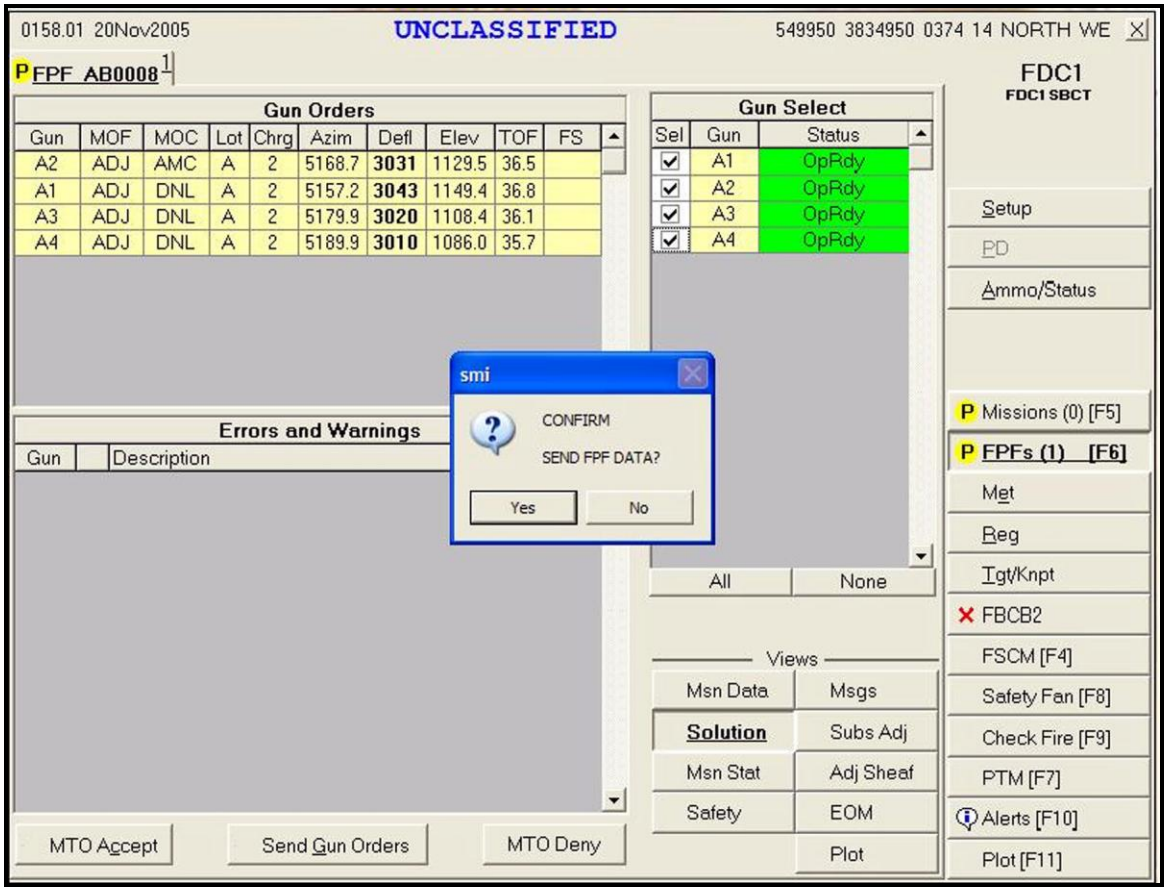


Figure 3-31. MFCS solution view screen.

MISSION STATUS VIEW SCREEN

3-55. When the operator sends gun orders, the MSN STAT screen (Figure 3-32) is displayed and the words "Gun Orders Sent" are displayed in the VIEWS section. The mission is monitored from this screen. Ready, Shot, Rounds Complete, and Abort are checked off as applicable when the gun sends them, and is automatically transmitted to the FSE or FO. Once gun orders are sent, the operator needs to process a subsequent adjust before a new set of gun orders can be computed and sent. When the adjusting gun sends "Ready," the operator clicks the READY button to send the message to the FSE or FO. If the mission is AMC, the operator receives an order to fire from the FSE or FO and then clicks the FIRE button. The FIRE button is shaded. Upon receiving "Shot," a check appears in the SHOT box and the box turns green and the SHOT button is shaded. The time of flight and a red splash are then displayed, and the SPLASH button is shaded. If the gun aborts the mission, a check will appear in the ABORT box and the reason for the abort is displayed in the ABORT REASON field. The operator continues to process the orders until the gun is adjusted.

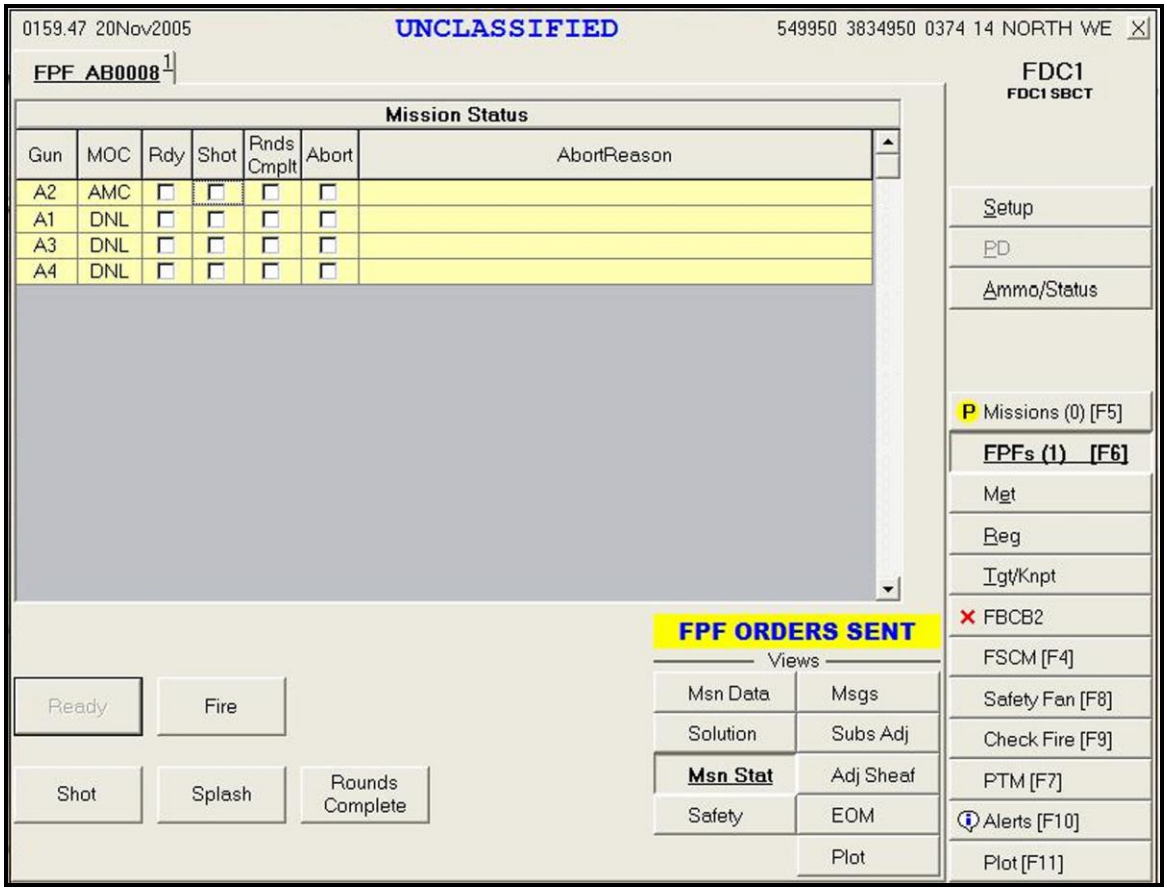


Figure 3-32. MCFS mission status view screen.

SUBSEQUENT MESSAGES TO ADJUST ALL THE GUNS

3-56. Once the first gun is adjusted in the sheaf, the data is applied to each of the other guns until they are also adjusted in the sheaf. The operator now processes the orders from the FO to individually adjust each gun. He selects the gun to adjust and follows the same procedures used in paragraphs 3-52 through 3-55 above.

- Upon receipt of the message, the operator records data and acknowledges receipt. He can choose PROCESS or DELETE. When PROCESS is selected, the following screen is displayed (Figure 3-33), the operator makes any necessary adjustments; this step adjusts the gun in the sheaf. Once satisfied, the operator clicks USE ALL and the Mission Status screen appears.

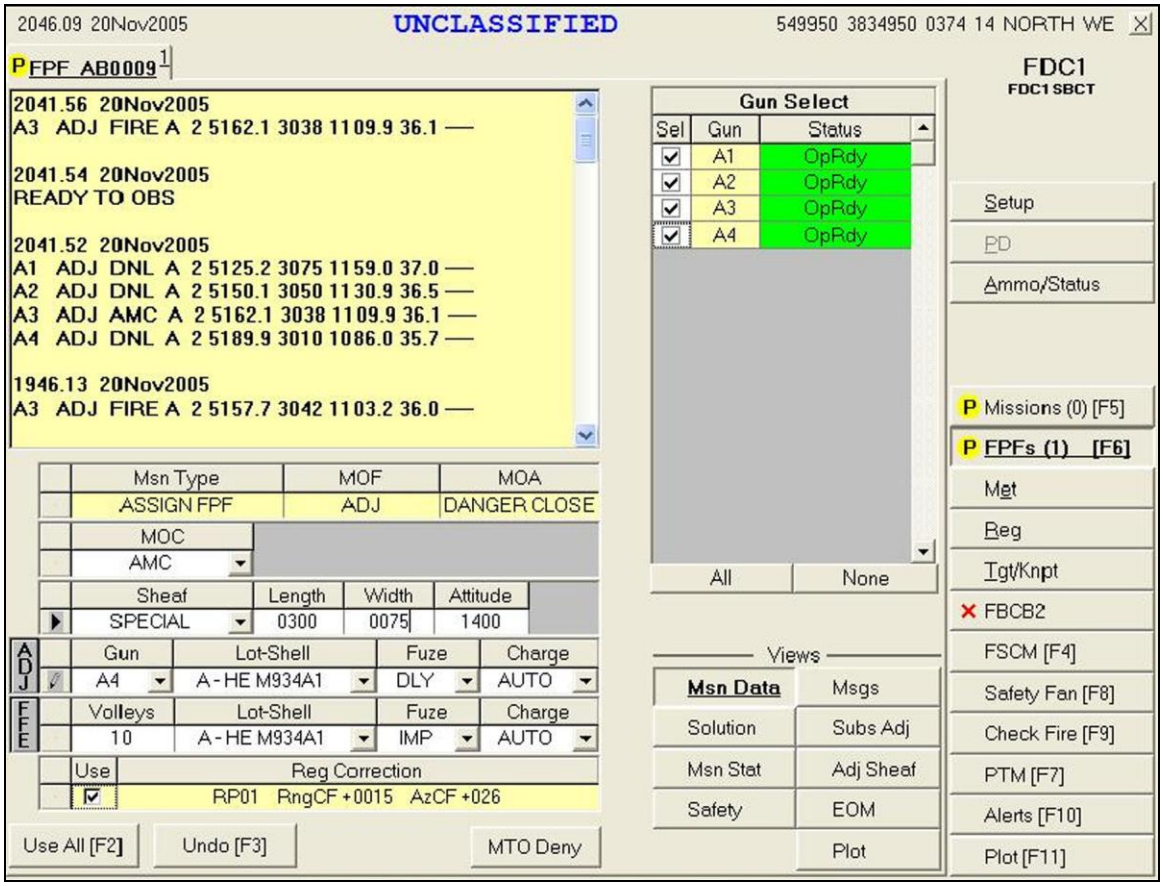


Figure 3-33. MFCS mission data status view screen.

- The operator selects the gun to adjust in GUN SELECT and verifies that the status of the gun is OPRDY.
- The operator monitors the mission from the Mission Status screen. He reviews and performs the same actions described in paragraph 3-56. The indirect fire team continues to make adjustments using the same process until the FO requests an EOM.

END OF MISSION AND STORE THE FPF

3-57. When the FO or FSE orders an EOM, the operator stores the FPF using the EOM screen.

End of Mission View Screen. The EOM-STORE FPF option is the only available selection. The operator clicks the down arrow in the controlling FO field, chooses the correct FO participating in the mission, and then clicks USE ALL. The Subsequent Message screen is displayed stating "End of Mission" with the target number (Figure 3-34).

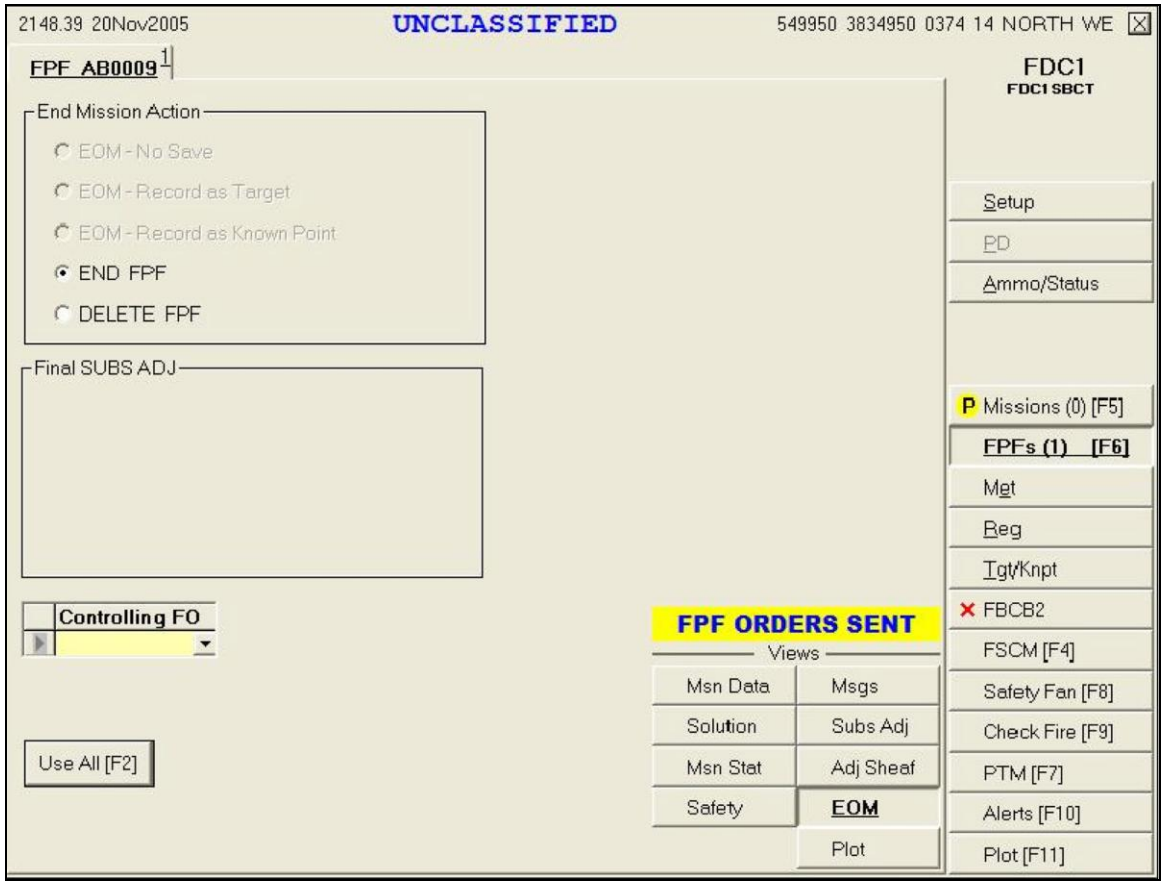


Figure 3-34. MFCS solution end of mission view screen.

Mission Status View Screen. The words STORED FPF, in blue letters are displayed over the VIEWS section. The FPF is stored in the FPF buffer and also in the gun FPF buffer until the operator receives a plain text or radio message to fire the FPF (Figure 3-35).

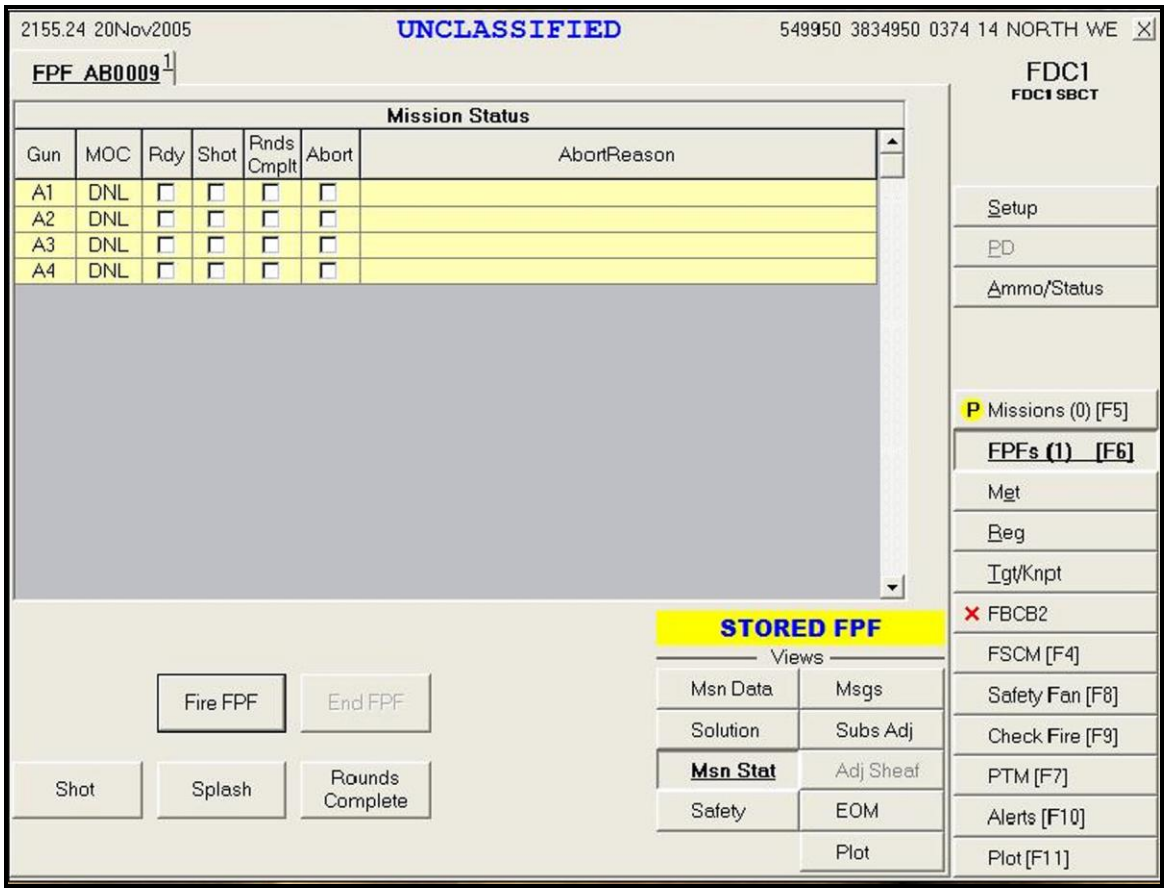


Figure 3-35. MFCS mission status view screen.

CALL FOR FIRE FROM THE FSE OR FO TO FIRE THE FPF

3-58. Upon receipt of the fire FPF message, the operator selects FPF in the control button area to bring up the FPF buffer. He selects the appropriate FPF tab, clicks the MSN STAT button in the views section, and clicks FIRE FPF. The operator receives a message to "Confirm Send Fire FPF to Guns" and clicks OK.

ENDING THE FPF MISSION

3-59. The operator clicks EOM. Delete FPF is the only option. He clicks USE ALL and the Messages View screen appears (Figure 3-36). The operator clicks PROCESS and deletes the active FPF, which also sends a "Delete FPF" message to the guns and automatically deletes the FPF from their buffer.

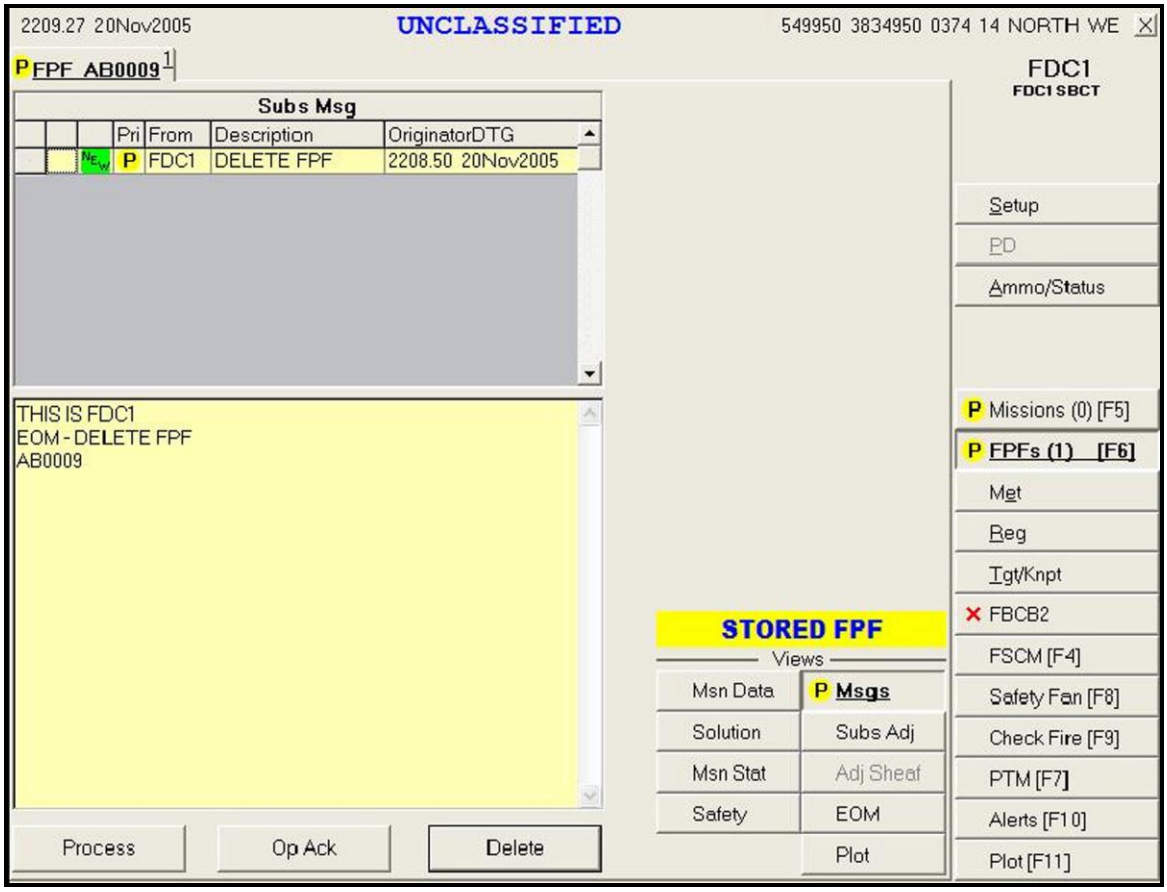


Figure 3-36. MFCS mission status view screen.

MANUALLY CONDUCTED FPF MISSIONS

3-60. Procedures for a manual FPF mission are similar to a digital mission initiated by the FSE or FO. The only differences are that the operator must manually initiate the CFF, manually process all adjustments, and manually click EOM to end the mission. Otherwise, procedures and screens are the same.

SMOKE MISSIONS

3-61. Smoke missions are used to conceal ground maneuver, obstacle breaching, and recovery operations as well as key assembly areas, supply routes, and logistical facilities. The two types of smoke missions are quick and immediate.

QUICK SMOKE MISSIONS

3-62. Smoke missions are conducted using a combination of the MFCS and traditional FDC procedures. The standard smoke mission covers 500 meters for a period of 10 minutes. The four primary steps in a smoke mission are: (1) The CFF and adjustment, (2) The calculation of the rounds required using the smoke card, (3) The establishment of the smoke screen, and (4) The maintenance of the smoke screen.

Call for and Adjustment of the Smoke Mission. The smoke mission is received either digitally or by voice radio as a standard new call. The FO, MFCS operator and the gun adjust the fires using

HE. Due to ballistic differences between the HE and the smoke shell, a smoke round is fired to confirm the adjustments.

Calculation of the Rounds Required Using the Smoke Card. As the rounds are being adjusted, the section chief uses the smoke card to determine the number of rounds required to sustain the smoke screen based on relative humidity, temperature gradient, and wind speed.

Establishing the Smoke Screen. Once the adjustments are made, the guns fire 12 smoke cartridges with proximity fuses to establish the curtain.

Maintaining the Smoke Screen. The guns fire the necessary rounds per minute to sustain the smoke screen. The FDC controls these fires by alternating fire between the guns assigned to the mission.

IMMEDIATE SMOKE MISSIONS

3-63. The primary requirement for an immediate smoke mission is speed. The CFF is usually conducted by voice radio. The manual MFCS methods are used with the MFCS operator entering the data and then clicking the IMMEDIATE SMOKE button.

Chapter 4

STRYKER MCV CREW AND BATTLE DRILLS

SBCT Infantry battle and crew drills describe how platoons and sections apply immediate action, fire, and maneuver to commonly encountered situations and equipment malfunctions. Drills require leaders to make decisions rapidly and to issue brief oral orders quickly. A Stryker platoon's ability to accomplish its mission often depends on Soldiers, leaders, squads, and sections that execute key actions quickly.

Section I — TRAINING

4-1. The goal of training is to produce combat ready units that respond to known or suspected enemy activity and defeat the enemy. Drill training is a key factor in achieving this goal. Drills require proficiency in individual, leader, and collective tasks prior to conducting critical wartime missions. Leaders should therefore tailor training to be realistic and challenging while increasing the difficulty of conditions as the unit becomes more efficient.

DRILL TRAINING

4-2. There are two types of drills; crew and battle drills. In this chapter we will focus on M1129A1 Stryker mortar carrier vehicle crew and battle drills. Drills are disciplined, repetitious exercises that teach and perfect skills or procedures (actions), collective tasks, or task steps. Warrior tasks, battle drills, collective tasks and other training products are located on the Digital Training Management System (DTMS). Infantry unit task lists and collective tasks are accessible through the DTMS, and are also posted to the Warrior University website (https://www.warrioruniversity.army.mil/login.html).

CREW DRILLS

4-3. Drilled actions are trained responses to "a given stimulus, such as an enemy action, a leader's brief order, or the status of the weapon or equipment." A crew drill is a critical collective action (or task) performed by a weapon or equipment crew to train in the use of weapons and equipment in combat, or to preserve life. Crew drills are initiated on cue with minimal leader orders and are performed to standard throughout like units in the Army. This chapter's crew drills are for MCV mounted elements.

Note: Dismounted crew drills are listed in ARTEP 7-90-DRILL.

BATTLE DRILLS

4-4. A battle drill is a critical collective action (or task) performed by a platoon or smaller element without the application of a deliberate decision making process. The battle drill is initiated on cue, accomplished with minimal leader orders, and performed to standard throughout like-Army units. The action of a battle drill is vital to success in combat and critical to preserving life. It is initiated on cue

(enemy action or a brief order), usually involves fire or maneuver, and is a trained response to a given stimulus.

4-5. Drills provide the following training advantages:

1. They are based on unit missions applying specific tasks, standards, and performance measures required to support mission proficiency.
2. They build from simple to complex and focus on the basics.
3. They link how-to-train and how-to-fight at small unit level.
4. They provide an agenda for continuous coaching and critiquing.
5. They develop leaders and build teamwork and cohesion under stress.
6. They enhance the chance for individual and unit survival on the battlefield.

TRAINING GUIDANCE

4-6. Battle and crew drill training is conducted through the use of the "talk-through, walk-through, run-through" method. M1129A1 MCV trainers must be masters of a drill to train others in it. They may wish to periodically talk their MCV crew through the drill—explaining each Soldier's role; then have them go through it slowly, on open ground, correcting any mistakes as they go. Concepts that should be applied when developing MCV crew and battle drill training are train as you fight; train using appropriate doctrine; use performance-oriented training; train to challenge; and train to sustain proficiency.

TRAIN AS YOU FIGHT

4-7. The goal of combat-level MCV training is to achieve combat-level standards. Every effort must be made to attain this difficult goal. Within the confines of safety and common sense, leaders must be willing to accept less than perfect initial results, and demand realism in MCV training. Integrated realistic conditions should include smoke, noise, simulated CBRN, battlefield debris, loss of key leaders, and cold weather.

TRAIN USING APPROPRIATE DOCTRINE

4-8. MCV training must conform to Army doctrine. FM 3-0 (100-5), *Operations*, describes common procedures and uniform operational methods that permit leaders and organizations to adjust rapidly to changing situations.

USE PERFORMANCE-ORIENTED TRAINING

4-9. Soldiers learn best by using a hands-on approach. Leaders are therefore responsible to provide these opportunities. All M1129A1 MCV training assets and resources including training aids, devices, simulators, and simulations (TADSS) must be included in the strategy.

TRAIN TO CHALLENGE

4-10. Tough, realistic training challenges the intellect and body while exciting and motivating Soldiers and leaders. It builds competence and confidence by developing and honing skills.

TRAIN TO SUSTAIN PROFICIENCY

4-11. Once individuals have been trained to a required level of MCV crew and battle drill proficiency, leaders must structure training plans to repeat critical MCV drill tasks at the minimum frequency necessary for sustainment.

FORCE PROTECTION (SAFETY)

4-12. Risk assessment is the thought process of making operations safe without compromising the mission. Unit leaders must continuously perform risk assessments of the conditions in which training is conducted to prevent the unnecessary loss of Soldiers and equipment. The degree of risk varies with the conditions at the time of training. In reality, risk management is smart decision making. Assessment concepts should include the following questions:

- Have MCV crews done the training before?
- Will the training be done for the first time at night?
- Are the crews fatigued?

4-13. A well-trained Stryker unit is normally accident free. However, accidents can occur through no fault of a Soldier or equipment operator. Most accidents result from inadequately trained, unsupervised, fatigued, or complacent personnel.

TRAINING TOUGH AND SAFE

4-14. MCV training must be tough, realistic, and SAFE. Stryker unit leaders should consider the following points as they integrate risk assessment into their training:

- Accept no unnecessary risks.
- Make risk decisions at the proper level.
- Accept risks if mission benefits outweigh the costs.

4-15. It is important to remember that the commander is the safety officer, but all Soldiers and leaders are responsible for safe training.

4-16. Every leader is responsible to—

- Identify the risks using the factors of METT-TC.
- Assess possible loss, cost, and probability.
- Make decisions and develop controls to reduce risks.
- Implement controls by integrating them into plans, orders, standing operating procedures (SOPs), training performance standards, and rehearsals.
- Supervise and enforce safety controls and standards at all times. (Leaders should make on-the-spot corrections when an unsafe act is observed.)

4-17. Stryker brigade combat team leaders use the safety checklist of the United States Army Safety Center, Fort Rucker, Alabama. The checklist is used in conjunction with local unit safety checklists to enhance the overall safety practices of Stryker Infantry units during training.

Section II — MCV CREW DRILLS

4-18. MCV crew drill training emphasizes rapid response to critical situations involving enemy action, weapons, or equipment failure. When MCV training is effective, crewmen will respond immediately when anticipated cues alert needed action.

CREW AND SQUAD DRILLS

4-19. Like Stryker battle drills, Soldiers must practice Stryker crew drills so they can accomplish them without the application of a deliberate decision-making process. Crew drills are initiated on cue with minimal leader orders. It is the Stryker MCV squad leader's responsibility to explain and demonstrate the drill duties and responsibilities of each vehicle squad member. It is up to the squad leader to instruct and walk his MCV Soldiers through each squad drill to ensure they can perform their assigned positions.

4-20. Vehicle operations add another dimension to MCV squad training. Many of the techniques are similar, but with differing procedures. The squad leader assigns MCV vehicle positions to the crew/squad, and trains each Soldier in his assigned position. The crew/squad is then given the opportunity to observe individual instruction of other assigned MCV positions. This way, every squad member has situational understanding of each other's position duties and can assume the responsibilities of those positions if required. No drill should be done collectively until each member of the crew/squad can perform his individual duties and responsibilities, proficiently perform all drill steps, and accomplish all drill standards.

4-21. Teamwork is essential when performing crew drills because it requires each squad member to be proficient in his assigned position for the good of every team member. Every Soldier in a Stryker MCV squad must be trained independently on his assigned vehicle position, and must perform the drill to standard before a crew drill is performed collectively. The squad leader should have the MCV Soldier demonstrate his functioning part of the drill several times; first for proficiency; and finally, for time. Leaders conduct MCV crew drills collectively when every Soldier within the squad has met the standard at his assigned position.

Note: The MCV squad must demonstrate proficiency in each crew drill before conducting a drill for time.

4-22. The following MCV crew drills cover actions such as mounting and dismounting from a vehicle with or without equipment organic to the vehicle; placing the 120-mm Stryker mortar into combat action, and extinguishing a fire on the MCV. The actions a Soldier takes will differ depending on the configuration of the vehicle, the equipment organic to the vehicle, and the equipment issued to assigned vehicle Soldiers. MCV Soldiers should be trained on each crew drill until they are proficient on their assigned vehicle position and can execute the steps to standard. MCV crew drills should be performed during all hours of the day, including periods of limited visibility, and at least once in MOPP 4.

CAUTION

Personnel could receive injuries and equipment could be damaged if all safety cautions and warnings are not adhered to when operating the Stryker MCV. Crew Drills should be performed using the crawl, walk, and run method of training. Walk the Soldiers through each drill before running them for time.

REACT TO A ROLLOVER WHILE MOUNTED ON A MCV

ACTION: React to a Rollover on a Mortar Carrier Vehicle (MCV).

CONDITION: As a member of a mounted squad or crew, given individual equipment, assigned individual weapons and ammunition, and a fully equipped MCV. (1) The driver is maneuvering off-road and loses control of the vehicle on the side slope of a hill, causing the vehicle to roll over. The M240B is mounted and ready to fire, and all hatches are closed. (2) The driver is maneuvering on the side of a roadway and the shoulder of the road gives way, causing the vehicle to turn over. The M240B is mounted and ready to fire, all hatches are open, and crew/squad personnel are standing up in the hatches. (3) The driver is maneuvering off-road along side a body of water and loses control of the vehicle, causing the vehicle to turn upside down into the water.

STANDARD: When the command ROLLOVER was given, the crew/squad took appropriate actions for:

1. Moving vehicle with all hatches closed.
2. Moving vehicle with all hatches open, with crew/squad personnel standing up in the hatches.
3. Moving vehicle along side a body of water.

WARNING

During a rollover, gas from batteries can explode and cause serious injuries. If the driver must exit through the crew compartment, precautions must be taken to prevent contact with battery acid that could spill and cause serious burns or blindness.

WARNING

Never attempt to exit an overturning or rolling vehicle. Wait until the vehicle comes to a complete stop. Soldiers can be killed or injured by premature removal or disconnection of seat belts or safety harnesses.

WARNING

Jumping from the top of a Stryker Vehicle with or without slat armor can cause injury to personnel.

HATCHES CLOSED

4-23. The squad leader commands, ROLLOVER. The squad leader is seated in his position, and braces for impact. The gunner, assistant gunner and ammunition bearer also brace for impact and hold onto hand straps for stability. The driver braces for impact.

HATCHES OPEN

4-24. The squad leader commands, ROLLOVER. The squad leader is standing up in his hatch, drops down into a seated position, and braces for impact. The gunner, assistant gunner, and ammunition bearer drop to their seats and brace for impact, holding hand straps for stability. The driver drops his seat and braces for impact.

MCV HAS ROLLED OVER

4-25. The squad leader checks for fires and accountability of personnel. All Soldiers check themselves for injuries and report to the squad leader. The driver shuts down the engine, engages the fuel shutoff, and turns the AUTO and AUX MASTER switches to the OFF position. If a fire is present in the engine compartment, he activates the engine compartment fire extinguishing system before shutting off AUTO and AUX MASTER switches.

EVACUATE THE MCV

4-26. The MCV squad leader checks for injured personnel and reports the incident. The gunner assists the driver in evacuating the vehicle. The squad members exit the vehicle through an unobstructed hatch. Extinguish fire if required. The MCV driver exits the vehicle through the driver's hatch or through crew compartment if driver's hatch is blocked. Soldiers who may have sustained injuries are assisted in evacuation from the MCV as necessary.

Notes:
1. The senior leader determines if it is safe to exit the vehicle and begins evacuation.
2. If the senior leader determines it is unsafe to exit the vehicle, personnel will wait for recovery and attempt to contact other platoon vehicles, or higher.
3. Rollover drill steps are not timed. They are drills the crew/squad should be aware of and practice if time permits, prior to vehicle movement.
4. Because the egress door hinges are located on the bottom of the door, it may require two personnel to open and brace this door (due to its weight) if vehicle rolls onto its top.
5. If the carrier is equipped with slat or add-on armor it may require two personnel to open and brace the egress door, if the vehicle rolls onto its left side.

EVACUATE A STRYKER MORTAR CARRIER VEHICLE

ACTION: Vacate an MCV.

CONDITION: As a member of a mounted MCV squad or crew, given individual equipment, assigned individual weapons and ammunition, and a fully equipped MCV. The vehicle has been engaged by enemy fire and is burning out of control. The M240B is loaded and ready to fire, and the ramp and all hatches are closed.

STANDARD: When the command BAIL OUT is given, the squad vacates the vehicle. The squad leader commands, BAIL OUT, and disconnects his CVC helmet. The ammunition bearer disconnects his CVC helmet and moves out through his hatch. The assistant gunner releases the emergency ramp release lever; then the assistant gunner and gunner exit the vehicle and move away from it. The driver disconnects his CVC helmet and opens his hatch. The squad leader exits behind the assistant gunner and moves away from the vehicle. The driver exits through his hatch, climbs off the vehicle, and joins the squad leader, ammunition bearer, gunner, and assistant gunner.

WARNING

Jumping from the top of a Stryker Vehicle with or without slat armor can cause injury to personnel.

Notes:
1. Some actions such as raising and lowering the MCV ramp should be simulated by the assistant gunner due to wear and tear on equipment caused by repetitive training.
2. If unobstructed, the MCV driver should exit the vehicle through the driver's hatch instead of exiting through the back of the vehicle. This is recommended due to the close quarters between the driver's seat, other stored equipment, and the time taken during an emergency evacuation. If the driver must evacuate the carrier via the back of the carrier, he must lower the seatback to the fully reclined position.
3. All Stryker vehicles are issued with seat belts for injury prevention during vehicle movement. Adjusting time for seat belt hook-ups is therefore recommended when conducting crew drills.
4. Each MCV crew/squad member must be familiar with the location and operations of all hatches and egress doors in the event that one escape route is blocked during an emergency evacuation.
5. When slat protective armor is mounted on the carrier, evacuating crew/squad members may need to climb over and down the armor to expedite their escape.

EXTINGUISH A FIRE ON A MCV

ACTION: Put out a fire on a MCV.

CONDITION: As a member of a mounted MCV squad or crew, given individual equipment, assigned individual weapons and ammunition, and a fully equipped MCV. The MCV squad leader is maneuvering the Stryker to a designated position, when the vehicle fire alarm alerts the crew that a fire has started in the vehicle.

STANDARD: When the command FIRE was given the MCV squad leader and driver maneuvered the vehicle to a safe location. The squad immediately extinguished the fire, minimizing damage to equipment and injury to Soldiers. Standards were accomplished through the following actions:

1. Acknowledged fire indicator in the annunciator panel by pressing the AFES reset button.
2. Engaged fire suppression system manually before exiting the vehicle.
3. Suppressed fire using portable fire extinguisher as needed.

Notes:
1. While in training, when the MCV is in motion, the driver will stop the vehicle, place the transmission into neutral, and engage the parking brake.
2. DO NOT manually engage the fire suppression system if the AFES fire indicator light remains off after pressing the reset button.
3. When the reset button is pushed, the light will illuminate and stay illuminated indicating that the fire has not been successfully extinguished. Light will illuminate periodically, indicating that a fire was present and has been extinguished. Light will also indicate when the fire extinguisher is partially discharged or empty and needs to be replaced.

4. The AFES will activate all fire extinguishing bottles in an attempt to extinguish the fire. If the fire indicator light remains ON, activate the manual toggle switch to ensure all fire extinguishers were fully discharged prior to dismounting vehicle.
5. Each crew/squad member must be familiar with the location and operations of all hatches and egress doors in the event that one escape route is blocked during an emergency evacuation.
6. When SLAT protective armor is mounted, evacuating MCV crew/squad members may need to climb over and down the armor to expedite their escape.

WARNING

If fire-extinguishing chemicals are discharged into the engine compartment while the MCV engine is running, engine exhaust becomes poisonous. Poison gas can cause serious injury.

WARNING

Ensure that the area behind the MCV is clear before attempting to lower the ramp. Personnel can be injured and equipment damaged when the ramp opens. Ensure the ramp door is closed and locked.

WARNING

Discharge from fire extinguishers can freeze skin. A discharging fire extinguisher can move violently when not properly secured. Personnel can be seriously injured and equipment damaged.

WARNING

HFC 25 (FE25) is a health hazard. Exposure to skin can cause freezing. Inhaling high concentrations may cause respiratory effects such as shortness of breath producing heart rhythm irregularities.

WARNING

FM 200 is a health hazard. Exposure to skin can cause freezing. Inhaling high concentrations may cause respiratory effects such as shortness of breath producing heart rhythm irregularities.

CAUTION

In spite of different stowage areas for the CBRN decontamination bottle and portable fire extinguishing bottles, there is a possibility of using one instead of the other, especially when the compartment is filled with smoke. Therefore, care should be exercised to avoid making this identification mistake. Always check labels before use.

MCV ENGINE COMPARTMENT FIRE

1. The MCV driver alerts crew/squad, ENGINE FIRE, and acknowledges fire by pressing the AFES reset button.
2. The MCV squad leader directs the driver to a safe position. The driver moves the vehicle to a safe position, stops, shuts down the engine, places the transmission in neutral, and engages the parking brake.
3. The MCV squad leader disconnects his seat belt and CVC helmet and secures his personal weapon. The ammunition bearer disconnects his CVC helmet and secures his personal weapon, then opens his hatch and climbs off the front slope of the vehicle. The gunner and assistant gunner disconnect their seat belts and secure their personal weapons. The assistant gunner then pushes the emergency ramp button and lowers the ramp. The driver opens the driver's hatch, disconnects his CVC helmet, and secures his personal weapon and portable fire extinguisher.
4. The MCV squad leader secures the rear portable fire extinguisher, exits the vehicle behind the ammunition bearer, and moves to the front of the vehicle to supervise the extinguishing of the engine compartment fire. The MCV driver checks the AFES indicator light and manually discharges AFES (if the light indicator remains ON) by raising the engine toggle guard on the AFES panel and pushing up on the toggle switch.
5. The MCV driver turns off all vehicle power, exits through driver's hatch, and climbs off the front slope of the vehicle.
6. The MCV squad leader accounts for all personnel and supervises extinguishing of the fire. The driver and the gunner extinguish the fire using the portable fire extinguishers (as needed).

Note: The MCV squad leader checks for location and condition of the fire before allowing the crew near the vehicle and reports to higher.

7. The MCV squad leader checks the engine compartment to assess the condition of the fire.

Notes: 1. Some actions such as raising and lowering the MCV ramp should be simulated due to the wear and tear on the equipment, which is caused by repetitive training.

2. During training the use of fire extinguishers is simulated.

3. All Stryker vehicles come with seat belts, which should be used to prevent injuries to Soldiers during vehicle movement. Adjusting time for seat belt hook-ups is recommended when conducting crew drills.
4. MCV crew members must wait 3 to 5 minutes before opening engine access hatch to assess the condition of the fire.

TROOP COMPARTMENT FIRE

1. The MCV driver alerts crew/squad by announcing, TROOP COMPARTMENT FIRE. He then acknowledges fire by pressing the AFES reset button.

2. The MCV squad leader directs the driver to a safe position. The driver moves the vehicle to a safe position, stops, shuts down the engine, places the transmission in neutral, and engages the parking brake.

3. The squad leader and ammunition bearer disconnect their CVC helmets and secure their personal weapons. The driver opens his hatch, disconnects his CVC helmet, and secures his personal weapon and portable fire extinguisher. The assistant gunner disconnects his seat belt, secures his personal weapons, releases the emergency ramp lever, and exits the vehicle. The gunner disconnects his CVC helmet and seat belt, secures his personal weapon and exits the vehicle.

4. The squad leader secures the portable fire extinguisher and exits the vehicle behind the ammunition bearer.

5. The driver checks the AFES indicator light and manually discharges AFES (if the light indicator remains ON) by raising the toggle guard on the AFES panel and pushing up on the TROOP toggle switch.

6. The driver turns off all vehicle power, exits through the driver's hatch, and climbs off the front slope of the vehicle.

7 The driver and gunner position themselves IAW where the fire is located. The squad leader accounts for all personnel and checks for the location and condition of the fire before allowing anyone near the vehicle. He reports the incident to higher.

8. The driver extinguishes the fire assisted by the gunner. The squad leader supervises the extinguishing of the fire.

Notes:
1. Some actions such as raising and lowering the MCV ramp should be simulated by the gunner and driver due to wear and tear on equipment that is caused by repetitive training.
2. Use of fire extinguishers is simulated.
3. All Stryker vehicles are issued seat belts that should be used to prevent injuries during vehicle movement. Adjusting time for seat belt hook-ups is therefore recommended when conducting crew drills.
4. In the event of a hull fire, the squad leader investigates the location and condition of the fire before attempting to extinguish .

PLACE A 120-MM STRYKER MORTAR INTO ACTION

ACTION: Place a Stryker 120-mm mortar into action.

CONDITION: Given a M11291A Stryker with the gun crew seated in their normal positions; seat belts on; a 120-mm mortar complete and locked in the traveling position (muzzle cover on); cargo hatches in the closed position and combat locked; and the M67 sight unit secured in the sight box with latches locked. The vehicle ramp can be open or closed.

STANDARD: Placed the mortar into action so that the sight was set at 3200 mils deflection, 1100 mils elevation, all bubbles were level.

WARNING

M1129A1 Stryker Mortar doors are large and extremely heavy. Two Soldiers are required to safely open, close, and secure the doors in the open or closed position. Attempting to open or close mortar doors can result in serious injury to personnel.

WARNING

Mortar doors must be securely locked with lock pins installed when in the open door position to prevent doors from accidentally closing. Failure to lock mortar doors with lock pins in the open door position when firing or repositioning vehicle may result in serious injury to personnel.

WARNING

Mortar doors are under spring tension. To avoid serious injury, keep face and body parts clear of doors and hands clear of door edges when opening or closing.

CAUTION

When the commander's hatch is opened to the 180-degree position, it interferes with the opening/closing of mortar doors. Ensure the commander's hatch is not open at the 180-degree position or damage to the vehicle will occur.

***Note*:** The left M1129A1 mortar door must be opened before the right mortar door can be opened. Each door's close latch has a combat lock. Combat locks must be disengaged to open mortar doors from inside the vehicle.

PLACEMENT OF THE RMS6-L INTO FIRING CONFIGURATION

4-27. This drill should begin with the MCV mortar crew mounted in the carrier. The purpose of this drill is to get the mortar into a firing position to be reciprocally laid; or to engage a target using the direct lay method. The MCV driver leaves the engine running. The intercom between the driver, gunner, and squad leader is maintained so the squad leader and gunner can direct the driver to move the carrier for the first deflection reading in reciprocal laying. To mount the mortar in the firing position, the squad leader

gives the preparatory command, PREPARE FOR ACTION, and the mortar squad takes the following actions:

1. The gunner places one hand on the rear combat lock handle of the assistant gunner's (left) mortar door, and the other hand on his seatbelt release lever. The assistant gunner places one hand on the rear combat lock release handle of the gunner's (right) mortar door and the other hand on his seatbelt release lever. The ammunition bearer places one hand on the forward combat lock handle of the assistant gunner's (left) mortar door and one hand on his seatbelt release. When the squad is ready, the squad leader commands, ACTION.
2. On the command, ACTION, the gunner, assistant gunner, and ammunition bearer simultaneously release their seat belts and rotate the combat lock handles they are holding. Each crew member will then open his corresponding door close latch handle.
3. The ammunition bearer unlatches the assistant gunner's toolbox, removes the sight box, closes the tool box, and places the sight unit on the heat exchanger cover with the handle facing toward the gunner's position. The ammunition bearer does not open the sight box.
4. The assistant gunner releases the elevation travel strap and removes the dovetail slot cover from the sight mount. The gunner moves forward to the center of the left mortar door and opens the center combat lock handle and door close latch handle. The gunner moves to the left mortar door forward combat lock and door close latch handle and opens both.
5. The assistant gunner and ammunition bearer push the assistant gunner's (left) mortar door up and out, ensuring it fully engages the door open latches. They then insert the mortar door locking pins front and rear. The ammunition bearer turns and assists the gunner in pushing the gunner's (right) mortar door up and out, ensuring it fully engages the door open latches. They then insert the mortar door locking pins, front, and rear.
6. The assistant gunner moves to the front of the cannon. He places his right shoulder under the mortar, then pushes up until the elevation folding mechanism locks in the raised position, and the bronze bushing drops down into the fully locked position. He then elevates the cannon approximately 35 turns on the elevation hand wheel.
7. The gunner removes the sight unit from its case and then closes the case. He ensures it is on a deflection of 3200 mils and elevation of 1100 mils, and locks it into the dovetail slot on the mortar.
8. The gunner correctly indexes the telescope in the horizontal or vertical position and locks the telescope in place and dead levels the mortar. The assistant gunner removes the muzzle cover. The gunner and assistant gunner cross-level the mortar.
9. The gunner ensures the mortar fire/safety switch is in the "fire" position and then announces, UP. The squad leader signals UP to the aiming circle operator. At this time the crew should be at their firing posts. The MCV squad is now ready to reciprocal lay or to engage a target by the direct lay method.

PERFORM SMALL DEFLECTION AND ELEVATION CHANGES ON A STRYKER MOUNTED 120-MM MORTAR SYSTEM

ACTION: Perform small deflection and elevation changes on a Stryker mounted 120-mm mortar system.

CONDITION: Given an M1129A1 Stryker mortar carrier vehicle with M67 sight installed, aiming posts placed out at 50 and 100 meters from the mortar system, and a deflection of 3200 mils and elevation of 1100 mils indexed on the sight.

STANDARD: The new deflection and elevation will be indexed without error. Vertical cross line will be within 2 mils of an aligned sight picture. Bubbles will be leveled within the outer red lines.

Note: Small deflection changes are greater than 50 mils, but less than 75 mils. Elevation changes are greater than 35 mils, but less than 90 mils.

LAY FOR SMALL DEFLECTION AND ELEVATION CHANGE

Note: The gun crew will repeat all elements of fire commands.

1. The gunner is given a deflection and elevation change in the form of a fire command. Example: SECTION, 1 GUN, HE QUICK, 1 ROUND, DEFLECTION 5890, CHARGE 2, ELEVATION 1255.
2. As soon as the gunner receives the fire command, he places the data on the sight and elevates or depresses the mortar to float the elevation bubble.
3. The gunner then looks into the sight to determine where he has to traverse the mortar. The gunner will then place his hand on the traversing hand wheel and traverse half the distance to his aiming posts and stop.
4. The gunner commands the assistant gunner to "level."
5. The assistant gunner uses the cant correction knob to level the deflection bubble and announces, CHECK.
6. The gunner and assistant gunner repeat steps 3 through 5 until the vertical cross line is within 2 mils of the left side of the aiming post and the deflection bubble is level.
7. The gunner will then level his elevation bubble with the elevation hand wheel.
8. Before the gunner announces, GUN UP, he should recheck his data and bubbles to ensure the proper lay of the weapon system.

PERFORM LARGE DEFLECTION AND ELEVATION CHANGES ON A STRYKER MOUNTED 120-MM MORTAR SYSTEM

ACTION: Perform large deflection and elevation changes on a Stryker mounted 120-mm mortar system.

CONDITION: Given an M1129A1 Stryker Mortar Carrier with M67 sight installed. Aiming posts are placed out at 50 and 100 meters from the mortar system with a deflection of 3200 mils and elevation of 1100 mils indexed on the sight.

STANDARD: The new deflection and elevation will be indexed without error. Vertical cross line will be within 2 mils of an aligned sight picture. Bubbles will be leveled within the outer red lines.

***Note*:** Large deflection changes are greater than 200 mils, but less than 300 mils. Elevation changes are greater than 100 mils, but less than 200 mils.

LAY FOR LARGE DEFLECTION AND ELEVATION CHANGE

***Note*:** The gun crew will repeat all elements of fire commands.

1. The gunner is given a deflection and elevation change in the form of a fire command.
2. As soon as the gunner receives the fire command, he places the data on the sight and elevates or depresses the mortar to float the elevation bubble, and unlocks the azimuth quick release lever (lever out).
3. The gunner then looks into the sight to determine where he has to traverse the mortar. The gunner shifts the mortar back to within 20 mils of the aiming posts, levels the mortar, and reengages the azimuth quick release lever (lever in). The gunner then places his hand on the traversing hand wheel and traverses half the distance to his aiming posts.

Note: Each tooth of the traversing gear is approximately 65 mils. To lock the traversing gear after the azimuth quick release lever is re-engaged, the crew may need to rotate the turntable. To save time, the gunner should coordinate with the assistant gunner to push the turntable in the same direction every time.

4. The gunner commands the assistant gunner to LEVEL.
5. The assistant gunner uses the cant correction knob to level the deflection bubble and announces CHECK.
6. The gunner and assistant gunner repeat steps 3-5 until the vertical cross line is within 2 mils of the left side of the aiming post and his deflection bubble is level.
7. The gunner will then cross level his deflection bubble (the assistant gunner may manipulate the cant knob in cross leveling).
8. The gunner will repeat steps 3-5 with the assistance of the assistant gunner until the vertical cross line is within 2 mils of his aiming post and his deflection bubble is level.
9. The gunner will then level his elevation bubble with the elevation hand wheel.
10. Before the gunner announces, GUN UP, he should recheck his data and bubbles to ensure the proper lay of the weapon system.

RECIPROCAL LAY A STRYKER MOUNTED 120-MM MORTAR

ACTION: Reciprocal lay a Stryker mounted 120-mm mortar.

CONDITION: Given an M1129A1 Stryker Mortar Carrier, M2 aiming circle, an aiming circle operator, M67 sight mounted with bubbles level on a deflection of 3200 mils, and elevation of 1100 mils.

STANDARD: The gun is laid within 1 mil of mounting azimuth. All bubbles are leveled. Aiming posts are properly emplaced. The vertical cross hairs of the M67 sight are within 2 mils of the left side of the aiming post. The gunner must announce GUN UP within 80 seconds.

SETUP CONDITIONS:

- The mortar is prepared for action and laid on an initial azimuth.
- The sight is set at 3200 mils deflection and 1100 mils elevation.
- The aiming circle is set up about 75 meters from the carrier where it is visible to the gunner.
- The aiming circle is oriented on an azimuth of not less than 100 mils or not more than 200 mils away from the initial azimuth.
- A relay man is positioned halfway between the aiming circle and carrier to relay commands.
- The turntable is centered with the turntable azimuth lock engaged.
- The aiming circle operator lays the vertical hair line on the mortar sight and announces, AIMING POINT THIS INSTRUMENT.
- The gunner refers the sight unit (using the deflection micrometer knob) to the aiming circle with the vertical cross line splitting the lens of the aiming circle, and announces; NUMBER (NUMBER OF GUN) GUN, AIMING POINT IDENTIFIED.
- The aiming circle operator reads the deflection to the gunner. Example: NUMBER (NUMBER OF GUN) GUN, DEFLECTION, THREE THREE ONE FIVE (3315).
- The gunner repeats the command and indexes the announced deflection on the sight and relays on the center of the aiming circle lens by directing the driver to turn the vehicle left/right. The vehicle is turned until the vertical hair line of the sight unit bisects the aiming circle lens +/- twenty (20) mils. The assistant gunner must maintain the cross-level bubble during carrier movement. The gunner directs the driver to straighten the wheels and set the brakes. The gunner releases the azimuth locking handle and the gunner traverses while the assistant gunner

cross-levels back to the center of the aiming circle lens. Once the correct sight picture is obtained and the bubbles are level, the gunner announces, NUMBER (NUMBER OF GUN) GUN, READY FOR RECHECK.

- The aiming circle operator uses his azimuth micrometer knob to place the vertical hair line on the lens of the mortar sight unit and reads the new deflection to the gunner. Example: NUMBER (NUMBER OF GUN) GUN, DEFLECTION, THREE THREE TWO SIX (3326). The gunner and crew repeat all commands and the process is repeated until the gunner announces, NUMBER (NUMBER OF GUN) GUN, ZERO MILS (OR ONE MIL) MORTAR LAID.

CONDUCT MISFIRE PROCEDURES ON A STRYKER 120-MM MORTAR SYSTEM

ACTION: Conduct misfire procedures on a Stryker 120-mm mortar system.

CONDITION: Given a Stryker Mortar Carrier Vehicle with a loaded mortar which fails to fire. The first crew member that notices the failure of the round to fire announces, MISFIRE.

STANDARD: All required actions to remove the misfire must be performed in sequence and without error.

WARNING

Do not drop another cartridge on top of a misfired cartridge. Dropping another cartridge on top of a misfired cartridge may result in detonation of propelling charges, fuzes, and main charges of both cartridges causing injury or death to personnel.

WARNING

Crew members must keep head clear of front and rear of mortar when performing misfire procedures. Placing any part of the body in front of cannon or directly behind recoil mechanism may result in serious injury or death to personnel.

***Note*:** A misfire is a failure of a cartridge to fire after it is dropped into the mortar cannon. Misfires can be caused by defective or dirty ammunition and cartridges dropped with the safety mechanism set to SAFE. Other causes include damaged or worn firing pins, dirty cannons, and obstructions in the cannon that prevent the cartridge from sliding down and striking the firing pin.

1. When a misfire occurs, the first crew member that notices shouts, MISFIRE!
2. The vehicle commander alerts the FDC of misfire using either voice or digital radio communications.

***Note*:** To avoid injury during peacetime live-fire exercises, all crew members, except the gunner and squad leader, will exit the vehicle through the squad leader or ammunition bearer's hatch. They will then move to a position 100 meters in the opposite direction of fire. In combat, all crew members remain inside the vehicle.

3. Gunner confirms safety mechanism is set to FIRE position ("F" position is showing) and announces, WEAPON IS ON FIRE.

Note: If the gunner confirms system is on SAFE, the gunner announces, WEAPON IS ON SAFE, and leaves the weapon on SAFE. If the squad leader confirms the system is on SAFE, he announces, WEAPON IS ON SAFE, and he and the gunner exit the vehicle in the opposite direction of fire. They then move to the same location as the rest of the crew, then proceed to step 8.

4. The squad leader confirms the action of the gunner by physically observing that the "F" is showing and announces, WEAPON IS ON FIRE.

5. The gunner secures the rubber mallet and strikes the upper portion of the cannon up to three times with the rubber mallet. If the cartridge fires, the squad leader will call the crew back to the vehicle and the mission will resume. If the cartridge does not fire after striking the cannon with the rubber mallet, the squad leader and gunner will exit the vehicle from the opposite direction of fire and wait for one minute.

6. After one minute, the gunner, assistant gunner, and squad leader return to the vehicle.

WARNING

Do not touch the cannon with bare hands if the cannon is hot. Touching a hot cannon may result in injury to personnel. The cannon and breech must be cool enough to touch with bare hands before continuing with misfire procedures. Cartridge cook-off may occur if misfire procedures are conducted before the cannon and breech are cool. Failure to wait until the cannon and breech are cool may result in injury or death to personnel.

7. The gunner checks the barrel for heat using bare hands. Starting at the muzzle, the bare hand is moved close to the barrel, sensing for heat, if heat is not sensed with the hands, the gunner touches the barrel lightly with his fingertips every few inches down to the breech cap. If the barrel is too hot, the crew uses some means (water, snow, or elapsed time) to cool the barrel before attempting to remove the misfire.

8. When the barrel is cool enough to handle, the gunner places the safety mechanism on SAFE ("S" showing) and announces, THE SAFETY MECHANISM IS IN THE SAFE POSITION.

9. The assistant gunner physically confirms that the safety mechanism is on SAFE ("S" showing) and announces, THE SAFETY MECHANISM IS IN THE SAFE POSITION.

10. The squad leader confirms the actions of the gunner and assistant gunner and physically verifies that the safety mechanism is in the SAFE position.

11. Ensuring the cannon is pointed toward the target area, the gunner traverses the mortar using the traversing hand wheel until the cannon is at the 3200 mils position and travel lock is engaged. (The cannon is pointed over the center of the ramp.)

12. The assistant gunner lowers the ramp as directed by the squad leader if not already lowered using the troop ramp control box.

13. If the M67 sight is installed, the gunner locks data on the sight and removes the sight and places it back in the sight box.

14. The assistant gunner removes and stows the blast attenuator device (BAD). The squad leader confirms the actions of the assistant gunner.

15. The gunner and assistant gunner stow their seats in the raised position.

16. The gunner slowly lowers the cannon to its lowest elevation using the elevation hand wheel.

17. The gunner and assistant gunner slowly lower the cannon to the travel position by pushing up on the brass bushing and lowering the folding mechanism.

WARNING

If cleaning staff assembly sections cannot be extended and tightly locked when attached to the cartridge extractor, or cartridge extractor catches do not operate properly, the cartridge extractor is not mission capable. Do not use a defective cartridge extractor assembly to remove a misfired cartridge from the cannon. Use of a defective cartridge extractor assembly may result in injury or death to personnel.

18. The assistant gunner inspects extractor catches on the cartridge extractor to ensure they are the latest configuration. There should be a 1/8 inch hole in the face of each catch. The hole indicates that the catch is the latest configuration. The assistant gunner inspects the cartridge extractor and makes sure that the cartridge extractor catches are free of burrs, wear, or rust/corrosion that would impair function. The assistant gunner tests each cartridge extractor catch to ensure free operation, and that each catch will snap positively into its original position.

19. The squad leader confirms the actions of the assistant gunner. If the cartridge extractor fails to meet inspection standards, the squad leader will attempt to retrieve another mission capable cartridge extractor from another squad. If unable to retrieve another mission capable cartridge extractor from another squad, he will proceed to removal of a stuck cartridge in step 32.

20. The assistant gunner attaches the cartridge extractor to the extended artillery cleaning staff assembly ensuring the extractor is securely attached and the cleaning staff assembly sections are fully extended and locked.

21. While keeping head and body away from the front of the cannon, the assistant gunner rotates the artillery cleaning staff assembly to obtain positive control of the extractor head. The assistant gunner must place the extractor in his left palm facing upward. He inserts the cartridge extractor into the cannon and lowers the cartridge extractor slowly (hand to hand) deeper into the cannon until contact is made with the round.

22. The assistant gunner rotates the extractor in either direction until the spring-loaded extractor catches connect into the round. Rotation continues until resistance is felt.

Note: If the round is grasped by the extractor, continue with step 23. If the round is not grasped by the extractor, proceed to removal of a stack cartridge in step 32.

---

23. When the assistant gunner has ensured that the cartridge extractor is firmly connected with the round, the round is to be extracted in one steady motion (hand to hand) without stopping.

24. With the gunner's hands held at the ready at the muzzle, the assistant gunner withdraws the cartridge extractor assembly in a steady motion until the extractor appears at the end of the muzzle.

WARNING

When removing the cartridge, do not touch the cartridge primer and do not stand in front of the cannon. Touching the cartridge primer or standing in front of cannon may result in injury or death to personnel.

25. The assistant gunner continues to withdraw the round. The gunner grasps the body of the round as it comes out of the barrel. The cartridge extractor and round are moved by the assistant gunner and gunner down the ramp as they proceed to the left or right side of the vehicle.

26. Once the gunner and assistant gunner have cleared the ramp, the ammunition bearer comes forward and stands beside the gunner.

27. With the assistant gunner holding the artillery cleaning staff assembly and the gunner holding the round, the ammunition bearer presses on all four extractor catches at the same time, releasing the round from the cartridge extractor.

28. The gunner inspects the cartridge for cause of misfire. If the primer has been struck by the firing pin, he disposes of the cartridge in accordance with applicable safety regulations and unit SOP.

Note: If no contact or insufficient contact was made with the firing pin, check the safety mechanism function on the cannon. Clean the cannon before attempting to fire the round a second time. If the cartridge does not fire after checking the safety mechanism and swabbing the cannon, repeat the misfire procedure and dispose of the cartridge in accordance with applicable safety regulations and unit SOP.

29. The assistant gunner swabs the barrel and replaces the blast attenuator device. The gunner places the safety mechanism to the FIRE position ("F" is showing).

30. The squad leader confirms the actions of the gunner and assistant gunner and verifies that the safety mechanism is in the FIRE position.

31. The gunner places the mortar into action (replacing the M67 sight unit if applicable), and the mission is continued.

IN THE EVENT OF A STUCK CARTRIDGE

WARNING

Procedures for removing a stuck cartridge are to be performed ONLY after misfire procedures have been attempted and a stuck cartridge cannot be pulled out of the barrel. Performing this procedure without first attempting misfire procedure may result in injury or death to personnel.

WARNING

Crew members must keep head clear of the front and rear of the mortar when performing misfire procedures. Placing any part of the body in front of a cannon or directly behind a recoil mechanism may result in serious injury or death to personnel.

32. Squad leader verifies safety mechanism is set to SAFE position (with "S" showing).
33. The gunner loosens the wiper compression clamp and removes the two wiper segments.
34. The ammunition bearer pulls out and turns the cannon retaining ring plunger.
35. The ammunition bearer unscrews and removes the cannon retaining ring using a large spanner wrench and hammer while the gunner secures the cannon to keep it from sliding. The assistant gunner maintains positive control of the artillery cleaning staff.
36. The gunner slowly pushes the cannon forward approximately 3 inches until the breech key clears the cradle assembly keyway.
37. The ammunition bearer unscrews and removes the breech cap using a hammer and removal tool while the gunner holds the upper portion of the cannon.
38. The assistant gunner attempts to push the cartridge out through the base of the cannon (fin first and in one steady motion) while the ammunition bearer places his hands ready to catch the round.
39. The ammunition bearer grasps the round by the fin and body of the round as it comes out of the barrel.
40. Once the ammunition bearer has positive control of the round, the assistant gunner allows the cleaning staff to rest in the bore and moves to the rear of the cannon.
41. The assistant gunner presses on all four of the extractor catches at the same time releasing the round from the cartridge extractor.
42. The ammunition bearer hands the round to the assistant gunner who passes the round to the gunner. The gunner carries the round down the ramp and proceeds to the left or right side of the vehicle. At this point the crew follows steps 28-31.
43. The ammunition bearer replaces the breech cap and cannon retaining ring and engages the cannon retaining ring plunger.
44. The assistant gunner and gunner replace the wiper segments and tighten the wiper compression clamp.
45. The crew places the gun into action and continues the mission.

***Note*:** If the round cannot be pushed out of the cannon, the gunner, assistant gunner, and ammunition bearer—keeping the cannon in a horizontal position—slide the cannon toward the rear of the vehicle and out of the cradle assembly, then walk the barrel down the ramp. The cannon with stuck round is placed a safe distance from the carrier and the unit contacts EOD. The squad leader reports his actions to the chain of command.

Section III — MCV BATTLE DRILLS

4-28. A battle drill is "a critical collective action (or task) performed by a platoon or smaller element without the application of a deliberate decision making process. Battle drills usually involve fire or maneuver. They are initiated on cue (such as an enemy action or a leader's brief order); are accomplished

with minimal leader orders, and are performed to standard throughout like units in the Army. Drill actions are vital to success in combat and critical to preserving life.

4-29. Effective battle drills produce a trained response to a given stimulus. The following battle drills are for mounted MCV elements.

REACT TO A BIOLOGICAL OR CHEMICAL ATTACK

ACTION: React to a biological and/or chemical attack while dismounted/mounted on a Stryker Mortar Carrier Vehicle (MCV).

CONDITION: As a member of a dismounted/mounted squad or crew, given individual equipment, assigned individual weapons and ammunition, and a fully equipped MCV. The squad/crew is in a defensive position near a contaminated area. Personnel hear a chemical alarm or are ordered to mask.

STANDARD: When the command "GAS" is given:

1. The squad or crew immediately dons their protective masks and hoods within 15 seconds and mounts/dismounts as necessary.
2. Connect their breathing apparatus to the vehicle M13A1 gas particular filtration unit (GPFU) within 60 seconds.
3. Within 90 seconds, Soldiers begin self-decontamination.
4. Soldiers assume MOPP4 posture within 8 minutes.
5. Soldiers complete basic skills decontamination within 15 minutes.
6. Decontaminate vehicle and equipment.

1. *A Chemical Alarm is sounded.*
    1. The squad leader stops breathing and within 9 seconds dons, clears, and seals his protective mask. Within 6 seconds, he pulls the hood overhead and zips it up. He then alerts the vehicle crew by giving the alarm "GAS," using arm and hand signals, or by using radio communications.
    2. Squad members stop breathing and within 9 seconds don their protective masks, clear, and seal. Within 6 seconds they pull hoods overhead and zip them up. All give the alarm "GAS" or give arm-and-hand signals for a chemical attack.

Note: While mounted, the squad leader, ammunition bearer, and driver hatches are closed, and the M240B is in the ready-to-fire configuration.

---

    3. Crew/squad, if dismounted, takes shelter on vehicle.
    4. All squad members connect their protective mask breathing apparatuses to the vehicle M13A1 gas particular filtration unit (GPFU).

Note: If the squad is in a mounted configuration, the squad leader, ammunition bearer, driver hatches, and ramp are closed.

---

2. *The squad leader directs the squad to perform self decontamination and report status when decontamination is complete.*
    1. All decontaminate with M258A1/M291 kit and provide buddy aid as necessary.
    2. The squad leader reestablishes the chain-of-command and communications, and reports the situation to the company commander. The squad leader asks for an "Up" from the crew/squad when decontamination is complete. He then sends a situation report to the commander.

3. *The gunner, assistant gunner, ammunition bearer, and driver, reply with "Up" when finished with the decontamination process.*

4. *Mission Oriented Protective Posture 4 (MOPP4) is initiated.*
    1. The squad leader directs the squad to don MOPP4 gear.
    2. The crew/squad dons MOPP4 using buddy aid as necessary.

5. *Identify chemical agent using chemical detector paper and the M256 detector kit.*
    1. The squad leader directs the gunner, assistant gunner, and driver to check for chemical agents.
    2. The gunner disconnects his protective mask breathing apparatus from the vehicle M13A1 GPFU, exits through his hatch, and checks the top of the vehicle and the M240B machine gun. He then gives the squad leader a report of his findings.
    3. The driver disconnects his protective mask breathing apparatus from the vehicle M13A1 GPFU, exits through his hatch, then assists the gunner checking the top of the vehicle and the driver's compartment. The squad leader is provided a report of his findings.
    4. The assistant gunner disconnects his protective mask breathing apparatus from the vehicle M13A1 GPFU and checks the inside and outside of vehicle. The squad leader is provided a report of his findings.

    Note: Ramp remains closed. Assistant gunner exits vehicle using the ramp door.

6. *Squad leader determines if decontamination is required and requests support, if necessary.*
    1. The squad leader directs the squad to prepare for vehicle decontamination. Crew/squad reports chemical presence on vehicle, if any, then reports findings to commander.
    2. The ammunition bearer locates the M11 or the M13 decon apparatus and passes it to the driver.

7. *Uses the M11 or the M13 decontaminating apparatus to decontaminate equipment.*
    1. The squad leader directs decontamination of the vehicle. He reports to the commander when the decontamination process is completed.
    2. The gunner assists the decontamination process and reports to the squad leader when the decontamination process is completed.
    3. The driver decontaminates the vehicle using the M11 or M13 decon apparatus.
    4. If necessary, the gunner and/or assistant gunner assist the driver. They disconnect their protective mask breathing apparatuses from the vehicle M13A1 GPFU.

8. *Designated personnel begin monitoring with monitoring equipment.*
    1. The squad leader directs the squad to perform monitoring, and then disconnects his protective mask breathing apparatus from the vehicle M13A1 GPFU. He supervises the use of monitoring equipment to monitor the environment in and around the vehicle and reports all findings to the commander.
    2. The gunner uses monitoring equipment to monitor the environment in and around the vehicle. He reports to the squad leader when the monitoring process is completed.
    3. The driver and ammunition bearer assist monitoring as necessary.

    Note: Ramp remains closed. The crew members exit the vehicle using the ramp door.

9. *The squad moves and displaces as appropriate or continues its mission.*

Note: The squad/crew remains in MOPP4 and remains connected to the vehicle M13A1 GPFU until the squad leader commands, ALL CLEAR.

1. The squad leader commands, MOUNT UP, and connects his protective mask to the vehicle M13A1 GPFU.
2. The squad/crew performs drill steps IAW "Mount the Carrier." They connect their protective masks to the vehicle M13A1 GPFU.

Notes:
1. Some actions such as raising and lowering the ramp should be simulated due to wear and tear on the equipment caused by repetitive training.
2. Use of decontaminates and monitoring equipment is simulated.
3. All Stryker vehicles are issued seat belts to prevent injuries during vehicle movement. Adjusting time for seat belt hook-ups is therefore recommended when conducting battle drills.

REACT TO A NUCLEAR ATTACK

ACTION: React to a nuclear attack while dismounted/mounted on Stryker Mortar Carrier Vehicle.

CONDITION: As a member of a dismounted/mounted squad or crew, given individual equipment, assigned individual weapons and ammunition, and a fully equipped MCV. The squad or crew is warned of a possible nuclear attack. Soldiers see a brilliant flash of light. (The squad or platoon leader may give the alert to initiate the drill.)

STANDARD: If dismounted, personnel immediately drop to a prone position and take individual steps necessary to survive the blast. If mounted, personnel immediately drop down inside the vehicle and brace themselves; then establish local security immediately after the blast.

1. *Personnel react to unwarned nuclear attack (a brilliant flash of light).*

Note: The squad is in a dismounted configuration.

1. The squad leader commands, HIT THE GROUND, immediately drops to the prone position, and closes his eyes.

Note: The vehicle commander, ammunition bearer, and driver's hatch should be closed and the M240B in operation when Soldiers are dismounted.

2. The squad drops to the ground and closes their eyes.
3. The squad leader and squad members turn their bodies toward the blast, stick their thumbs in their ears, cover their faces with their hands, tuck their arms and weapons under their bodies, tuck their heads down into their shoulders, keep their helmets on, and face downward.

2. *All personnel stay down until the blast wave passes and debris stops falling.*
   1. The squad leader commands, ALL CLEAR, and stands up.
   2. The gunner, assistant gunner, and ammunition bearer move back to the carrier.
   3. The driver moves back to the driver's compartment.
   4. The squad leader moves back to his position.

3. *The squad leader commands, CHECK PERSONNEL AND EQUIPMENT.*

4. *Personnel give casualties first aid, if needed, and evacuate.*
    1. The squad leader directs members to report their status and requests medical evacuation, if necessary. He then submits a casualty report to commander, if needed.
    2. The crew members report equipment status, as "Up" or "Down." If injured, they report the type of injury.

5. *The squad leader establishes security and reports to higher headquarters.*
    1. The squad leader directs the crew members to "post security," and submits an initial NBC-1 Report to the commander.
    2. The gunner places the M240B into operation and observes the squad sector.
    3. The driver and crew stand by for the order to move.

6. *Personnel react to unwarned nuclear attack (a brilliant flash of light).*

Note: The squad is in a mounted configuration, and the vehicle is moving.

---

    1. The squad leader commands, STOP THE VEHICLE.
    2. The driver slows down and stops the vehicle.

7. *The squad leader commands, TAKE COVER, then turns his body and faces toward the rear of the vehicle, away from day/night vision aids, and closes his eyes. The ammunition bearer and driver turn to face the rear of the vehicle, away from day/night vision aids, and close their eyes. The gunner and assistant gunner turn their body to face the rear of the vehicle and close their eyes.*

8. *Actions before the arrival of the blast wave.*

Note: Squad remains in their seated positions.

---

    1. The squad leader commands, SECURE THE VEHICLE AND BRACE, and turns off all radios that are not needed. He then tucks his chin against his chest, bends over at the waist, and braces by holding on to his seat.
    2. The ammunition bearer and driver secure their hatches, lower their seats to the full down position, tuck their chins against their chests, bend over at the waist, and brace by holding on to their seats.
    3. The gunner/assistant gunner tucks his chin against his chest, bends over at the waist, and braces by holding on to his seat.

9. *Actions after blast wave.*
    1. The squad leader commands, ALL CLEAR, and moves back to squad leader position.
    2. The crew prepares their stations.

10. *The squad leader re-establishes the chain of command and communications.*
    1. The squad leader commands, CHECK PERSONNEL AND EQUIPMENT, and turns vehicle radios ON.
    2. All squad members check their stations.

11. *The squad leader submits reports to the commander. Other personnel render casualties first aid, if needed, and evacuate.*

1. The squad leader directs the squad to report their status and checks the crew for injuries if they are not moving. If needed, a medical evacuation is requested, and casualty and initial NBC-1 Reports are submitted to the commander.
2. The crew reports equipment status as "Up" or "Down." If injured, they report the type of injury.

Notes: 1. Some actions such as raising and lowering the ramp should be simulated due to wear and tear on the equipment caused by repetitive training.
2. The squad leader or a selected representative should complete an NBC-1 Report, direct the Soldiers to apply buddy aid to any casualties with injuries such as broken limbs, remove the casualties from the vehicle without causing further injury, and call for a medical evacuation.
3. All Stryker vehicles are issued seat belts that should be used to prevent injuries during vehicle movement. Adjusting time for seat belt hook-ups is therefore recommended when conducting battle drills.

REACT TO AN AMBUSH (MOUNTED)

ACTION: React to an ambush while mounted on a Stryker Mortar Carrier Vehicle (MCV).

CONDITIONS: As a member of a mounted squad, given individual equipment, assigned individual weapons and ammunition, and a fully equipped MCV. The MCV is in a platoon traveling formation with driver and gunner/ammunition bearer hatches open. The M240B is traversed left/right for flank security, and the weapon is loaded on SAFE. The platoon enters a kill zone and the enemy initiates an ambush with a light anti-armor weapon and high volume of fire.

STANDARDS: The squad moves out of the kill zone to a covered and concealed position, returns fire and forces the enemy to withdraw with no damage to the vehicle, receives no casualties, and causes no damage to friendly forces.

1. The squad leader commands, AMBUSH, and directs the driver to seek cover. He then alerts the squad and other members of the section or platoon over the vehicle radio to the direction of ambush (front, left/right flank, or rear). The driver moves the vehicle out of the kill zone or to a covered and concealed position, stops, and secures driver's hatch.
2. The squad leader returns suppressive fire in the direction of the ambush. The driver observes the area through viewing ports and alerts the squad leader to enemy activity.
3. The squad leader calls in a SITREP to the platoon leader.

Notes: 1. Time stops when the MCV has moved out of the kill zone and the squad leader has called in a SITREP to the platoon leader.
2. Some actions such as raising and lowering the ramp should be simulated due to wear and tear on the equipment caused by repetitive training.
3. All Stryker vehicles come with seat belts that should be used to prevent injuries during vehicle movement. Adjusting time for seat belt hook-ups is therefore recommended when conducting battle drills.

REACT TO DIRECT FIRE (MOUNTED)

ACTION: React to direct fire/ATGM while mounted on a Stryker Mortar Carrier Vehicle (MCV).

CONDITIONS: As a member of a mounted squad, given individual equipment, assigned individual weapons and ammunition, and a fully equipped MCV. The MCV is in a platoon traveling formation with the M240B traversed left or right for flank security, and the weapon loaded on SAFE. The platoon detects the signature of an antitank weapon or detects heavy machine gun fire.

STANDARDS: The driver takes evasive actions by seeking a covered and concealed position. The squad leader returns fire using the M240B machine gun at known or suspected enemy positions, forcing enemy withdrawal with no damage to the vehicle, receives no casualties, and causes no damage to friendly forces.

1. The squad leader commands, ENEMY FIRE, and directs the driver to seek cover. He then alerts the squad over the vehicle radio to the direction of enemy fire (front, left/right flank, or rear). The driver moves the vehicle out of the kill zone using evasive action, stops, then secures the driver's hatch.

Note: Evasive actions involve varying speeds, zigzagging, and changing direction frequently while moving to a covered and concealed position.

2. The squad leader returns fire in the direction of enemy fire. The driver observes the area through viewing ports and alerts the squad to enemy activity.

3. The squad leader calls in a SITREP to the platoon leader, and if needed, calls for and adjusts indirect fire.

Notes:
1. Time stops when the MCV has moved out of the kill zone and the squad leader has called in a SITREP to the platoon leader.
2. Some actions such as raising and lowering the ramp should be simulated due to wear and tear on the equipment, which is caused by repetitive training.
3. All Stryker vehicles are issued seat belts that should be used to prevent injuries during vehicle movement. Adjusting time for seat belt hook-ups is therefore recommended when conducting battle drills.

REACT TO INDIRECT FIRE (MOUNTED)

ACTION: React to indirect fire while mounted on a Stryker Mortar Carrier Vehicle (MCV).

CONDITION: As a member of a mounted squad, given individual equipment, assigned individual weapons and ammunition, and a fully equipped MCV. Exercise is conducted during daytime or periods of limited visibility. The MCV is in a platoon traveling formation with the M240B traversed left or right for flank security, with weapon loaded and on SAFE or in a secured halt position. The platoon is engaged with indirect fire.

STANDARDS: On impact of round, the squad leader has the driver move the MCV out of the impact area. The squad sustains no more than one casualty and receives no vehicle damage.

1. The squad leader commands, IN COMING, and secures the squad leader's hatch. He then directs the driver to move as quickly as possible in a direction out of the engagement area. (Example: “move out at 3 o'clock, 200 meters.”) The driver secures his hatch and moves the vehicle as rapidly as possible out of the impact area in the direction given by the squad leader. The vehicle gunner secures his hatch.

2. The squad leader directs the driver to an alternate firing position or rally point. The driver stops the vehicle in a covered and concealed position.
3. The squad leader calls in a SITREP to the platoon leader.

Notes: 1. Some actions such as raising and lowering the ramp should be simulated due to wear and tear on equipment caused by repetitive training.

2. All Stryker vehicles are issued seat belts that should be used to prevent injuries during vehicle movement. Adjusting time for seat belt hook-ups is recommended when conducting crew drills.

Chapter 5

GUNNER'S EXAMINATION

This chapter addresses the procedures for administrating the gunner's examination for the M1129A1 Stryker MCV RMS6-L Mortar System. Existing steps and procedures for conducting the gunner's examination for the ground mounted mortar are found in FM 3-22.90, *Mortars*, Chapter 9. The Stryker gunner's examination tests the proficiency of the gunner in three areas: (1) Placing the RMS6-L Mortar System into action; (2) Making small and large deflection and elevation changes manually; (3) Making small and large deflection and elevation changes digitally. The gunner's examination is also a test of the crew member's ability to assist the gunner in accomplishing these tasks.

Section I — PREPARATION

5-1. Preparation for the gunner's examination teaches the Soldier how to properly and accurately perform the gunner's duties. The squad leader is responsible for this preparation. Squad members are rotated within the squad so each member can become proficient in all squad positions. Individual test scores should be maintained and consolidated to determine each squad's score. These squad scores can then be compared to build spirit de corps.

METHODS OF INSTRUCTION

5-2. The conditions and requirements of each step of the qualification course are explained and demonstrated. Each candidate is given practical work and is constantly supervised by his squad leader to ensure accuracy. Speed-accuracy is stressed from the start and is attained through repetition. The platoon leader/platoon sergeant monitors the instruction given by the squad leaders within the platoon. Demonstrations are usually given to the entire group. Squads also perform practical work under the supervision of the squad leader.

PRIOR TRAINING

5-3. A Soldier must be proficient in mechanical training, crew drill, and the execution of fire commands before he qualifies to take the examination.

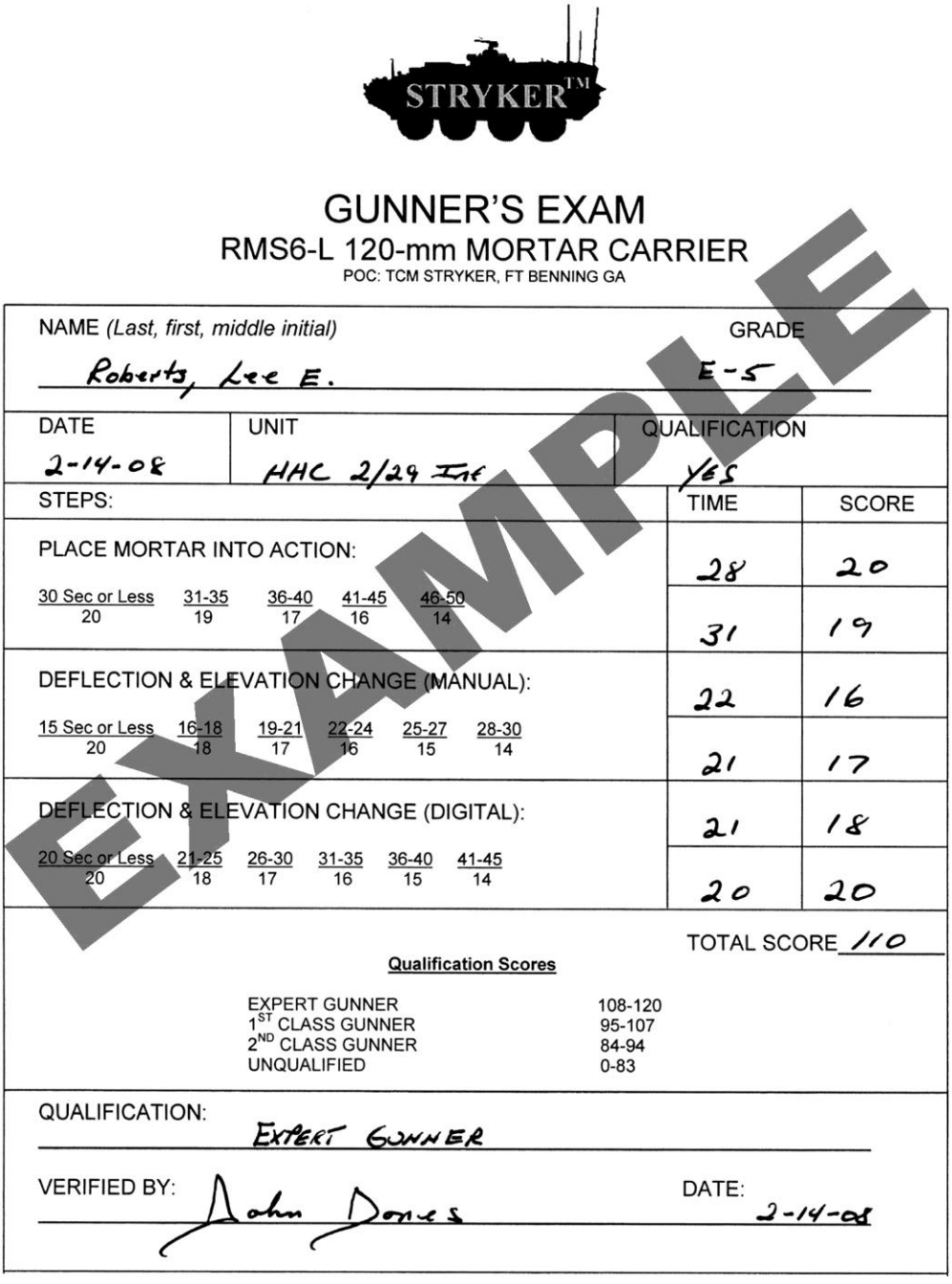
PREPARATION EXERCISES

5-4. The preparatory exercises for the gunner's examination consist of training in those steps found in the qualification course. After sufficient preparatory exercises, candidates are given the gunner's examination. Those failing the examination should be retrained for testing at a later date.

EXAMINING BOARD

5-5. The examining board consists of one officer and two senior NCOs who are proficient with the RMS6-L Mortar System. No more than one member is selected from the candidate's organization. (The commander who has authority to issue special orders appoints the board.) Scores are recorded on the

RTMS6-L 120-mm mortar carrier gunner's exam (see Figure 5-1 for a completed example). A blank copy of this form is located in the back of this publication for local reproduction. This is not an official Army form. It has been developed exclusively for this special text.



GUNNER'S EXAM

RMS6-L 120-mm MORTAR CARRIER

POC: TCM STRYKER, FT BENNING GA

NAME *(Last, first, middle initial)*		GRADE	
Roberts, Lee E.		E-5	
DATE	UNIT	QUALIFICATION	
2-14-08	HHC 2/29 Inf	YES	
STEPS:		TIME	SCORE
PLACE MORTAR INTO ACTION:		28	20
30 Sec or Less 20 / 31-35 19 / 36-40 17 / 41-45 16 / 46-50 14		31	19
DEFLECTION & ELEVATION CHANGE (MANUAL):		22	16
15 Sec or Less 20 / 16-18 18 / 19-21 17 / 22-24 16 / 25-27 15 / 28-30 14		21	17
DEFLECTION & ELEVATION CHANGE (DIGITAL):		21	18
20 Sec or Less 20 / 21-25 18 / 26-30 17 / 31-35 16 / 36-40 15 / 41-45 14		20	20
		TOTAL SCORE	110

Qualification Scores

EXPERT GUNNER	108-120
1ST CLASS GUNNER	95-107
2ND CLASS GUNNER	84-94
UNQUALIFIED	0-83

QUALIFICATION: EXPERT GUNNER

VERIFIED BY: John Jones DATE: 2-14-08

Figure 5-1. Example of completed RTMS6-L 120-mm MCV gunner's exam.

LOCATION AND DATE

5-6. Each unit armed with a mortar weapon system gives examinations semiannually. Other units may conduct examinations or allow their eligible members to take the qualification tests at nearby stations. (The commander authorizing the issue special orders determines the date of the examination.) The area selected should be on flat terrain consisting of soil that allows for aiming posts to be easily positioned at 50 and 100-meters from the station position.

ELIGIBLE PERSONNEL

5-7. The following personnel are eligible to take the examination:

- Commissioned officers, NCOs, and enlisted men assigned to a mortar unit.
- Commissioned officers, NCOs, and enlisted men whose duties require them to maintain proficiency in the use of mortars, as determined by battalion and higher commanders.

QUALIFICATION SCORES

5-8. A gunner's earlier qualification ends when he is administered a record course with the mortar. He is classified according to his latest examination score as follows:

- Expert Gunner: 108-120
- First Class Gunner: 95-107
- Second Class Gunner: 84-94
- Unqualified: 83 or less

GENERAL RULES

5-9. Conditions should be the same for all gunners during the test. The examining board ensures that information obtained by a candidate during testing is not passed to another gunner, and that gunners do not receive sight settings or laying of mortars left by a previous gunner.

- Unit equipment should be used in the examination; however, it should be the best available. Sight settings are considered correct when any part of the index coincides with any part of the line of graduation of the required setting.
- The left side of the aiming post is used for alignment. The elevation and cross-level bubbles are considered centered when the bubbles are resting entirely within the outer etched lines on the vials.
- The candidate is permitted to traverse the mortar to the middle point of traverse before each trial at laying the mortar.
- In time trials, the candidate does not receive credit for the trial if he performs any part of it after announcing "Up."
- The candidate selects his assistants from within his squad to participate in the test. When squad members are unavailable for testing, the candidate may select his assistants from outside the squad but from within his organization. The board makes sure that no unauthorized assistance is given the candidate during the examination.
- A candidate is given three trials – one for practice, and two for record. If he takes the first trial for record, then he must take the second trial for record even if he fails it. His credit score is the total of the two record trials. When he fails in any trial through the fault of an examiner, defective sight, mortar, mount, or any other instrument used, that trial is void and the candidate is given another trial as soon as possible. If his actions cause the mortar to function unsatisfactorily during testing, he receives no credit for that portion of the test.
- When a mechanical failure occurs and a mortar fails to maintain the lay after the candidate announces, UP, a board member twists or pushes the mortar (taking up the play without

manipulation) until the cross-level bubble is within the two outer etched lines. He then looks through the sight and, if the vertical line is within two mils of the correct sight picture, the candidate is given credit for that trial as long as other conditions are met. The candidate must repeat all commands. Commands should be varied between trials, using even and odd numbers, and right and left deflections.

Section II — GUNNER'S EXAMINATION RMS-6L

5-10. This examination tests the gunner's ability to perform basic mortar gunnery tasks with the RMS-6LMortar System on a Stryker MCV (Figure 5-1, p. 5-2).

SUBJECTS AND CREDITS

5-11. The examination consists of the following tests with maximum credit scores as shown in Table 5-1.

Table 5-1. Gunner's examination maximum credit scores.

Place the 120-mm Stryker Mortar into Action	40
Perform Deflection and Elevation Changes Manually on a Stryker 120-mm Mortar	40
Perform Deflection and Elevation Changes Digitally on a Stryker 120-mm Mortar	40

EQUIPMENT

5-12. The minimum equipment needed for the three stations includes three complete MCVs, three sights, one aiming circle, six aiming posts, and three stopwatches.

Note: To reduce the number of MCVs required, both manual and digital deflection changes can be tested on the same MCV, but both tasks must be performed by each gunner.

PROCEDURE

5-13. The gunner carries his scorecard from station to station. The evaluator at each station fills in the time, trial score, and credit score, and initials the appropriate spaces.

PLACE A 120-MM STRYKER MORTAR INTO ACTION

5-14. The gunner is tested at Station No. 1 on his ability to perform quickly and accurately the gunner's duties of placing the mortar into action from the traveling position.

EQUIPMENT

5-15. One MCV complete. One stopwatch for the evaluator.

CONDITIONS

5-16. The mortar is locked in the traveling position.

1. The crew is seated in their normal positions with seat belts on.
2. The M67 sight is in its case and the case is stored in the IAW the Stryker load plan.
3. Muzzle cover is on the cannon.
4. The mortar doors are in the closed position and combat locked. (The ramp may be in the up or down position).
5. The evaluator ensures that the candidate understands the requirement of the test and instructs him to report I AM READY before each trial.

PROCEDURE

5-17. The gunner is given three trials. If he chooses to use the first (practice) as a record, he must also use the second trial as a record. If he chooses to use the first trial as a practice, he must use the second and third trials as record. His credit score for the test is the total of the two record trials.

1. The evaluator positions himself inside or outside of the carrier where he can best observe the action of the gunner. The evaluator's position should not interfere with the actions of the candidate.
2. The trial is complete when the gunner announces, UP.
3. The gunner must place the mortar into action so that the sight is set at 3200 mils deflection, 1100 mils elevation, and all bubbles are level, within 50 seconds.
4. Time starts when the squad leader commands, ACTION.
5. The ammunition bearer unlocks the front latches on the left and then right top cargo doors in coordination with the assistant gunner and gunner.
6. The assistant gunner unlocks the center and rear latches on the left cargo door and locks the door in the open position.
7. The gunner unlocks the rear latch on the right cargo door and locks the door in the open position.
8. The assistant gunner removes the cannon muzzle cover and cannon tie-down strap, then lifts the cannon to the firing position and locks the folding bushing. Next he elevates the cannon approximately 35 turns using the elevation hand wheel.
9. The gunner removes the M67 sight from its case and indexes a deflection of 3200 mils and an elevation of 1100 mils.
10. The gunner mounts the M67 sight onto the sight mount, levels the elevation bubble with the elevation hand wheel, and tells the assistant gunner, LEVEL.
11. The assistant gunner cross levels the M67 sight using the cant knob and tells the gunner, CHECK.
12. The gunner and assistant gunner will repeat steps 6 and 7 until all bubbles are level.
13. When the gunner is satisfied that the mortar is mounted correctly he will announce, GUN UP, so the squad leader can inspect the weapon system.

SCORING

5-18. Scoring procedures are as follows:

1. The gunner receives no credit when the–
   - Time exceeds 50 seconds.
   - Sight is not set at 3200 mils of deflection and 1100 mils elevation.
   - Elevation and cross-level bubbles are not centered (within outer red marks).
   - The traversing lock handle is not locked.
   - Mortar doors are not secure in the open position with hatch pins installed.
   - The safety mechanism is not set to FIRE (with F showing).

2. When the mortar is in correct firing position within prescribed limits, credit is given as follows:

TIME (Seconds)	POINT CREDIT
30 or less	20
31-35	19
36-40	17
41-45	16
46-50	14

PERFORM SMALL DEFLECTION AND ELEVATION CHANGES ON A STRYKER 120-MM MORTAR SYSTEM (MANUAL)

5-19. The gunner is tested at Station No. 2 on his ability to perform the gunner's duties when he is given commands that require a change in deflection and elevation.

Note: The deflection change will not be less than 30 mils and not more than 60 mils. Elevation changes are not less than 40 mils and not more than 90 mils.

EQUIPMENT

5-20. One MCV complete. One stopwatch for evaluator.

CONDITIONS

5-21. The mortar is prepared for action with the sight installed.

1. The sight is laid on two aiming posts placed out 50 and 100 meters from the carrier on a referred deflection of 2800 mils and 1100 mils elevation.
2. The change in deflection causes the candidate to traverse the mortar between 30 to 60 mils for deflection and between 40 to 90 mils in elevation.
3. The gunner is allowed to begin the test with his hand on the deflection knob.

PROCEDURE

5-22. The gunner is given three trials. If he chooses to use the first (practice) as a record, he must also use the second trial as a record. If he chooses to use the first trial as a practice, he must use the second and third trials as record. His credit score for the test is the total of the two record trials.

Note: The gun crew will repeat all elements of the fire commands. The traverse locking pin will be in the proper position to prevent the traverse mechanism from traversing between 5600 and 0800 mils when using the traversing hand wheel. The gunner will announce, GUN UP, within 30 seconds.

1. The gunner is given a deflection and elevation change in the form of a fire command.
2. The gunner places the data on the sight and elevates or depresses the mortar to float the elevation bubble.
3. The gunner looks into the sight to determine where he has to traverse the mortar. The gunner then places his hand on the traversing hand wheel and traverses half the distance to his aiming posts and stops.
4. The gunner commands his assistant to, LEVEL.

5. The assistant gunner uses the cant correction knob to level the deflection bubble and announces, CHECK.
6. The gunner and assistant gunner repeat steps 3-5 until the vertical cross-line is within 2 mils of the left side of the aiming post and his deflection bubble is level.
7. The gunner levels his elevation bubble with the elevation hand wheel.
8. Before the gunner announces GUN UP he should recheck his data and ensure all bubbles are level and proper lay of the weapon system.
9. Time is charged against the gunner from the announcement of the last digit of the elevation element until the gunner announcement of UP.

SCORING

5-23. Scoring procedures are as follows:

1. The candidate receives no credit when–
   - The time exceeds 30 seconds.
   - The deflection or elevation is not indexed correctly.
   - The elevation or cross-level bubbles are not centered within the outer lines.
   - The vertical cross-line of the sight is not within 2 mils of the left edge of the aiming post.
2. When the mortar is laid correctly within the prescribed limits, credit is given as follows:

TIME (Seconds)	POINT CREDIT
15 or less	20
16-18	18
19-21	17
22-24	16
25-27	15
28-30	14

PERFORM LARGE DEFLECTION AND ELEVATION CHANGES ON A STRYKER 120-MM MORTAR SYSTEM (DIGITAL)

5-24. The gunner is tested at Station No. 3 on his ability to perform the gunner's duties when he is given commands that require a change in deflection and elevation using the Mortar Fire Control System (MFCS).

Note: Deflection changes are greater than 200 mils, but less than 300 mils. Elevation changes are greater than 100 mils but less than 200 mils.

Note: For test purposes, the mortar is mounted with the traversing quick release lever locked. The Gunner's Display (GD) is activated and shows AZ LAYED and EL LAYED. Time will start when the information for azimuth and elevation change is displayed on the gunner's display.

EQUIPMENT

5-25. One MCV complete, fully operational MFCS, an operator for the Commander's Interface and an assistant gunner. One stopwatch for evaluator.

CONDITIONS

5-26. The mortar is prepared for action.

1. The change in deflection causes the candidate to traverse the mortar between 200 to 300 mils for deflection and between 100 to 200 mils in elevation.
2. The candidate is allowed to begin the test with his hand on the deflection knob.

PROCEDURE

5-27. The gunner is given three trials. If he chooses to use the first (practice) as a record, he must also use the second trial as a record. If he chooses to use the first trial as a practice, he must use the second and third trials as record. His credit score for the test is the total of the two record trials.

1. The squad leader alerts the crew of a change by announcing the gun number. (Example: NUMBER 2 GUN).
2. The gunner observes the GD as the correction arrows appear.
3. The gunner elevates the gun with the elevation hand wheel until the GD shows EL LAYED.
4. The gunner may unlock the traverse quick release or turn the traversing hand wheel until the GD shows AZ LAYED. If the traverse quick release lever is used, it must be locked after it is used. (before the gunner announces GUN UP).
5. The gunner makes fine adjustments with the traversing and elevation hand wheel until the GD shows AZ LAYED and EL LAYED.
6. Once the GD shows AZ LAYED and EL LAYED, the gunner announces GUN UP.

Note: Time stops when the gunner announces GUN UP. The evaluator observes the GD and verifies the lay of the gun.

SCORING

5-28. Scoring procedures are as follows:

1. The candidate receives no credit when –
   - The time exceeds 45 seconds.
   - The deflection or elevation is not indexed correctly.
   - The turntable is not in the locked position.
2. When the mortar is laid correctly within the prescribed limits, credit is given as follows:

TIME (Seconds)	POINT CREDIT
20 or less	20
21-25	18
26-30	17
31-35	16
36-40	15
41-45	14

Chapter 6

EXAMPLE STRYKER MCV LOAD PLAN

This chapter describes the use of matrixes and illustrations IAW the standard combat load plan of the Stryker MCV. Equipment addressed in this load plan includes basic issue items (BII), additional authorization list (AAL), and components of end item (COEI). This chapter's example load plan can be adopted by SBCT commanders and leaders when establishing their own vehicle load plans. Some of the items listed in the Stryker MCV load plan are METT-TC dependent.

GENERAL

6-1. Combat loading consists of standard stowing of ammunition and equipment in and on a MCV. When performed efficiently, the process ensures that all material is readily accessible and stowed in the proper location.

STANDARD LOADING PLAN

6-2. Because the equipment carried on a MCV will vary slightly depending on its intended use (squad, platoon leader, company commander), a standard combat-loading plan should be developed for each vehicle. Authorized unit equipment may also vary based upon unit mission, geographical location, and basic ammunition loads. Standard procedures for MCV combat loading discussed in chapter X should be used in conjunction with the operator's manual. Based on mission essential equipment and ammunition, the process can be modified to fit the needs of each unit.

INSPECTION OF EQUIPMENT

6-3. The first step in combat loading ensures all items are present and serviceable through a comprehensive inspection. Assigned MCV equipment (weapons, tools, individual equipment, and ammunition) should be laid out in logical inspection sequence. Items are arranged in groups for easy accountability. Regular complete inspections ensure the MCV is always fully equipped.

STRYKER LOADING

6-4. All individual TA-50 equipment issued to Soldiers cannot be stowed on a MCV. Therefore, only those individual items required on a day-to-day basis are carried on board. Based on guidance from the platoon leader or company SOP, the platoon sergeant is responsible for the selection of stowed MCV TA-50 equipment. Other items such as cold weather gear and extra sets of clothing (if not needed) are carried in the company trains. When required, the platoon sergeant coordinates the storage of excess TA-50 with company supply.

LOADING

6-5. Loading the Stryker MCV is most efficiently accomplished by dividing the vehicle into loading areas and assigning responsibility for each area to designated squad members. Loading responsibilities can be divided IAW Table 6-1.

Table 6-1. Stryker load area responsibilities.

RESPONSIBLE PERSON	AREA
Squad Leader	Overall Supervision
Vehicle Commander/Gunner	Commander's Station/Vehicle Interior
Assistant Gunner	Ammunition Stowage/Troop Compartment
Ammunition Bearer	Ammunition Stowage/Vehicle Exterior
Driver	Driver's Compartment

6-6. Every item loaded must be secured to protect it from damage and injuring occupants when the vehicle is moving. Extra equipment or ammunition (for which there is no designated vehicle stowage space) must be securely strapped down in the best available place.

Note: Equipment or ammunition should never be thrown into the vehicle.

MCV BASIC ISSUE ITEMS

6-7. The equipment listed by category in Tables 6-2 through 6-3 is standard issue on the Stryker MCV. Leaders may choose to include or withhold certain items in accordance with their mission. But these are the basic equipment items each vehicle should have on board.

TABLE LEGEND ACRONYMS

6-8. Legend category acronyms include: basic issue items (BII); components of end item (COEI); and additional authorization list (AAL) equipment.

Table 6-2. Stryker MCV basic issue items.

BASIC ISSUE ITEMS (BII)			
ITEM	**NSN**	**QTY**	**CATEGORY**
Adapter, grease gun	4930-01-061-0433	1	BII
Ax, single bit	5110-00-293-2336	1	BII
Bag, assy, pamphlet	2540-00-670-2459	1	BII
Bag, tool, satchel	5140-00-473-6256	1	BII
Brush, paint	8020-00-205-6512	1	BII
Brush, wire scratch	7920-00-269-1259	1	BII
Cable assy (tow rope, synthetic)	4020-20-000-0583	1	BII
Cable assy (NATO slave)	2590-00-148-7961	1	BII
Can, fuel, 5 gal	7240-01-337-5269	2	BII
Can, water, 5 gal	7240-00-089-3827	2	BII
Chock block	2540-00-678-3469	2	BII
CVC, headset-microphone, (small to medium)	5965-01-453-2687	3	BII
CVC, headset-microphone, (large)	5965-01-453-2684	2	BII
CVC, shell, helmet (small to medium)	8470-01-389-3815	3	BII
CVC, shell, helmet (large)	8470-01-389-3821	2	BII
Coupling assy, quick disconnect (emergency)	4730-01-171-2275	1	BII

Table 6-2. Stryker MCV basic issue items (continued).

BASIC ISSUE ITEMS (BII)			
ITEM	**NSN**	**QTY**	**CATEGORY**
Coupling assy, quick disconnect (service)	4730-01-171-2276	1	BII
Crowbar, 26-inch length	5120-00-224-1372	1	BII
Cutter wire	5110-00-595-8229	1	BII
Drain plug, large	4730-21-912-9286	1	BII
Drain plug, small	4730-21-912-9285	1	BII
Extension, socket wrench, 5 inch, 1/2 inch dr	5120-01-335-1050	1	BII
Extension, socket wrench, 8 inch, 3/4 inch dr	5120-00-234-7328	1	BII
First aid kit	6545-00-922-1200	1	BII
Flag set (complete)	8345-00-375-0223	1	BII
Folder, equipment record	7510-00-889-3494	1	BII
Fuel transfer assembly	4720-20-000-7467	1	BII
Funnel, steel, flex spout	7240-00-559-7364	1	BII
Gage and hose assy	4910-00-441-8685	1	BII
Gage, air pressure	4910-01-003-9599	1	BII
Grease gun, lubricating	4930-00-253-2478	1	BII
Hammer, hand sledge 10 lbs	5130-00-243-2957	1	BII
Handle, mattock pick	5120-00-288-6574	1	BII
Handle, socket wrench, ratchet 1/2 inch dr	5120-00-230-6385	1	BII
Head nut spinner	5120-01-335-1892	1	BII
Heater, water and ration	7310-01-387-1305	1	BII
Hose assy, trailer brake (towing)	7420-21-919-0309	1	BII
Inflator assembly	4910-21-920-4694	1	BII
Jack assembly 12-ton	5120-01-146-8096	1	BII
Key set, socket head screw (kit 2mm-19mm)	5120-01-335-1508	1	BII
Litter, folding, rigid	6530-01-380-7309	1	BII
Mattock pick	5120-00-243-2395	1	BII
Mirror, pick-up	5120-01-428-8005	1	BII
Mittens, heat protective, asbestos (pr.) M240B	8415-01-092-0039	1	BII
Oilier, hand, 6 oz	4930-00-262-8870	1	BII
Padlock set (6 each)	5340-01-408-8452	1 set	BII
Pliers, slip joint, angled nose multi-tongue	5120-00-278-0352	1	BII
Pliers, slip joint, w/cutters, 8-inch long	5120-00-223-7397	1	BII
Screwdriver attachment, socket wrench	5120-01-437-3760	1	BII
Screwdriver, cross tip, 4-inch long	5120-00-234-8913	1	BII
Screwdriver, cross tip, 8-inch long	5120-00-542-3438	1	BII
Screwdriver, flat tip #2, 10-inch long	5120-00-293-3309	1	BII
Screwdriver, flat tip #2, 6-inch long	5120-00-062-0813	1	BII
Shackle 12-ton	2510-01-321-1221	1	BII
Shackle 30-ton	4030-01-186-7197	4	BII
Shovel, hand	5120-00-293-3336	1	BII
Snatch block	3950-01-347-9666	1	BII
Socket, 1/2 inch dr, 1/2 inch, 6-point	5120-01-398-7937	1	BII
Socket, 1/2 inch dr, 10mm, 6-point	5120-01-349-4547	1	BII
Socket, 1/2 inch dr, 13mm, 6-point	5120-01-398-8033	1	BII
Socket, 1/2 inch dr, 14mm, 6-point	5120-01-348-9033	1	BII
Socket, 1/2 inch dr, 16mm, 6-point	5120-01-348-9035	1	BII
Socket, 1/2 inch dr, 18mm, 6-point	5120-01-348-9037	1	BII
Socket, 1/2 inch dr, 19mm, 6-point	5120-01-398-7919	1	BII

Socket, 3/4 inch dr, 27mm, 6-point	5120-01-348-9698	1	BII

Table 6-2. Stryker MCV basic issue items (continued).

BASIC ISSUE ITEMS (BII)			
ITEM	**NSN**	**QTY**	**CATEGORY**
Support plate, jacking	5340-21-914-1589	1	BII
Tarpaulin, nylon 12 ft x 17 ft	8340-00-841-6456	1	BII
Tire repair kit	2640-00-922-6921	1	BII
Tow pintle	2540-00-776-0103	1	BII
Triangle set	9905-00-148-9546	1	BII
Wrench box & OE 7/16 inch	5120-01-335-1291	1	BII
Wrench box & OE 10mm	5120-01-431-1012	1	BII
Wrench box & OE 15mm	5120-01-431-1031	1	BII
Wrench box & OE 19mm	5120-01-435-6953	1	BII
Wrench box & OE 24mm	5120-01-054-7141	1	BII
Wrench box & OE 6mm	5120-01-431-1090	1	BII
Wrench box & OE 7mm	5120-01-431-0985	1	BII
Wrench, adjustable 12 inch	5120-00-264-3796	1	BII
Wrench transfer case assembly	5120-20-000-7448	1	BII
Flashlight, MX-991U w/batteries	6230-00-264-8261	2	BII
ADDITIONAL AUTHORIZATION LIST (AAL)			
ITEM	**NSN**	**QTY**	**CATEGORY**
Alarm, chemical agent automatic M22	6665-01-438-6963	1	AAL
Aiming light IR AN/PAQ-4	5855-01-107-5925	5	AAL
AN/PVS-6 MELIOS	5860-01-350-8551	1	AAL
AN/VSQ-2 (V-1) EPLRS	7010-01-475-5277	1	AAL
Baseplate 81mm (battalion mortars)	1015-01-236-0389	1	AAL
Baseplate 60mm	1010-01-043-7504	1	AAL
Binoculars 7x50	6650-01-224-2555	1	AAL
Bipod 81mm	M177 11579803	1	AAL
Bipod 60mm	M170 11579090	1	AAL
Cannon, 120mm		1	AAL
Cannon, 81mm, M253	1015-01-440-5935	1	AAL
Cannon 60mm, M225	1010-01-044-5883	1	AAL
Carbine, 5.56mm M4	1005-01-231-0973	5	AAL
Commander's interface M95	TBD	1	AAL
Compass, magnetic	1290-00-930-4260	5	AAL
Computer sys. digital, AN/UYK-128 (FBCB2)	7010-01-475-5277	1	AAL
Data transfer device, AN/CYZ-10 w/lanyard	5810-01-343-1194	2	AAL
Decon kit individual M295	6850-01-357-8456	5	AAL
Detector kit chemical Agent M256A1	6665-01-133-4964	1	AAL
Driver's display M95	TBD	1	AAL
Global positioning system (PLGR)	5825-01-395-3513	1	AAL
Interrogator set AN/PSX-1	5895-01-472-6633	5	AAL
Lightweight weapon sight AN/PAS-13 (crew)	5855-01-464-3151	1	AAL
Machine gun, 7.62mm M240B	1005-01-412-3129	1	AAL
Mask, protective M40 w/carrier (small)	4240-01-258-0061	1	AAL
Mask, protective M40 w/carrier (medium)	4240-01-258-0062	1	AAL
Mask, protective M40 w/carrier (large)	4240-01-258-0063	1	AAL
Mask, protective M42 w/carrier (small)	4240-01-413-4100	1	AAL
Mask, protective M42 w/carrier (medium)	4240-01-413-4101	1	AAL
Mask, protective M42 w/carrier (large)	4240-01-413-4102	1	AAL

Mortar Fire Control System (MFCS) pointing device	TBD	1	AAL

Table 6-2. Stryker MCV basic issue items (continued)

ADDITIONAL AUTHORIZATION LIST (AAL)			
ITEM	**NSN**	**QTY**	**CATEGORY**
Night vision goggles AN/PVS-7B	5585-01-228-0937	5	AAL
Radio set, AN/VDR-2	6665-01-222-1425	1	AAL
Radio set, AN/VRC-88F (company mortars)	5820-01-452-8435	1	AAL
Radio set, AN/VRC-91F (RSTA/BN mortars)	5820-01-541-8249	1	AAL
Reeling machine, w/handle RL-39	3895-00-498-8343	1	AAL
Telephone set, TA-1/PT	5805-00-521-1320	1	AAL
Tow bar	2540-00-936-7801	1	AAL
Transponder set, AN/PSC-12	5895-01-472-6632	1	AAL
Plotting board, indirect fire, M16 w/case	1220-00-602-7941	1	AAL
Plotting board, indirect fire, M19 w/case	1220-01-059-7989	1	AAL
Cable telephone, WD-1/TT, DR-8, 500 meters	6145-01-155-4258	1	AAL
Camouflage screen support system	1010-01-179-6025	2	AAL
Camouflage screening sys, ultra ltwt gen purpose	1080-01-457-2956	2	AAL
COMPONENTS OF END ITEMS (COEI)			
Device, blast attenuator, BAD	1015-01-354-2152	1	COEI
Driver's vision enhancer AN/VAS-5 (DVE)	5855-01-394-7125	1	COEI
Mount, machine gun, M240B	TBD	1	COEI
Mount, tripod M122	1005-00-710-5599	1	COEI
Spare barrel, M240B	12976817	1	COEI
Winch control, electrical	10652414-001	1	COEI
Windshield, vehicular	2150-21-913-4172	1	COEI
Windshield, bag	8105-21-920-4304	1	COEI

Table 6-3. BII for 120-mm, 81-mm, and 60-mm mortars.

ITEM	NSN	QTY RSTA	QTY BN	QTY CO	CATEGORY
Brush cleaning 120mm	1015-01-408-9014	1	1	1	BII
Brush cleaning 120mm	1015-01-407-7616	1	1	1	BII
Staff assembly 120mm	1015-01-292-0966	1	1	1	BII
Extractor cartridge	1015-01-433-4471	1	1	1	BII
M67 Sight elbow telescope	6650-01-341-5195	1	1	1	BII
M67 Sight mount telescope	6650-01-340-6082	1	1	1	BII
M67 Sight unit w/case	1240-01-366-7322	1	1	1	BII
M2A2 Aiming circle w/accessories	1290-01-067-0687	1/SEC		1/SEC	BII
M45A1 boresight w/case	1240-00-152-3512	1	1	1	BII
M14 Aiming post case	1290-01-043-8288	2	2	2	BII
M14 Aiming posts	1290-01-046-8320	16	16	16	BII
Stake driving	1010-01-043-8195	2	2	2	BII

RECOMMENDED STOWAGE LOCATIONS

6-9. The following illustrations (Figures 6-1 through 6-11) show recommended stowage locations of all equipment listed in Tables 6-2 through 6-3. These illustrations are examples and can be modified by the unit commander when developing their own load plans.

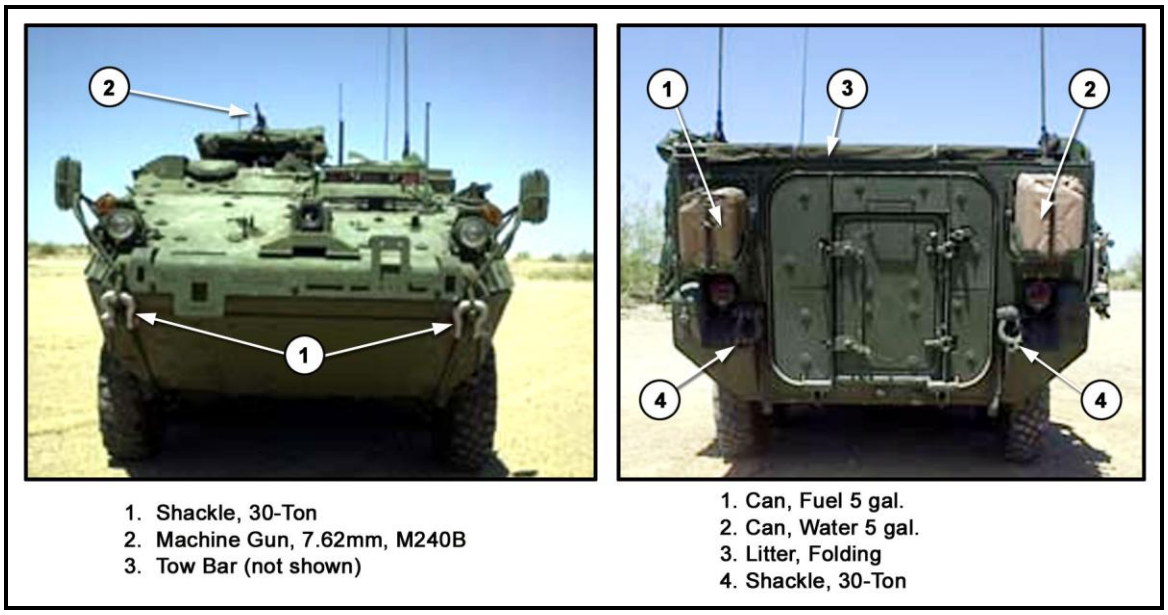


Figure 6-1. Exterior MCV stowage – front and rear.

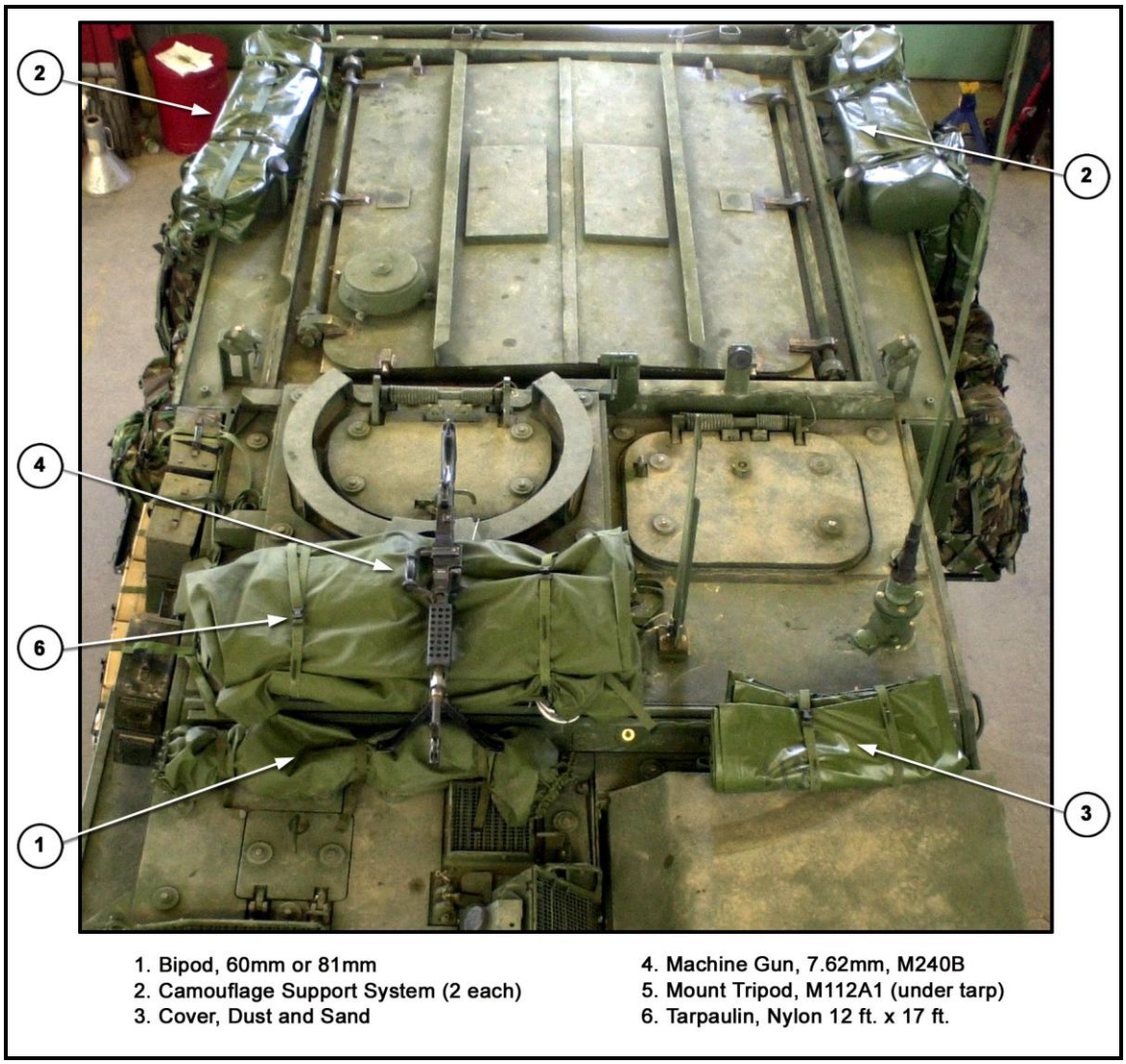


Figure 6-2. Exterior MCV stowage–top.

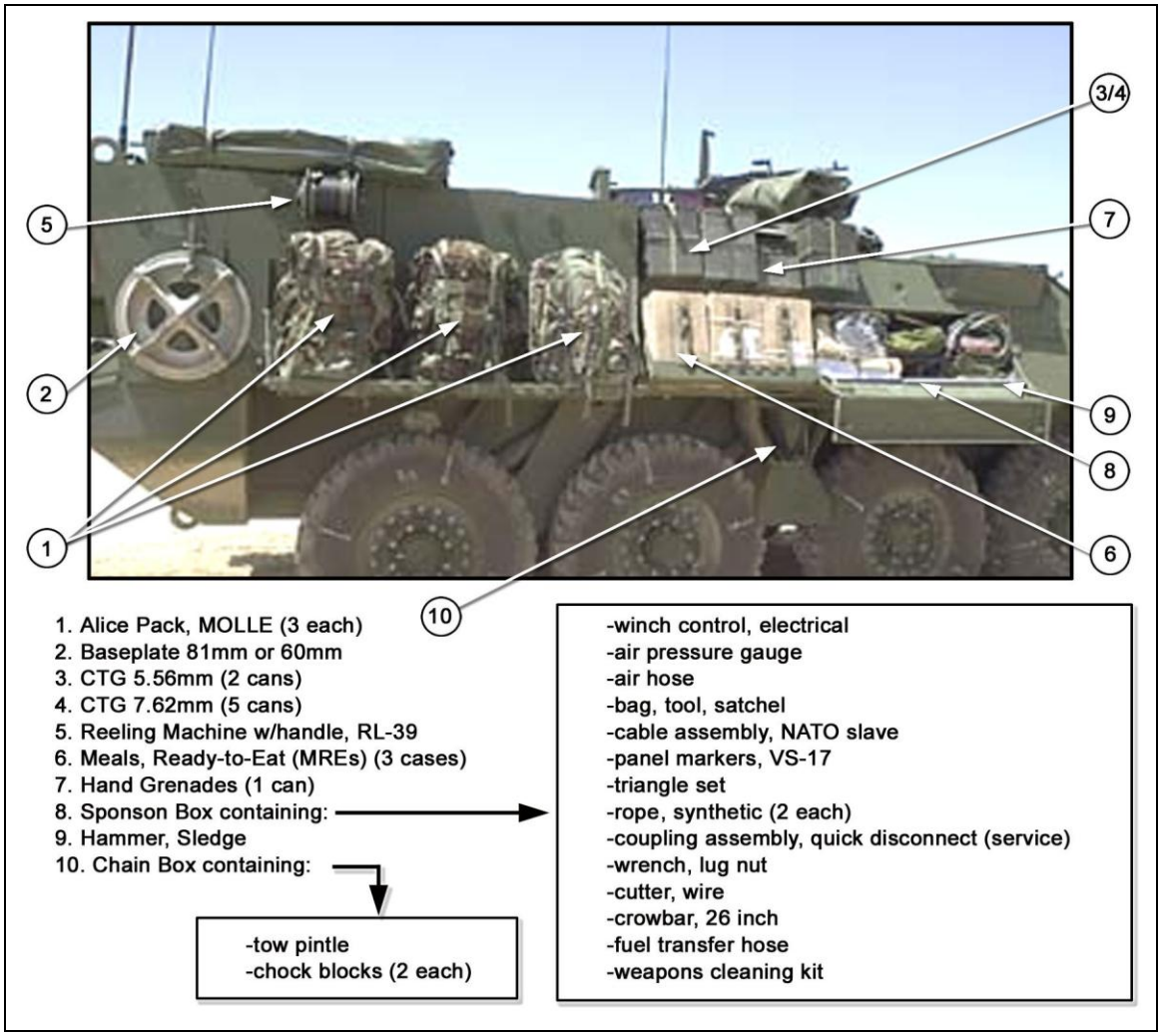


Figure 6-3. Exterior MCV stowage – right side.

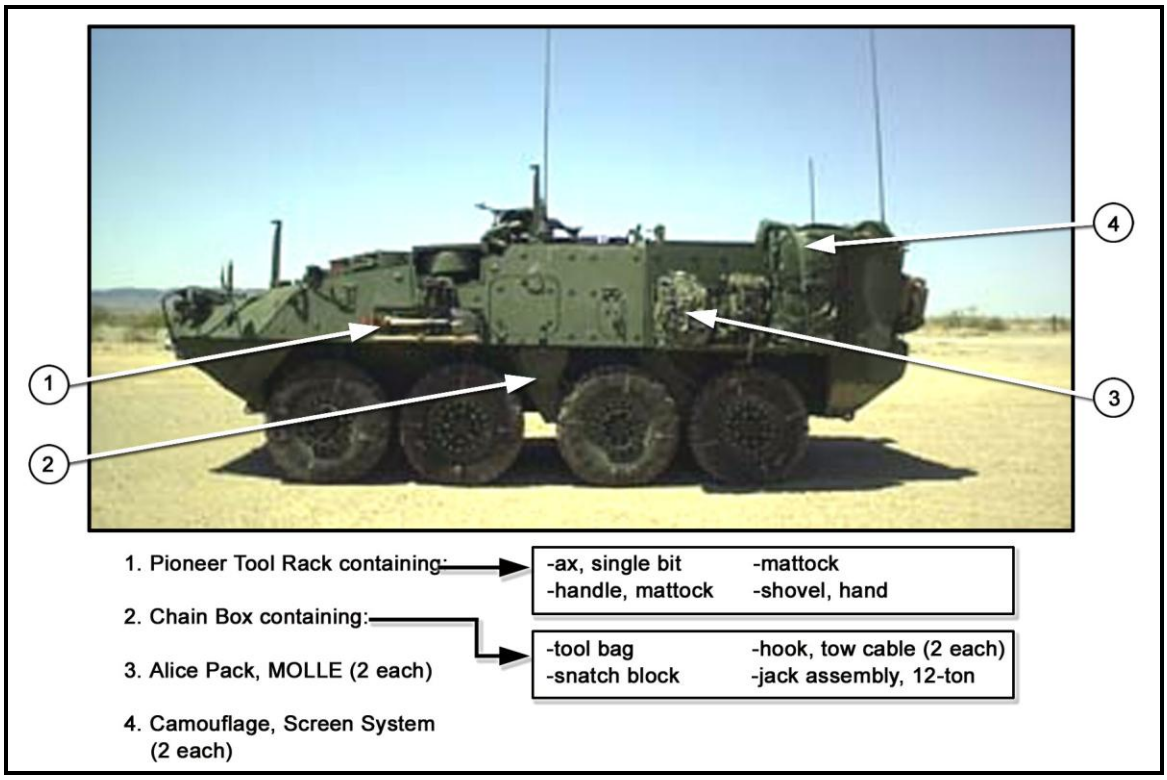


Figure 6-4. Exterior MCV stowage – left side.

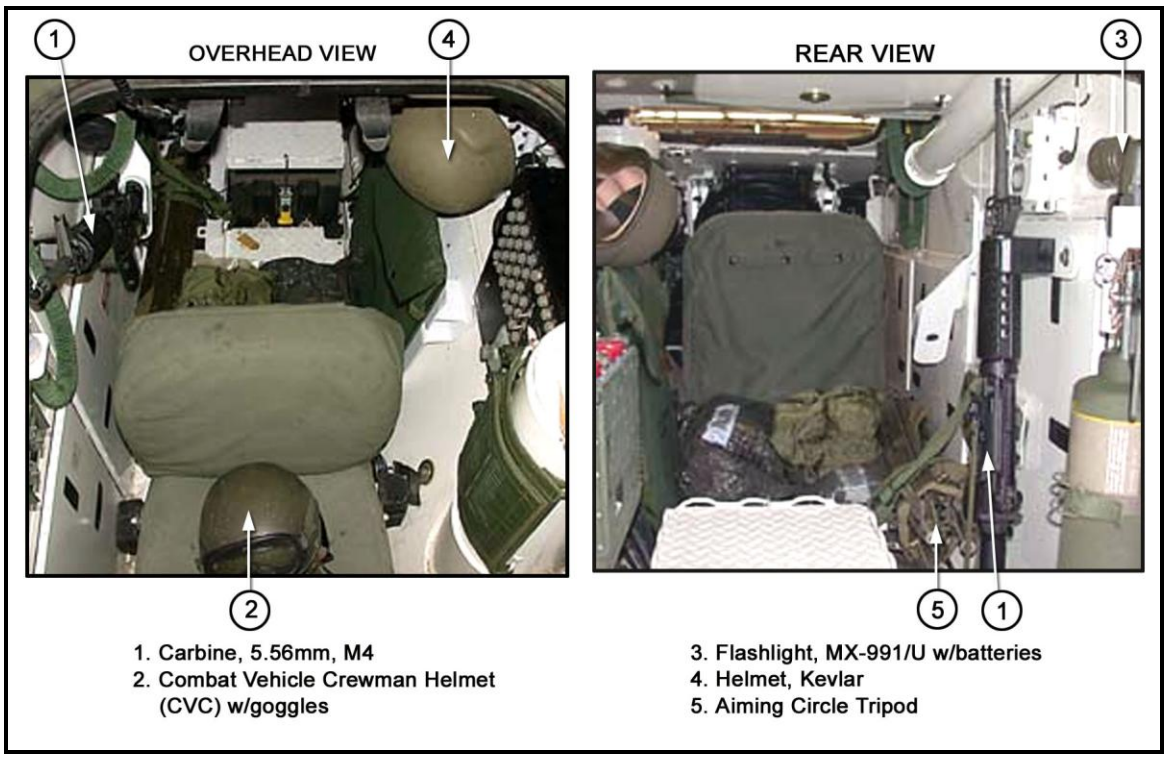
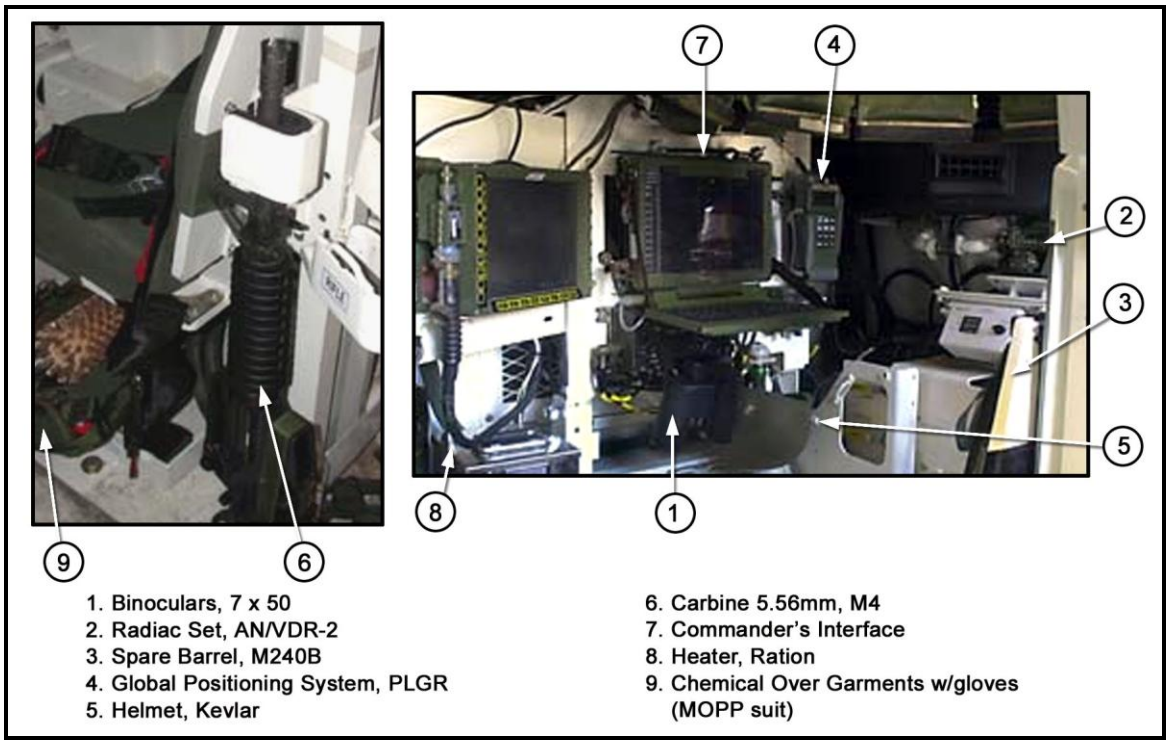
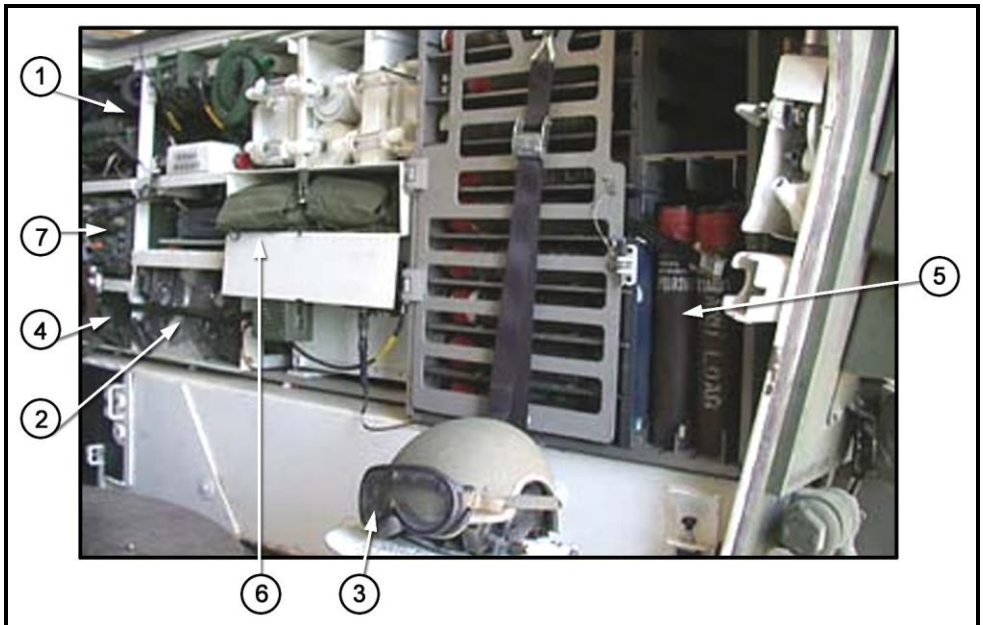


Figure 6-5. Interior MCV stowage – driver's compartment.



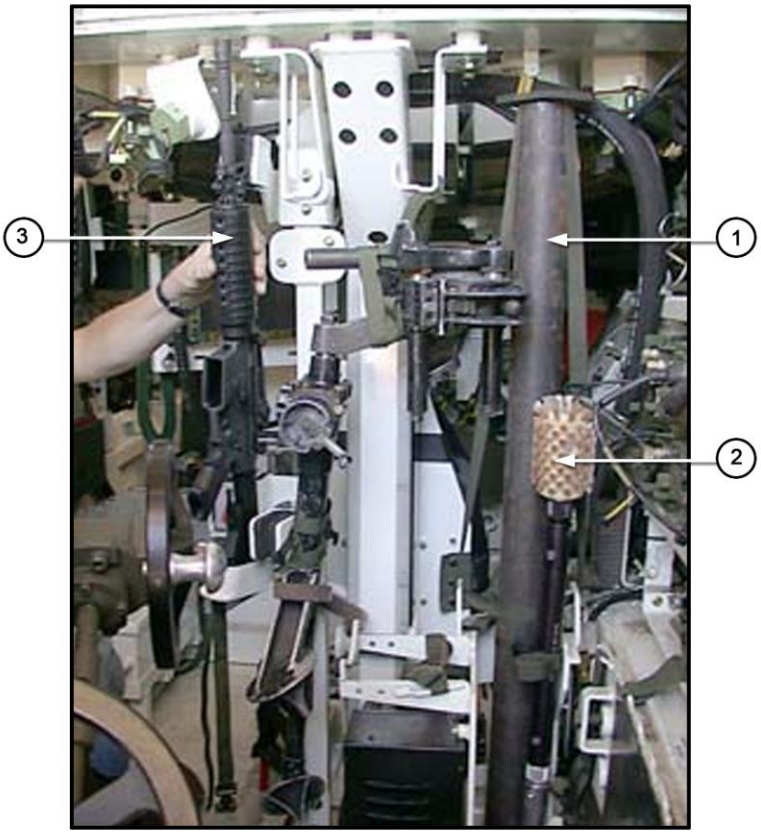
1. Binoculars, 7 x 50
2. Radiac Set, AN/VDR-2
3. Spare Barrel, M240B
4. Global Positioning System, PLGR
5. Helmet, Kevlar
6. Carbine 5.56mm, M4
7. Commander's Interface
8. Heater, Ration
9. Chemical Over Garments w/gloves (MOPP suit)

Figure 6-6. Interior MCV stowage – commander's station.



1. AN/VSQ-2 (V-1) EPLRS
2. Chemical Over Garment w/gloves (MOPP Suit) (3 each)
3. Combat Vehicle, Crewman Helmet (CVC w/goggles)
4. Computer System Digital, AN/UYK-128 (FBCB2)
5. CTG 120mm, 12 rounds, or CTG 81mm, 35 rounds, or CTG 60mm, 7 rounds
6. Night Vision Goggles, AN/PVS-7B or AN/PVS-14 (3 each)
7. Radio Set AN/VRC-88F or Radio Set AN/VRC-91F

Figure 6-7. Interior MCV stowage – troop compartment (right side).



1. Cannon, 81mm or 60mm
2. Cleaning Staff w/Bore Cleaning Brush
3. Carbine, 5.56mm, M4

Figure 6-8. Interior MCV stowage – troop compartment (behind vehicle commander's seat)

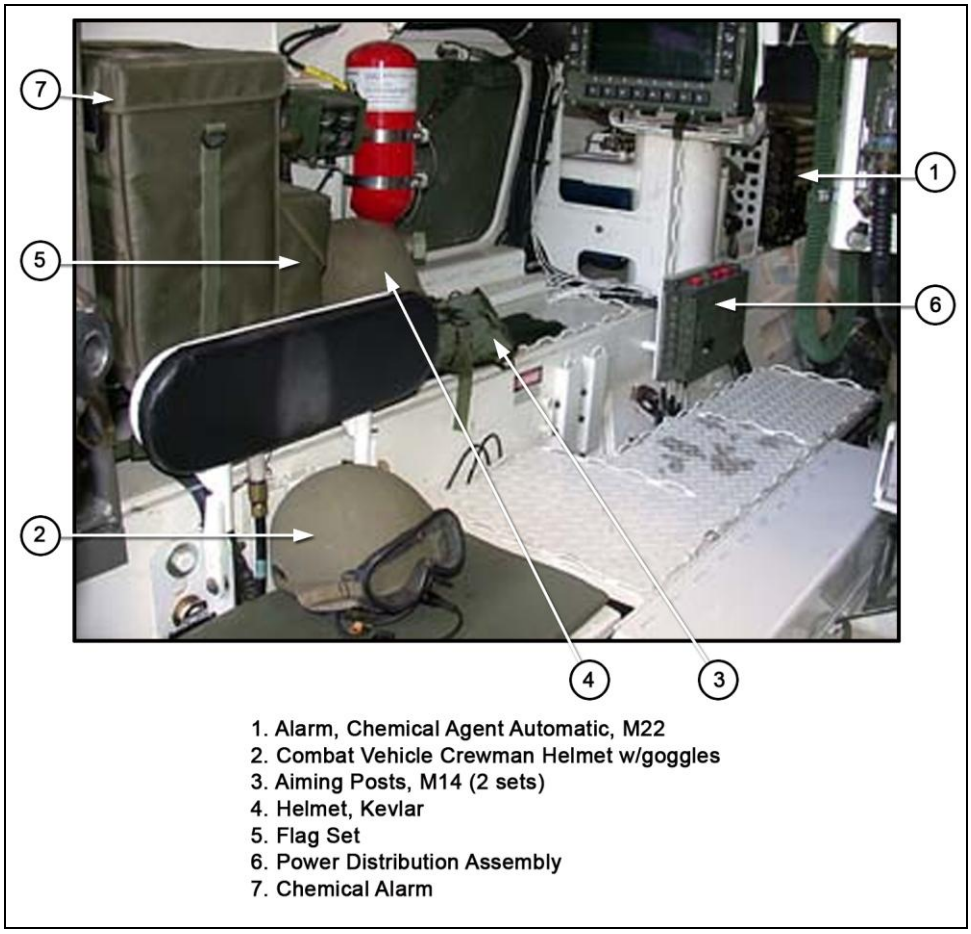


Figure 6-9. Interior MCV stowage – troop compartment (left side).

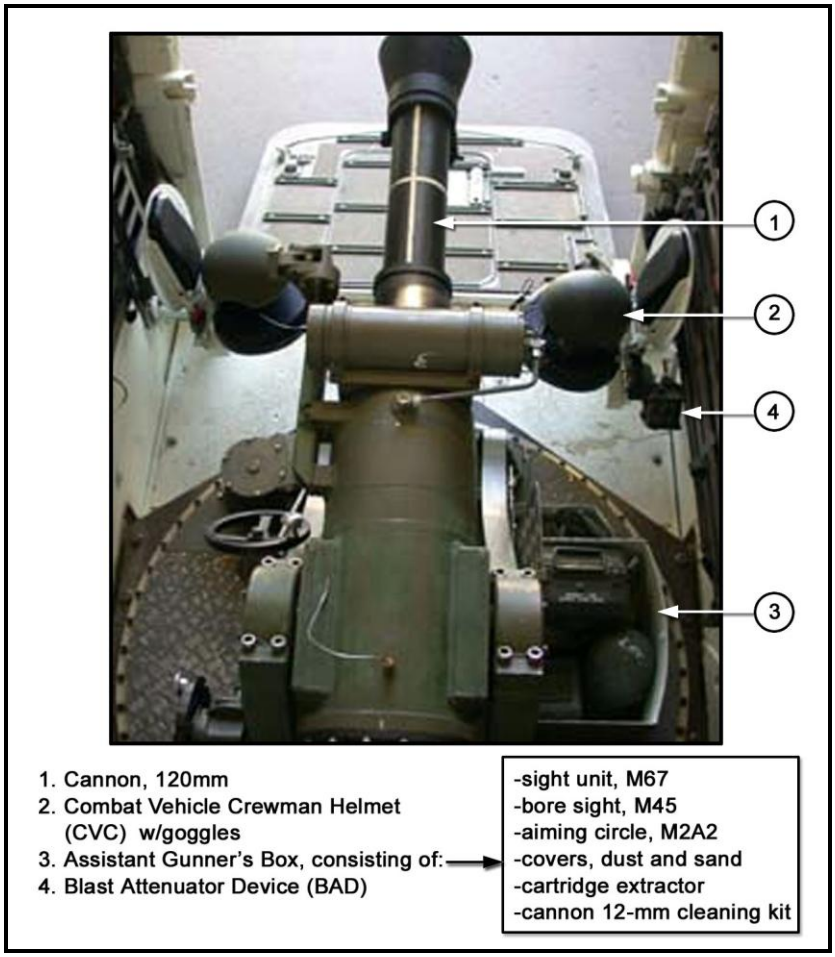


Figure 6-10. Interior MCV stowage – troop compartment (gun turntable).

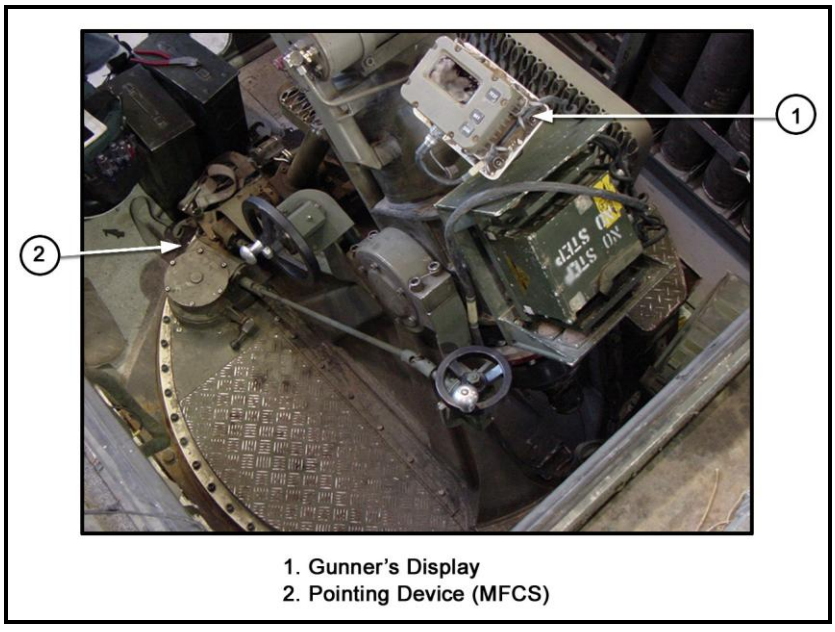


Figure 6-11. Interior MCV stowage – troop compartment (gun turntable).

Appendix A

STRYKER MCV TRANSPORT OPERATIONS

The MCV is transportable by rail, air, sea, and road. It is equipped with suitable tie-down and lifting points integral to the chassis. These points are reinforced to permit loading and securing for transportation. Stencils identify the location and use of tie-downs and lifting points.

Section I — UNIT TRANSPORTATION

A-1. The SBCT can be deployed by air, land, or sea. Each mode of travel is governed by separate regulations for equipment preparation before and during transport, and equipment on- and off-loading procedures. Several types of military transportation documents can be found on the Army Doctrine and Training Digital Library (ADTDL) and the Combined Arms Support Command (CASCOM) websites.

REFERENCES

A-2. Stryker technical manuals and Stryker-related field manuals include sections and chapters covering forms of transportation and how to prepare Strykers for air, land, and sea transport. The following manuals provide transportation measures units must take when planning a deployment by air, land, or sea.

- FM 4-01.011, *Unit* Movement *Operations*, provides guidelines for conducting air, land, and sea movements.
- FMI 3-35, *Army* Deployment *and Redeployment*, focuses on the planning for and execution of deployments in a joint arena to satisfy Joint Operation Planning and Execution System (JOPES) process requirements. It concentrates on the sequence of actions and requirements for both the deploying unit and agencies responsible for its deployment from origin/mobilization station to the ports of embarkation (fort-to-port).
- TM 9-2355-311-10-2-3 and TM 9-2355-311-10-3-1 contains specific information that cover forms of transportation and how to prepare the Stryker MCV for air, land, and sea transport. Strykers with an RWS (ICV, ESV, CV, NBC-RV, and the Stryker ATGMV) must be placed in a stowed position before transporting. The MCV requires additional reconfiguration when compared to other Stryker vehicles, requiring extensive removal of stowage brackets and appurtenances when being configured for C130 air transportation. The MCV will take more time to prepare for air transport.

STRYKER POCKET GUIDE AND PERFORMANCE WORKSHEET

A-3. Stryker pocket guides and performance worksheets are included in each of the Stryker technical manuals to provide other reference guides for vehicle transport.

RESPONSIBILITIES

COMMANDER

A-4. It is the commander's responsibility to ensure that all MCV equipment is ready for deployment. This is a time-consuming process because of the numerous requirements that must be met. This includes the type of equipment being moved, where it is being moved to, and how it is being moved.

INSTALLATION

A-5. The installation is responsible for procuring and storing, blocking, bracing, packing, crating, and tie-down material. Vessel captains provide tie-down chains for their ships. The Air Force normally provides tie-down chains for equipment moved on its aircraft. Therefore, it is imperative that the unit determine its needs and convey them through the chain of command to the appropriate support agency.

LOAD TEAMS

A-6. Each unit is required to have an appropriate number of personnel trained in vehicle preparation and aircraft, rail, and truck loading/unloading techniques. Specific skills required include—

- Preparing and activating vehicle load plans.
- Preparing vehicles for shipment (purging, protecting fragile components, weighing, and marking for movement).
- Executing aircraft, truck, and railcar tie-down procedures.
- Loading and unloading unit vehicles on aircraft, trucks, and railcars.
- Palletizing cargo on 463L pallets (see FMI 3-35).

A-7. Load team composition is tailored to the type and quantity of equipment to be loaded, and the time available for loading. In general—

- For rail movement: a well-trained team of five operators using prefabricated tie-down devices can complete loading of equipment on a flatcar in approximately 15 minutes.
- For air movement: a six-person team can provide efficient loading and tie-down of equipment.

A-8. There are many references available for help and direction on the loading of equipment. Some of these include Department of Defense (DoD) Military Standards (MIL-STDs) 209K, 810F, 910, 913, and MIL-HDBKs 669 and 1791.

MOVEMENT OPERATIONS SOP

A-9. Table A-1 provides ideas, data, and a template for a unit movement SOP. It is not intended to be all inclusive. Rather, it is intended to identify those things that a unit must consider and plan for when preparing for deployment. Use only those items that apply.

Table A-1. Unit movement operations SOP.

STANDING OPERATING PROCEDURES
Unit Movement Operations

1. **APPLICATION:** Identify operations that are applicable to this SOP.

2. **PURPOSE:** Define the purpose of this SOP and how it will be used to support movement operations within the unit.

3. **REFERENCES:** Identify any FMs, TMs, and any higher headquarters' SOPs that may be applicable to developing your unit's SOP.

Table A-1. Unit movement operations SOP (continued).

4. **RESPONSIBILITY FOR PREPARATION, CHANGES, and REVISIONS:** Identify the section or individual responsible for preparation of this SOP, and to whom recommended changes or revisions should be routed.

5. **EFFECTIVE DATE:**

6. **MOTOR MOVEMENT:**

   a. Vehicles. Preparation for movement.

   b. Motor marches.

      (1) Strip maps.

      (2) Route reconnaissance.

      (3) Messing and refueling.

      (4) Night marches.

      (5) Makeup of march units and serials.

      (6) Vehicle gap.

      (7) Speed and rate of march.

         (a) Column rate of march.

         (b) Lead vehicle speed.

         (c) Permissible catch-up speed.

         (d) March unit or serial time length.

      (8) Posting traffic guards during halt.

         (c) Infiltration.

         (d) Personnel. Conduct during movement.

            (1) Passengers

            (2) Drivers.

7. **VEHICLE AND EQUIPMENT OPERATIONS:**

   a. Motor pool.

      (1) Dispatch.

      (2) Service.

      (3) Maintenance.

   b. Administrative vehicles. Regulations.

8. **RAIL MOVEMENT:**

   a. S1 Action. Movement policy.

   b. S2 Action.

      (1) Reconnaissance report.

      (2) Security.

   c. S3 Action.

Table A-1. Unit movement operations SOP (continued).

(2) Rail Guards.

(3) Transportation movement teams.

d. S4 Action/UMO.

(1) Transportation request.

(2) Troop and guard mess.

(3) Blocking and dunnage.

(4) Shipping documents.

(5) Rolling stock.

(6) Loading schedules and area.

(7) Load teams.

9. AIR MOVEMENT:

a. S1 Action.

b. S2 Action.

c. S3 Action.

(1) Aircraft required.

(2) Drivers.

(3) Loading schedule and areas.

(4) Air-transportability technique.

d. S4/UMO action.

(1) Transportation request.

(2) Availability of tie-down devices or material.

(3) Equipment weight data for loading computation.

(4) Shipping documents.

(5) Vehicles required to load and unload the aircraft.

(6) Load plans.

(7) Passenger manifests.

(8) Cargo manifests.

(9) Loading teams.

(10) Marshaling area actions.

(11) Alert holding area actions.

(12) Loading ramp area actions.

(13) Actions at the APOD.

Table A-1. Unit movement operations SOP (continued).

10. WATER MOVEMENT:

a. S1 Action. Movement policy.

b. S2 Action.

(1) Reconnaissance report.

(2) Security.

c. S3 Action.

(1) Troop list.

(2) Loading plan.

(3) Supercargoes.

d. S4/UMO Action.

(1) Transportation request.

(2) Troop mess.

(3) Shipping documents.

(4) Vessels required.

(5) Loading schedule and area.

(6) Passenger manifests.

(7) Cargo manifests.

(8) Marshaling area actions.

(9) Staging area actions.

(10) Actions at the SPOD.

Section II — AIR TRANSPORTATION

A-10. The Army and Air Force have an agreement that enables the Stryker family of vehicles to be deployed through the military's three major transport aircrafts (C-5, C-17, and C-130), (Figure A-1). Commanders and leaders must ensure all U.S. Air Force requirements are strictly adhered to when conducting air transport operations. Loading aircraft leaves little room for mistakes. Air Force crews responsible for airlift of the Stryker family of vehicles will ensure Soldiers are aware of emergency evacuation procedures prior to loading the aircraft, and before lift-off. Air crewmen prepare the aircraft before any vehicle or equipment is loaded and notify personnel when the aircraft preparation is ready for loading. Complete procedures on preparation before-and-after air transport can be found in the appropriate technical manual for the specific vehicle variant.

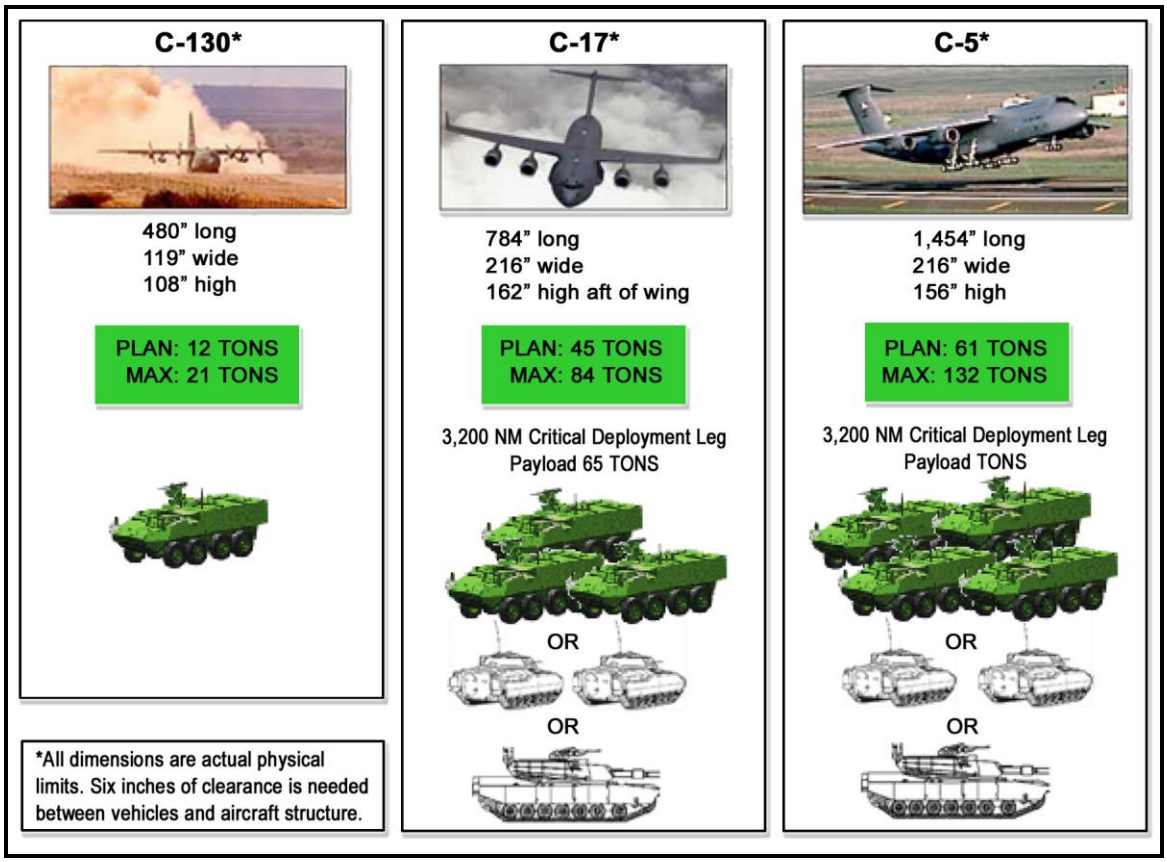


Figure A-1. Stryker vehicle C-130, C-17, C-5 aircraft lift comparison.

PREPARE THE MCV FOR AIR TRANSPORT

A-11. Commanders and leaders must ensure all U.S. Air Force requirements are strictly adhered to when conducting air transport operations. Loading aircraft leaves little room for mistakes. Therefore, regular practice, the development or request aircraft mock-ups, and the addition of "preparing for movement" to the unit mission essential task list (METL) is recommended.

ARRIVAL/DEPARTURE AIRFIELD CONTROL GROUP (ADACG)

A-12. Once a maneuver unit reaches the airfield staging area, preparation for loading and unloading of aircraft come under the control of the Arrival/Departure Airfield Control Group (ADACG). Airfield personnel are to inform unit commanders when to move vehicles and palletized equipment or supplies into a sterile staging area, and when to depart the staging area. The staging area is where Soldiers prepare Stryker and other unit vehicles for loading IAW specific aircraft requirements. Preparation time for transport depends on type of transport.

C-130

A-13. For C-130 transports the MCV requires additional reconfiguration when compared to other Stryker variants. The width of the MCV requires extensive removal of stowage brackets and appurtenances when configured for C-130 air transport. Weight and center of gravity restrictions also require that some items are: (1) removed and walked onto the aircraft after the MC is loaded, and (2) removed, palletized, and loaded onto a second aircraft along with three crewmembers. The MCV also requires different heights at specific times during transportation on the C-130. This is due to height restrictions and angles of approach when entering and exiting the aircraft. The MCV will first enter "load" height, which is approximately one

half the difference between nominal (normal) and flying (lowest) heights. After successful entry the MCV is required to lower to "flying" height to ensure adequate clearance and stability for the actual flight.

C-17 and C-5

A-14. C-17 and C-5 aircraft require little or no vehicle preparation. Load masters inspect vehicles before loading them on the aircraft. Vehicles are placed on scales and then moved to the aircraft for loading. Load masters load aircraft based on maneuver unit load plans, which can be adjusted by the load master. Aircraft personnel have the final authority regarding which aircraft will be loaded and the method of loading the assigned aircraft .

STRYKER COMBAT MISSION-READY CONFIGURATION

A-15. Crews must place a Stryker in a combat mission-ready configuration without substantial assembly or refit. As a result, set times are established for each configuration, ranging from 15 to 100 minutes to meet specific missions. Stryker technical manuals outline the necessary steps for preparing individual Stryker variants to meet chosen aircraft requirements for transport. Only the larger aircraft such as the C-5 and C-17 can transport Strykers with complete assigned crews. However, as a minimum, Strykers should deploy with vehicle crews. Prior to beginning loading, all emitters of electromagnetic interference (EMI) shall be de-energized. Weapon/smoke projectors shall be placed on SAFE and disconnected. All antennae shall be removed (leaving antenna mounts in place) and secured inside the vehicle. Weapon systems must be removed from the mount and secured inside the vehicle.

PREPARE THE MCV AFTER AIR TRANSPORT

A-16. Upon exiting the aircraft, crews have 10 minutes to prepare the vehicle for movement. Tasks included in this step are—

- Activate the central tire inflation system (CTIS) and select the proper tire inflation setting.
- At the end of the 10 minutes, move off the airfield to secure a location or a position that provides cover and concealment. Upon reaching a secure location or a position that provides cover and concealment, the crew will be required to complete the following:
- Prepare the vehicle commander's position for mounting the M240B.
- Load the weapon. (If ammunition is not deployed with the vehicle due to weight constraints, it should be drawn as the vehicle moves off of the airfield.)
  - Perform communications check and enter appropriate radio net.
  - Activate FBCB2 (if network is available).
  - Stow and reinstall any additional equipment removed from vehicle exterior such as camouflage nets, ammunition, rucksacks, and water cans.
- Additional tasks include mounting any equipment removed and flown on other aircraft due to weight and space requirements (example; slat armor).

Note: Mounting any protective armor taken off for transporting is METT-TC dependent.

Section III — TRANSPORT BY LAND

A-17. Rail and trucks are the most common modes of transport used by Army units. They are logistically easier than transporting by air or sea. Transportation Engineering Agency (TEA) Pamphlet 55-19 provides proper methods for securing vehicles on chain-equipped flatcars.

RAIL MOVEMENT

A-18. Responsibility for planning and executing rail movements is split between the unit and installation transportation officer (ITO). The unit determines movement requirements and submits them to the brigade movement coordinator (BMC). The BMC validates and consolidates all movement requirements prior to forwarding them to the supporting unit movement coordinator (UMC).

UNIT RESPONSIBILITY

A-19. Units are individually responsible for preparing their equipment for rail loading. Preparation includes packing, crating, banding, and blocking/bracing secondary loads. Units are also responsible for actual loading and tie-down of all vehicles and equipment loaded (Figures A-2 and A-3). Units load railcars under the technical supervision of the UMC and can generate automated rail load plans using TC-AIMS II. The ITO and railway agent are ultimately responsible for approving all rail loads.

Figure A-2. Stryker on railcar (front view).

Figure A-3. Stryker on railcar (rear-view).

PREPARE THE MCV FOR RAIL TRANSPORT

A-20. The preferred type of flatcar for unit moves is chain-equipped. These flatcars usually reduce the need for blocking and bracing material. They also reduce loading times and line-haul transportation costs. Flatcars without side rails are easier to load, and they easily accommodate wider vehicles.

THE CIRCUS METHOD

A-21. The most common and expeditious method of loading vehicles on flatcars is the circus method. This method uses flatcars as a roadbed with spanners placed between cars. After the loading sequence for the trail has been determined, the vehicles are staged in order. All vehicles are loaded onto the rearmost car and moved forward to their assigned locations.

A-22. The following is general rail movement planning guidance for units:

- Fill equipment with fuel to capacity as directed.
- Other than the fuel in vehicle fuel tanks, do not load ammunition and fuel together on any unit vehicle of a rail movement.
- Place warning placards on all sides of hazardous cargo loads. Do not stencil permanent placards on vehicles.
- Load unit equipment in organic vehicles to the greatest extent feasible. Secure equipment loads properly.
- Lock and seal sensitive arms, ammunition, and explosives in approved security containers. If railcar design permits, place security containers door-to-door to prevent unauthorized access to sensitive material. If container doors do not match, place an empty container against the loaded container to ensure there is a door-to-door match.
- Do not cover headlights, windshields, or mirrors with tape.

AT THE RAILHEAD

A-23. At the railhead, an officer is appointed to oversee rail-loading operations. The railcar loading site includes a medical aid station and should include command and control facilities, warming tents, and other needed life support services.

PREPARE THE MCV FOR TRUCK TRANSPORT

A-24. Movement by trucks or heavy equipment transporters (HETs) (Figures A-4 and A-5) is similar to movement by rail. Preparation before and after transport require the same procedures. Complete procedures for preparation before and after truck transport can be found in the appropriate technical manual for the specific vehicle variant.

Figure A-4. Stryker secured on heavy equipment transporter (HET) front view.

Figure A-5. Stryker secured on heavy equipment transporter (HET) rear view.

PREPARE THE MCV AFTER TRUCK TRANSPORT

A-25. Loading and unloading Strykers transported by land is usually performed in a secure area. Time is not usually a factor in placing the vehicle in its normal configuration and reinstalling removed equipment prior to loading.

Section IV — SEA TRANSPORTATION

A-26. Military Sealift Command (MSC) ships have been transporting U.S. Army and Marine Corps cargo in support of Operation Iraqi Freedom since early 2003. At the end of 2003, MSC transported the first SBCT deployed in support of Operation Iraqi Freedom. The Stryker is transportable by all strategic material transport vessels including break-bulk ships, containerships, lighter-aboard-ships, sea-barge carriers, and roll-on/roll-off ships.

PREPARE THE MCV FOR SEA TRANSPORT

A-27. Staging area setup and activities for sea deployment transport preparations are consistent with air and land transport requirements. MSC load masters and shipboard personnel determine what configuration Strykers must be in prior to on-board loading. Once approved load masters secure vehicles with the assistance of Stryker crews. The latest classes of MSC ships have drive-on capability. This capability allows for transportation of the Stryker in its combat ready configuration and minimizes vehicle transport preparation time.

PORT STAGING AND MARSHALLING AREAS

A-28. Unit personnel, supplies, and equipment are held in the port staging area to prepare for shipment; however, before moving to the port staging area, the unit, supplies, and equipment may be assembled in a marshaling area. Though they serve much the same purpose, there is a distinction between the two areas. In a marshaling area, the owning command retains responsibility and accountability for shipment. Once in the staging area, the port commander assumes responsibility and accountability. The following preparations and checks are conducted prior to loading vessels:

1. Unit equipment and supplies are checked to ensure they are properly labeled/tagged and accompanied by proper documentation.
2. Cargo lashing and height limitations are checked to ensure loads are within parameters for shipment. Secondary loads (unit supplies and equipment on vehicles) are checked to ensure they are properly blocked, braced, and secured.
3. Preventive maintenance checks and services (PMCS) are conducted and any required organizational or direct support maintenance accomplished. Fuel levels in vehicles and equipment are adjusted to proper levels.
4. Hazardous cargo is checked to ensure it is segregated, properly classified, described, packaged, marked, labeled, and in proper condition for transportation. This must be done IAW the Code of Federal Regulations (CFR) 49 and other prescribed regulations or directives.

A-29. Complete procedures on preparation before sea transport can be found in the appropriate technical manual for the specific vehicle variant.

PREPARE THE MCV AFTER SEA TRANSPORT

A-30. Though many of the ships used by deploying maneuver units require little or no change to Stryker configuration when boarding and stowing equipment, they do require the removal of protective armor (slat or AoA). As is true with air transport, the reason for armor removal is the increased Stryker dimensions when equipped with it, not increased vehicle weight.

Appendix B

STRYKER PROTECTIVE ARMOR

The proliferation of the rocket-propelled grenade (RPG) launcher and other antitank weapons has required additional protection for the survivability of the Stryker vehicle. To accommodate this need, the Department of the Army has developed reactive armor tiles and slat armor. Both protective innovations will increase Stryker protection levels against RPGs and other antitank weapons.

BACKGROUND

B-1. Add-on-armor kits are being developed for use with the Stryker vehicles. However, the kits are not ready for fielding. As an interim solution, a slat armor kit has been designed and installed to help mitigate hand-held antitank weapons effects of RPG class munitions.

B-2. The slat armor kit consists of a series of modules, which are mounted to all four sides of the vehicle with the use of various support assemblies. Plates of 0.25 inch thick rolled homogenous armor (RHA) are fastened to the upper sides of the ICV, to support existing stowage racks for the ICV and the support brackets for the slat armor. The modules consist of spaced steel slats which are positioned parallel to the ground with a built-in standoff distance of 10 inches from the vehicle surface and any stowed items. The slat armor kit adds 4920 lbs. to the weight of the vehicle bringing the gross vehicle weight of a fully stowed ICV to approximately 45,440 lbs.

SLAT ARMOR

B-3. Slat armor (Figure B-1) is designed to protect vehicle crew/squad members from hand-held antitank weapons. Slat armor consists of blast plates and louver assemblies installed around the perimeter of the vehicle. The louvers are fabricated of steel bars spaced a nominal 2.5 inches apart.

Note: To work as designed, a standoff distance of 10 inches must be maintained between the inside surface of the louver assemblies and the vehicle structure, vehicle components, and exterior BII/stowage.

B-4. Slat armor kits are packaged and shipped in two crates. Each contains the modules, mounting brackets, support assemblies, and hardware required to secure the armor on one vehicle. Installation instructions are provided with each kit. Blast plates fabricated of 0.25-inch steel are fastened to the upper sides of the vehicle. Skirts that protect the lower sides of the vehicle and allow refueling and outside electrical power or air connections are also included.

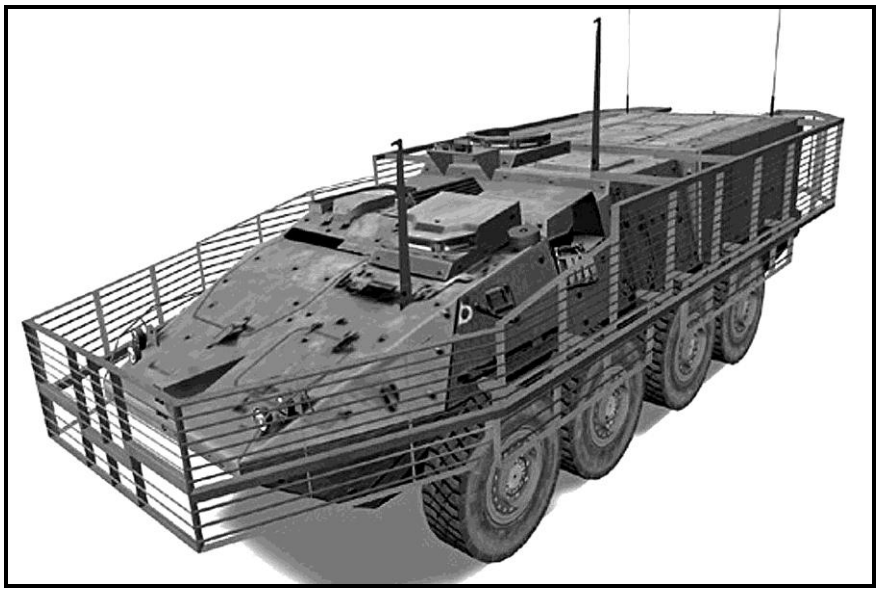


Figure B-1. Stryker MCV with slat armor.

VEHICLE PREPARATION

B-5. Numerous mounting fixtures (such as stowage racks and brackets) used to hold BII/stowage items must be removed from the Stryker exterior before slat armor can be installed. Some of these components are not used after slat armor is mounted and should be stored accordingly. Other remaining components are re-installed on top of the installed armor.

B-6. The following items do not get re-installed and need to be stored accordingly:

- Driver's handgrip.
- Stowage rails.
- Brackets.
- Brush guards.

SLAT ARMOR INSTALLATION

B-7. For complete installation instructions, TM 9-2540-231-12 for installers, and TM 9-2540-232-10 for operators, are available through individual Stryker unit publication clerks, and logs. Maneuverability details are fully covered in TC 7-21, Stryker Driver, Chapter 8.

B-8. Generally, slat armor is installed in groups based on vehicle location (front, left side, right side, and rear). Once shipping crates are unpacked, blast plates and louver assemblies are laid out in their respective groups as follows.

- All exterior BII and stowage from the vehicle is removed and laid aside for re-installation once armor is installed. Stowage items located on the roof are not removed.
- Lower stowage rails and brackets, pioneer tool rack, and bustle stowage rack are removed from the sides of the vehicle. Stowage rail and brackets will not be used after installation, therefore, store accordingly. Lay all other parts aside for re-installation.
- Headlight brush guards from the front and right vehicle corners are also removed. Brush guards are not used after armor is installed and should be stored accordingly.
- If attached on the vehicle, hook and pile strips are removed from the emergency hatch to the back of vehicle on left side, and from the chain box to the back of the vehicle on the right side.

B-9. Some existing vehicle components, such as the side bustle stowage racks, are impacted by the installation of the armor. The installation instruction guide packed with the armor explains any changes required.

SLAT ARMOR PMCS

B-10. When slat armor is installed, both the vehicle PMCS and the following must be used:

VEHICLE FRONT, LEFT, REAR, AND RIGHT SIDE CHECKS

B-11. The driver visually checks the front, left, rear, and right side of the vehicle for damage and loose or missing hardware. Mounting bolts are inspected for looseness. If bolts are loose, they are tightened. When time permits, bolts are tightened to the proper torque value by the maintenance CRT.

SAFETY PRECAUTIONS

B-12. Safety related precautions identified with the installation of slat armor are as follows:

- To prevent injuries during installation of the slat armor kit, three personnel are required to handle and install the modular assemblies.
- Slat armor may have sharp edges, which could cause injury. Leather work gloves must be worn when handling the armor.
- The lower front portion of the slat armor hangs low enough to impact the ground during the crossing of ditches or depressions during cross-country operations. Caution must be observed by the driver under these driving conditions.
- The emergency escape hatch opens rapidly outward when unlatched. During an emergency escape situation, the crewmen must quickly release the hatch and allow it to open without trying to restrict the outward motion.
- Due to the weight of the emergency escape hatch, opening and closing the hatch during non-emergency situations is a three-man operation that requires two crewmen on the outside to control and hold the hatch, and a third person inside the vehicle to operate the latch.
- The addition of slat armor to the rear access door increases the weight of the door. Opening and closing the door then becomes a two-man operation and requires the addition of a strap to the inside handle so that closing the door can be accomplished by two personnel.
- The means for climbing on and off the vehicle can be a hazard because of the possibility of falling. A three step means consists of a cable loop on the bottom of the slat armor with a metal rectangular shaped step approximately 20 inches above it, with the third step being on the top of the front of the vehicle. The slats in the front module are to be used for handholds.
- The possibility of injury from slipping and/or falling from the slat armor during deployment of the winch cable exists. Caution must be observed.
- Use of the standard tow bar for the Stryker vehicle during towing or recovery operations provides only 4.5 inches between the slat armor on the towing vehicle and the vehicle being towed. The standard tow bar is not to be used unless the front slat armor on the towed vehicle and the rear of the towing vehicle is removed. When the armor is removed, only 21 degrees of turning capability is provided. This condition is inadequate, except under emergency towing/recovery conditions. Use of the M984A1 HEMTT wrecker with PLS tow bar extension is recommended.
- The slat armor causes visibility degradation to the headlight capabilities for both the right and left front area of the vehicle. The driver will need to use caution and direct more attention to observance of the edge of the road, and to the recognition of objects and obstructions along the side of the roadway during nighttime operations.

- Training and guidance provided to the crewmen for the Stryker equipped with slat armor should emphasize the following:
  - A minimum standoff distance of 10 inches MUST be maintained between the inside surface of the slat armor and the vehicle structure, and any components and/or stowed items.
  - No gear or other items are to be hung or attached to the outside or inside of the slat armor kit.

UNEXPLODED ORDNANCE (UXO) PROCEDURES

B-13. Once the operator knows that a round is lodged in the armor, he should—

- Immediately evacuate the vehicle.
- Call for explosive ordinance disposal (EOD) support.
- Mark off the area around the vehicle at a safe distance.
- Never try to dislodge the round.

Appendix C

RANGE SAFETY PROCEDURES AND RISK MANAGEMENT

Though safety is a command responsibility, each member of the Stryker MCV mortar fire team must know safety procedures and enforce them. Safety is enhanced with MFCS features that provide safety and situational awareness information. However, no system is foolproof, so the individual awareness of each fire team member will be the most important factor in maintaining safe firing conditions. Misfire procedures mentioned in this appendix are based on peacetime operations. (See ARTEP 7-90-Drill for combat operations.)

Section I — SAFETY OFFICER DUTIES

C-1. Safety officers help commanders meet the responsibility of enforcing safety procedures. Safety officers have two principle duties:

1. To ensure the section is properly laid so when rounds are fired, they land in the impact area.
2. To ensure that all safety precautions are observed at the firing point.

DUTIES BEFORE DEPARTING FOR RANGE

C-2. The safety officer must read and understand the following:

- AR 385-63, Range Safety. 19 May 2003.
- Post range and terrain regulations.
- The terrain request of the firing area to know safety limits and coordinates of firing positions.
- Appropriate field and technical manuals pertaining to weapons and ammunition to be fired.

DUTIES OF SUPERVISORY PERSONNEL

C-3. Supervisory personnel must know the immediate action to be taken for firing accidents. The following is a list of *minimum* actions that must be taken if an accident occurs.

1. Ensure first aid is administered to injured personnel and that medical assistance is arranged.
2. If ammunition or equipment presents further danger, move all personnel and equipment out of the area.
3. Ensure settings are not changed and that the mortar position is not modified until a firing accident investigation has been completed.
4. Records the ammunition lot numbers involved in the accident or malfunction and report it to the battalion ammunition officer. If a certain lot number is suspect, its use is suspended (by the platoon leader).

MORTAR RANGE SAFETY CHECKLIST

C-4. A mortar range safety checklist can be written for local use. The following is a suggested checklist (it can also include three columns on the right titled “Yes,” “No,” and “Remarks”).

ITEMS TO CHECK BEFORE FIRING

1. Is a range log or journal maintained by the officer in charge (OIC)?
   (a) Is radio or telephone communication maintained with—
   (b) Range control?
   (c) Unit S3?
      (1) Firing crew?
      (2) Forward observers (FO)?
      (3) Road or barrier guards?
2. Are the required emergency personnel and equipment present on the range?
   (a) Are they properly briefed and qualified medical personnel?
   (b) Is there a wheeled or tracked ambulance?
   (c) Is there fire-fighting equipment?
3. Are the following range controls and warning devices available, readily visible, and in use during the firing exercise?
   (a) Barrier/road guards briefed and in position.
   (b) Road barriers in position?
   (c) Red range flag in position?
   (d) Blinking red lights for night firing.
   (e) Signs warning trespassers to beware of explosive hazards and not to remove duds or ammunition components from ranges.
   (f) Noise hazard warning signs.
4. Are current copies of the following documents available and complied with?
   (a) AR 385-63.
   (b) Technical and field manuals pertinent to the mortar in use.
   (c) Appropriate firing tables.
   (d) Installation range regulations.
5. Are the following personal safety devices and equipment available and in use?
   (a) Helmets.
   (b) Protective earplugs.
   (c) Protective earmuffs.
6. Is the ammunition the correct caliber, type, and quantity required for the day's firing?
   (a) Are the rounds, fuzes, and charges—
      (1) Stored in a location to minimize possible ignition or detonation?
      (2) Covered to protect them from moisture and direct sunlight?
      (3) Stacked on dunnage to keep them clear of the ground?
      (4) Strictly accounted for by lot number?
      (5) Exposed only immediately before firing?
      (6) Stored separately from ammunition and protected from ignition?
7. Has the range safety officer verified the following?
   (a) The mortar safety card applies to the unit and exercise.
   (b) The firing position is correct and applies to the safety card, and the base mortar is within 100 meters of the surveyed firing point.
   (c) Boresighting and aiming circle declination are correct.
   (d) The plotting board or mortar ballistic computer (MBC) is correct.
   (e) The FO has been briefed on the firing exercise and knows the limits of the safety fan.
   (f) The lay of each mortar is correct.

(g) The safety stakes (if used) are placed along the right and left limits.
(h) Each safety NCO and gunner has been informed in writing of the following:
  (1) Right and left limits (deflection).
  (2) Maximum elevation and charge.
  (3) Minimum elevation and charge.
  (4) Minimum time setting for fuzes.
  (5) All personnel at the firing position have been briefed on safety misfire procedures.
  (6) If the safety card specified overhead fire, firing is IAW AR 385-63. (Marine Corps units firing mortars over the heads of unprotected troops is not authorized. This practice is not recommended for Army units.)
(i) The mortars are safe to fire by checking—
  (1) Prefire safety checks for the specific mortar.
  (2) Mask and overhead clearance.
  (3) Weapons and ammunition.
  (4) Properly seated sights on weapons.
  (5) The lights on the sights and aiming stakes for night firing.
(j) The OIC is informed that the range is cleared to fire and that range control has placed it in a "wet" status.

ITEMS TO CHECK DURING FIRING

1. Are the unit personnel adhering to the safety regulations?
2. Is each charge, elevation, and deflection setting checked before firing?
3. Does the safety NCO declare the mortar safe to fire before the squad leader announces, HANG IT, FIRE?
4. Do all gun settings remain at last data announced until a subsequent fire command is issued by the FDC?
5. Are ammunition lots kept separate to avoid the firing of mixed lots?

ITEMS TO CHECK AFTER FIRING

1. Have the gunners and safety NCO verified that no loose propellants are mixed with the empty containers?
2. Has the safety NCO disposed of the unused propellants?
3. Has the unused ammunition been inventoried and repacked properly?
4. Have the proper entries been made in the equipment logbook (DA Form 2408-4, *Weapon Record Data*)?
5. Has the OIC or safety officer notified range control of range status and other required information?
6. Has a thorough range police been conducted?

SAFETY CARD

C-5. The safety officer receives a copy of the safety card from the OIC or range control—depending on local regulation—before allowing fire to begin. He constructs a safety diagram based on safety card information. The card is prepared and approved for each firing position and type of used ammunition. Though a mortar firing safety card's ultimate form will depend upon local regulations (training list, overlay, range bulletin), its basic format should contain the following:

- Unit firing or problem number.
- Type of weapon and fire.
- Authorized projectile, fuze, and charge zone.
- Grid of the platoon center.
- Azimuth of left and right limits.
- Minimum and maximum ranges and elevations.
- Any special instructions to allow for varying limits on special ammunition or situations.

SAFETY DIAGRAM AND SAFETY "T"

C-6. On receipt of the safety card or safety record, the safety officer will construct a safety diagram that graphically portrays the safety card's data. It does not need to be drawn to scale, but must accurately list the sight settings that delineate the impact area. The safety "T" serves as a convenient means of checking the commands announced to the gun crews against those commands that represent the safety limits.

C-7. The construction of the safety diagram and safety "T" is the same for all mortars. The diagram will show the right and left limits and deflections corresponding to those limits; the maximum and minimum elevations; and the minimum fuze settings (when applicable) for each charge to be fired. The diagram will also show the minimum and maximum range lines, the left and right azimuth limits, the deflections corresponding to the azimuth limits, and the direction and mounting azimuth on which the guns are laid.

C-8. To accurately complete a safety diagram, the safety officer must use the information supplied by range control and safety data card. To complete:

1. Enter the known data supplied from the safety card on the safety diagram.
2. Determine the direction of fire or the center of the sector.
3. Determine the mounting azimuth.
4. Determine mils left and right deviations of the mounting azimuth.
5. Enter the referred deflection.
6. Determine deflections to left and right limits.
7. Determine minimum and maximum charges and elevations.
8. If illumination is to be used, determine (from the appropriate firing tables) the minimum/maximum charges and ranges to burst and impact for the canister. Minimum range is used to determine the minimum charge and range to burst. Maximum range is used to determine the maximum charge and range to impact.

C-9. An example of the preparation of a safety diagram and safety "T" follows in sections C-18 and C-19.

C-10. An 81-mm mortar section is firing at firing point (FP) 52 with M821 HE and M853A1 ILLUM. The safety officer receives the safety record/card (Table C-1) from either range control or the OIC (in accordance with local range regulations).

Table C-1. Example completed safety record or card.

ARTILLERY/MORTAR SAFETY RECORD

DATE: 10 September 2007

FIRING POINT: FP 52 **WEAPONS:** M252, M224, M120/121

COORDINATES: GL12345678 **ELEV** **FUSE**

Weapon Projectile	Left Limit Mils	Right Limit Mils	Minimum Range Meters	Maximum Range Meters	Minimum Charge	Maximum Charge	Maximum Ordnance Meters or Feet
M821 HE	0500	0920	300	4000	0	4	NA
M853A1 IL	0500	0920	300	4000	0	4	NA

C-11. The safety officer calculates the data for the safety diagram and then places the data for each type of ammunition on separate safety diagrams. Refer to paragraphs C-12 through C-17, calculation rules, for a completed diagram example.

SAFETY DIAGRAM CALCULATION RULES

C-12. Calculate the direction of fire (DOF). Left limit is smaller than right limit (Table C-2). Subtract the left limit azimuth from the right limit azimuth. Divide the result by two and add that number to the left limit azimuth.

Table C-2. DOF calculation.

RIGHT LIMIT	+0920
MINUS LEFT LIMIT	-0500
SUM	420
SUM ÷ 2 =	210
LEFT LIMIT	+500
TOTAL	0710

C-13. The answer, 0710, is the DOF or the azimuth center of sector. (To calculate the DOF if the left limit is larger than the right limit, add 6400 to the *right* limit and use the same calculations as above. If the final answer is more than 6400, then just subtract 6400 to get the DOF.)

C-14. Round off the DOF or mounting azimuth. For all mortars using the M16 plotting board, round off to the nearest 50 mils. In the following example (Table C-3), the safety officer rounds 0710 to 0700.

C-15. Enter the referred deflection. The section sergeant provides the referred deflection. It can be any number, but 2800 is normally used (Table C-4).

C-16. Determine deflection for the left and right limits (Table C-5).

1. Determine the number of mils from the mounting azimuth to the left limit.

Table C-3. DOF or mounting azimuth round off calculation.

MOUNTING AZIMUTH	0700
LEFT LIMIT	-0500
MILS TO LEFT LIMIT	0200

2. Using the LARS rule for referred deflection, calculate the left limit deflection. (See FM 3-22.90, Chapter 1, page 1-10 for comprehensive details on this rule.)

Table C-4. Left limit deflection calculation.

CENTER OF SECTOR REFERRED DEFLECTION	2800
MILS TO LEFT LIMIT	+022 0
LEFT LIMIT DEFLECTION	3000

3. Determine the number of mils from the mounting azimuth to the right limit (Table C-5).

Table C-5. Mils from the mounting azimuth to the right limit calculation.

RIGHT LIMIT	0920
MOUNTING AZIMUTH	-0700
MILS TO RIGHT LIMIT	0220

4. Using the LARS rule for referred deflection, calculate the right limit deflection (Table C-6).

Table C-6. Right limit deflection calculation.

CENTER OF SECTOR REFERRED DEFLECTION	2800
MILS TO RIGHT LIMIT	+022 0
LEFT LIMIT DEFLECTION	3020

C-17. Determine minimum and maximum charges and elevations. Use the firing tables (FTs) for the mortar being fired to determine minimum and maximum charges and elevations. For example, the maximum range is 4,000 meters; the minimum range is 300 meters.

- M821 HE. Using FT-81-AR-2 for the M821 HE cartridge, the maximum and minimum charges and elevations are shown in Table C-7:

Table C-7. Minimum and maximum charges and elevations calculation.

Max or Min	Charge	Elevation
Maximum	Charge 4	1185
Maximum	Charge 3	1055
Minimum	Charge 0	1256

- M853A1 ILLUM. Using FT-81-AR-2 for the M853A1 illumination cartridge, the maximum and minimum charges, elevations, and time settings are shown in Table C-8:

Table C-8. Maximum and minimum charges, elevations, and time setting calculations.

Max or Min	Charge	Elevation (MILS)	Time Settings (Seconds)
Maximum	4	1142	45.5
Maximum	3	0925	35.1
Minimum	1	1507	25.7

C-18. Figure C-1 displays an example of a safety diagram for M8221 and M835A1 Illumination.

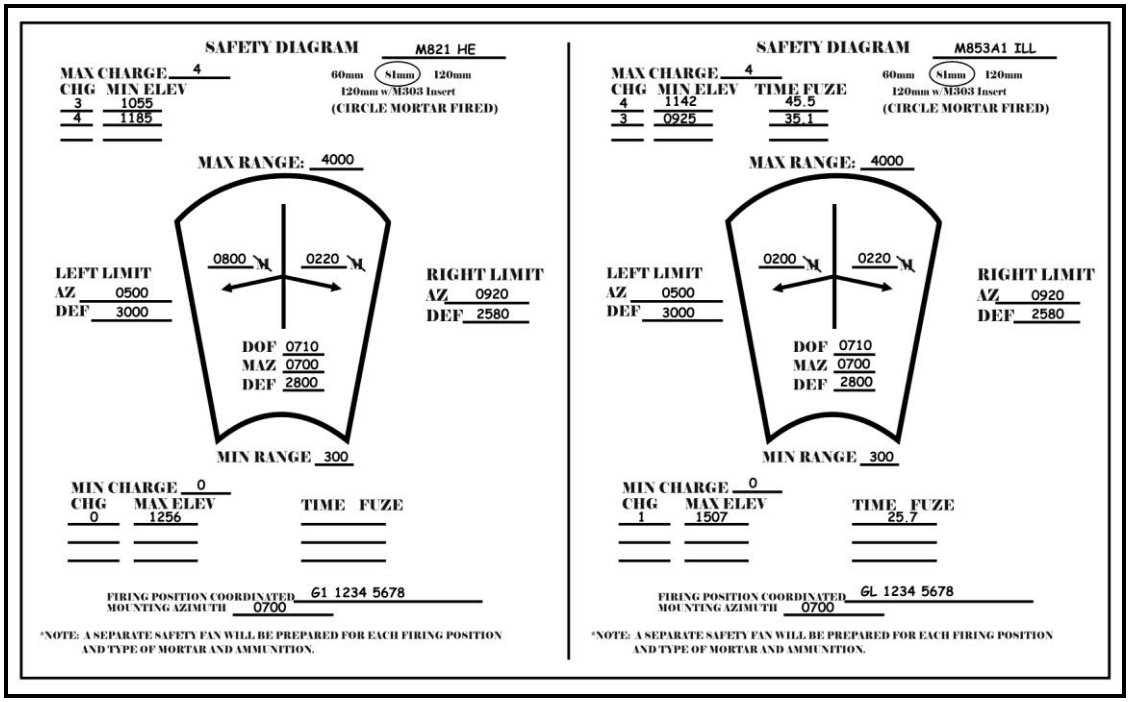


Figure C-1. Safety diagram for M8221 HE and M835A1 ILLUM.

C-19. A safety "T" is made for each type of cartridge being fired. The requisite data from the safety diagram is transcribed onto the safety "T" (Figures C-2 and C-3) and each gun has a copy.

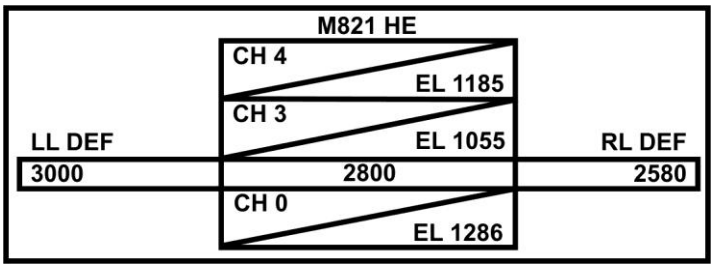


Figure C-2. Safety "T" for M821 HE.

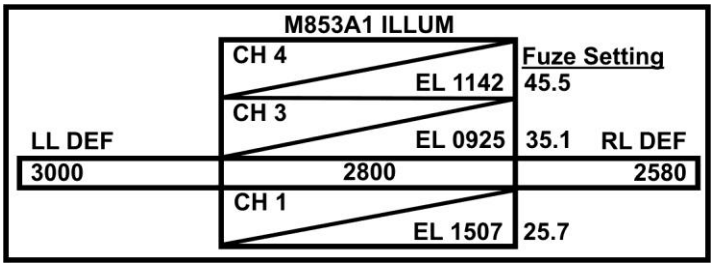


Figure C-3. Safety "T" for M852A1 ILLUM.

SURFACE DANGER ZONES

C-20. The surface danger zone (SDZ) is the ground and airspace designated within the training complex for vertical and lateral containment of projectiles, fragments, debris, and components resulting from the firing, launching, or detonation of weapon systems. It is composed of an impact area and buffer zones.

COMPONENTS

C-21. SDZs usually have a pie shape and a series of concentric-like zones coming from the target area in the center. Components include:

1. *Firing Position*. The point or location at which the mortar is placed for firing.
2. *Impact Area.* The ground and associated airspace within the training complex used to contain fired or launched ammunition and explosives, and the resulting fragments, debris, and components from various weapon systems. Indirect fire weapon system impact areas include probable error for range and deflection.
   (a) The target area contains the targets.
   (b) The dispersion area, by keeping the rounds inside the impact area, accounts for human error, gun or cannon tube wear, and propellant temperature. Its width is based on the range and deviation probable errors for the maximum range of the charge permitted.
      (1) The left and right dimensions are eight probable errors deflection (PE_D) from the left and right limits of the target area.
      (2) The far dimensions are eight probable errors range (PE_R) from the far edge of the target area.

BUFFER ZONES

C-22. Buffer zones, or secondary danger areas, contain the fragments, debris, and components from frangible or explosive projectiles and warheads functioning on the edge of the target area. They have two parts.

Area A

C-23. Area A is the secondary danger area (buffer zone). This area laterally parallels range impact and dispersion areas that contain fragments, debris, and components from frangible or explosive projectiles. Warheads functioning on the right or left edge of the impact area or ricochet area are also contained in this area. Area A starts at a 25-degree angle from the impact area (increased to 70-degrees for ranges at and beyond 600 meters for 60mm, 940 meters for 81mm, and 1,415 meters for 120-mm mortars). The width of area A depends on the mortar:

- 60mm: 250 meters
- 81mm: 400 meters
- 120mm: 600 meters

Area B

C-24. Area B is the secondary danger area (buffer zone) on the downrange (far) side of the impact area that contains fragments, debris, and components from frangible or exploding projectiles. Warheads functioning on the far edge of the impact area and area A are also contained in this area. The width of area B depends on the mortar:

- 60mm: 300 meters
- 81mm: 400 meters
- 120mm: 600 meters

CONSTRUCTION

C-25. SDZs usually exist for approved firing points that can be found at range control or in the range book for the FP. If the SDZ has to be constructed, personnel should refer to DA Pam 385-63.

AMMUNITION CARE AND HANDLING

C-26. A complete round of mortar ammunition contains all the components needed to get the round out of the tube and to burst at the desired place and time. This section discusses the proper care and handling, color codes, and field storage of ammunition.

C-27. The key to proper ammunition functioning is protection. Rounds prepared but not fired should be placed back in their containers, fin end first. Safety is always a matter of concern for all personnel and requires special attention where ammunition is concerned. Supervision is critical—improper care and handling can cause serious accidents as well as inaccurate fire. Some of the principles of proper ammunition handling are:

- Never tumble, drag, throw, or drop individual cartridges or boxes of cartridges.
- Do not allow smoking, open flames, or other fire hazards around ammunition storage areas.
- Inspect each cartridge before it is loaded for firing. Dirty ammunition can damage the weapon or affect the accuracy of the round.
- Keep the ammunition dry and cool.
- Never make unauthorized alterations or mix components of one lot with another.

Note: For care and handling of specific mortar rounds, see corresponding chapters in this handbook.

PROJECTILES/CARTRIDGES

C-28. Each projectile must be inspected to ensure there is no leakage of the contents, and that the projectile is correctly assembled.

BURNING OF UNUSED PROPELLING CHARGES

C-29. Mortar increments and propelling charges are highly flammable and must therefore be handled with extreme care to preclude exposure to heat, flame, or any spark-producing sources. This includes exposure to the hot residue from burning increments or propelling charges that float downward after a cartridge leaves the cannon. Like other types of ammunition, increments and propelling charges must be kept cool and dry. Storing these items inside metal ammunition boxes until needed is an effective way to prevent premature combustion.

1. Unused charges must not be saved. Instead, they should be removed to a storage area until they can be burned or otherwise disposed of in accordance with local range or installation regulations and/or SOP.
2. Burning increments create a large flash and a lot of smoke. In a tactical environment, the platoon leader must ensure burning increments do not compromise camouflage and concealment. The burning of increments in a dummy position, if established, can aid in the deception effort. In a range environment, the safety officer supervises the disposal of unused propellant increments.

FUZES

C-30. A round is never to be fired with a fuze that is not authorized for that round.

1. Fuzes are sensitive to shock and must be handled with care. Before fuzing a round, inspect the threads of the fuze and fuze well for cleanliness and crossed threads. The fuze should be screwed into the fuze well slowly until resistance is met and then firmly seated with a sharp twist of the M25 or M18 fuze wrench, as appropriate.

WARNING

Premature detonation may occur if a fuze is not properly seated.

2. To prevent accidental functioning of the point-detonating elements of fuzes of the M524 series, the fuzes must not be dropped, rolled, or struck under any circumstances. Any mechanical-time fuze that is set and modified must be reset to SAFE, and the safety wires (if applicable) must be replaced before the fuze is repacked in the original carton.
3. All primers must be inspected before use for signs of corrosion. If a seal has been broken, it is likely that the primer has been affected by moisture. In this case, the fuze should be turned in.

SEGREGATION OF AMMUNITION LOTS

C-31. Different lots of propellant burn at different rates and give slightly different effects in the target area. Therefore, the registration corrections derived from one lot do not always apply to another. Ammunition MUST be segregated by lot and weight zone. In the field storage area, on vehicles, or in a dump, ammunition lots should be roped off with communications wire or twine. They should also be conspicuously marked with a cardboard sign or other marker.

AMMUNITION COLOR CODES

C-32. Mortar ammunition is painted and marked with a color code for quick, accurate identification. A color-code chart (Table C-9) identifies rounds using the NATO color code and the U.S. color code.

Table C-9. Mortar ammunition color codes.

TYPE OF ROUND	NATO COLOR CODE			U.S. COLOR CODE		
	ROUND	MARKINGS	BAND	ROUND	MARKINGS	BAND
HIGH EXPLOSIVE (Causes troop casualties and damage to light material)	Olive Drab	Yellow Drab	NA	Olive	Yellow	Yellow
WHITE PHOSPHORUS (Screens, signals, and acts as an incendiary)	Light Green	Red	Yellow	Light Green	Red	Yellow
RED PHOSPHORUS (Screens, signals, and acts as an incendiary)	Light Green	Black	Brown	Light Green	Black	Brown
ILLUMINATION (Illuminates, signals, and marks)	White	Black	NA	NA	NA	NA
TRAINING PRACTICE (For training and practice)	Blue	White	Brown or None	Blue	White	Brown

FIELD STORAGE OF AMMUNITION

C-33. Most ammunition components can be stored at temperatures as low as -80 degrees for no longer than three days; and as high as 160 degrees for no longer than four hours.

C-34. The greatest hazards to ammunition in the storage area are weather, enemy fire, CBRN contamination, improper handling, and accidental fires. Regardless of the method of storage, those hazards must be considered. Some general considerations that apply to storage follow:

1. Stack ammunition by type, lot number, and weight zone (Figure C-4).

Note: WP ammunition must be stacked fuze-end up so melted filler will settle at the bottom, reducing the chance of voids forming off the long axis of the cartridge. The presence of voids off the long axis of the cartridge will cause the cartridge to fly erratically.

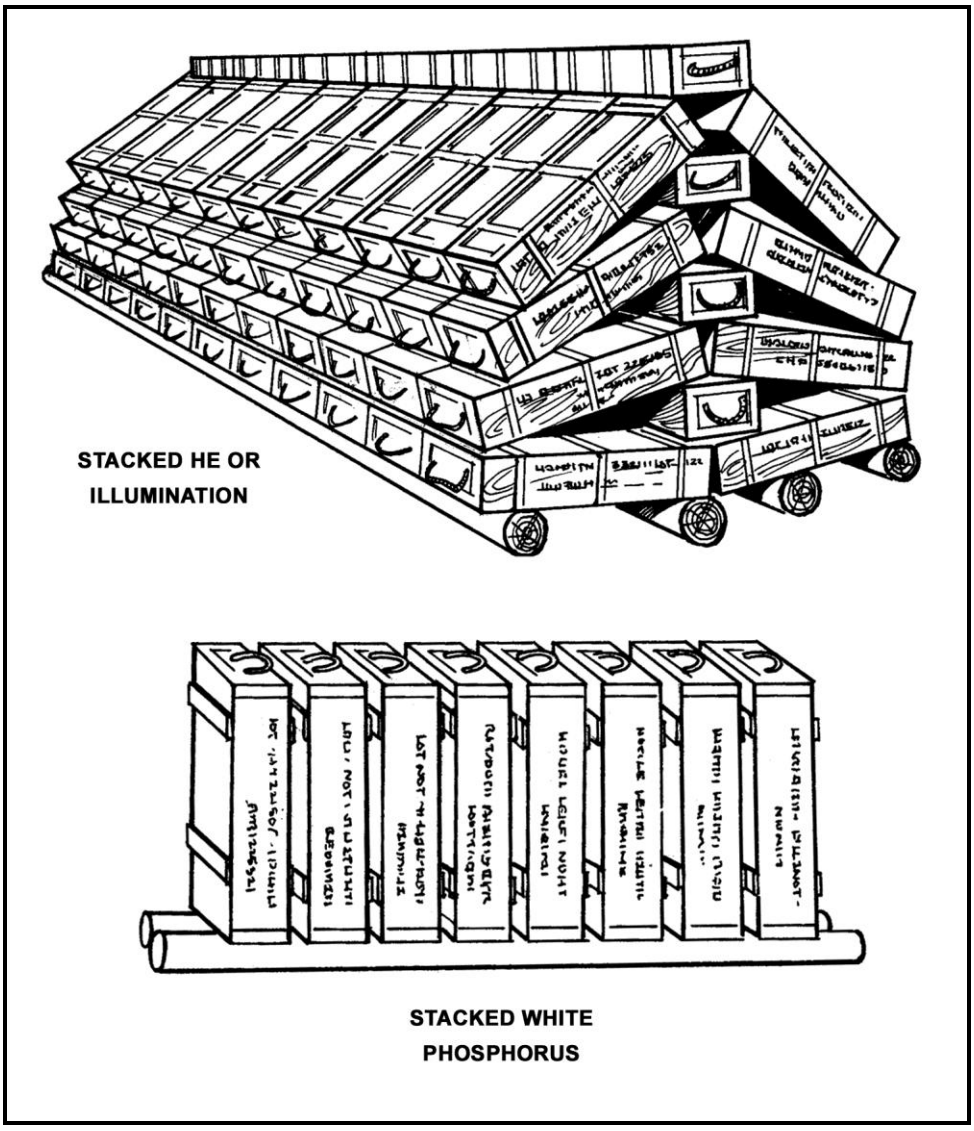


Figure C-4. Stacked ammunition.

2. If ammunition is stored on the ground, good strong dunnage at least 6 inches under each stack should be used.
3. Ammunition must be kept dry and out of direct sunlight by storing it in a vehicle or covering it with a tarpaulin. Adequate ventilation must be provided around ammunition and between covering material and ammunition.
4. Ammunition must be protected as much as possible from enemy indirect fires. To ensure proper ventilation when sandbags are used for protection—
   (a) Walls should be kept at least 6 inches from the stacks.
   (b) The roof must be kept at least 18 inches from the stacks.

C-35. An increase in malfunctions can occur with some proximity fuzes when fired if the temperature is below 0-degrees or above 120-degrees. Powder temperature affects the muzzle velocity of a projectile and is of frequent concern to the FDC.

Section II — RISK MANAGEMENT

C-36. This section describes how risk management is integrated into the Army training management cycle and training planning. FM 5-19, *Composite Risk Management*, provides the doctrinal framework for this critical aspect of safe training and operations. It also provides detailed guidance on the implementation of risk management across a wide range of Army applications.

RISK MANAGEMENT

C-37. All risk management, training, and operations assessment is performed IAW the requirements of AR 385-10, TRADOC Regulation 385-2, FM 7-0, FM 7-1, FM 100-14, and this handbook. Following is a brief description of risk management and assessment leader responsibilities to be applied during MCV mortar firing training:

SAFETY MANAGER

C-38. The safety manager will—

- Provide overall coordination of the risk management program.
- Provide guidance and assistance to facilitate effective implementation of the program.
- Review the risk management worksheet for operations and training determined to have high or extremely high residual risk factors.
- Check worksheet during range and training inspections.

COMMANDERS

C-39. Commanders will—

- Develop in writing and implement a comprehensive risk management program that meets the requirements of this manual.
- Integrate risk management into all operations and training.
- Train all leaders in risk management concepts, the requirements of this handbook, and the organizational risk management program.
- Ensure that a formal, documented risk management worksheet is completed for each training activity and operation, using the procedures and form described in this handbook. This document will be completed during the planning phase of any operation or training.
- Ensure worksheets are reviewed and accepted in writing by the leader at the appropriate level as designated in this manual.
- Maintain copies of all worksheets in the appropriate organizational files and at the training or operation site.
- Develop a comprehensive daily risk assessment checklist that addresses those factors, which may change from day-to-day or iteration-to-iteration, and identify new hazards not addressed in the risk management worksheet.
- Ensure a daily risk assessment checklist is completed before beginning the training or operation. This document will be completed immediately before the execution phase of an operation or training. For those operations conducted on a repetitive basis, the checklist must be completed before each day's activities. If conditions change significantly during an operation, the checklist should be reevaluated.
- Require the leader conducting the operation or training to consult with and receive approval from the individual who accepted the risk on the risk management worksheet. This must be done when the daily risk assessment checklist indicates the overall rating for the operation or training

is high or extremely high, when any factor is rated as extreme risk, or when more than one factor is rated as high risk.

- Ensure daily risk assessment checklists are maintained at the operation or training site until the event is completed. If an accident occurs during an operation, the checklist should be maintained until the investigation is completed.
- Ensure risk management worksheets are reevaluated before each operation or training event in coordination with the daily risk assessment checklist by the individual(s) responsible for the operation or training.
- Ensure the worksheet and daily risk assessment checklists are used as the basis for preoperational or training safety briefings with involved personnel.

GENERAL PROCEDURES

C-40. Risk management will be integrated into every operation and training event conducted on an installation, or by installation organizations at other locations.

- A formal, documented risk management worksheet and daily risk assessment checklist will be prepared for every operation and training event.
- The worksheet and daily risk assessment checklists will be prepared and risks will be assessed using the methodology and form described in this manual.
- For those training events or operations conducted on a repetitive basis, there is no requirement to complete a new worksheet before a new iteration. The initial worksheet is sufficient unless changes have been made to the training scenario or operation plan. Any changes would pertain to personnel safety, equipment, the environment, or new hazards identified on the daily risk assessment checklist that are not on the initial risk management worksheet.
- Whenever there is a change of command or supervision, risk management worksheets accepted by the outgoing commander or manager will be revised, updated, and submitted to the new commander or manager, for acceptance of risks.
- The worksheet will be revised whenever a change in the training or operation could affect the safety of personnel, equipment, area environment, or identified hazards not listed on a current risk management worksheet.

RULES OF RISK MANAGEMENT

C-41. Unnecessary risks will not be accepted. Leaders with authority to accept risks are responsible for protecting their personnel from unnecessary ones. Unnecessary risks are those that could be reduced or eliminated without hindering mission accomplishment.

- Risk decisions must be made at a level consistent with the risk involved. The leader ultimately responsible for the mission should make the risk decision.
- An identified risk is acceptable if it benefits or outweighs any costs. Leaders must understand that risk-taking is a decision making process that balances mission benefits and costs. They must be prepared to take acceptable risks to accomplish a mission.

RISK MANAGEMENT PROCESS

C-42. The process of risk management involves a complete cycle that feeds back to its start point in a logical manner. A key consideration when assessing risk options is to match process considerations with the extent of any risk probability. If the risk is high, the process should be complete and detailed. If the risk level is low, the process may be abbreviated. Generally, all steps of the process should be standard, yet curtailed by cutting back on step details, but not by eliminating any step. The following steps will be documented on all risk management worksheets and daily risk assessment checklists:

1. *Identify the Hazards*. Hazards are sources of danger that could be encountered while performing a task or mission. Leaders must try to identify any potential ones during operations or training planning. Special attention should be paid to identifying those hazards with a

potential for change, such as weather, Soldier alertness, supervision level terrain, and equipment conditions. Every hazard possibility should be identified.

2. *Assess the Hazards*. Identified hazards must be assessed to determine their cumulative effect on an operation. Controls can then be developed to reduce or eliminate hazard risk. The risk level for each hazard as it relates to the overall operation should be determined before implementation of control measures (initial) and after controls are implemented (residual).
3. *Make a Risk Decision*. Leaders are expected to weigh all identified risks against the benefits of conducting training and operations. Initial risk levels, controls, and residual risk levels should be considered when making a risk acceptance decision. Risk decisions must be made at a level that corresponds with the degree of risk.
4. *Implement Controls*. Controls established as a result of steps one through three of the risk management process are implemented in this step that prescribes leader action to reduce or eliminate hazards. Specific controls should be integrated into plans, orders, SOPs, training performance standards, and rehearsals. Knowledge of controls that stem down to the individual Soldier or employee is essential.
5. *Supervise*. Supervision goes beyond ensuring personnel do what is expected of them. It includes; following-up during and after an action to ensure all went according to plan, reevaluating the plan or making adjustments as required to accommodate unforeseen issues, and incorporating lessons learned for future use. Preparation of the Risk Management Worksheet.

C-43. DA form 7566 (Composite Risk Management Worksheet) is to be completed during the planning phase of any operation or training. Table C-10 contains instructions on completing DA Form 7566. An uncompleted example of DA Form 7566 can be seen in Figure C-5.

Table C-10. DA Form 7566 worksheet instructions.

Worksheet Instructions	
Item	**Instruction**
1 through 4	Self explanatory.
5	Subtask relating to the mission or task in Block 1.
6	Hazards – Identify hazards by reviewing METT-TC factors for the mission or task. Additional factors include historical lessons learned, experienced, judgment, equipment characteristics and warnings, and environmental considerations.
7	Initial Risk Level – Includes historical lessons learned intuitive analyses, experience, judgment, equipment characteristics and warnings, and environmental considerations. Determine initial risk for each hazard by applying risk assessment matrix (Table C-3). Enter the risk level for each hazard.
8	Controls – Develop one or more controls for each hazard that will either eliminate the hazard or reduce the risk (probability and/or severity) of a hazardous incident. Specify who, what, where, why, when, and how for each control. Enter controls.

9	Residual Risk Level– Determine the residual risk for each hazard by applying the risk assessment matrix (Table C-3). Enter the residual risk level for each hazard.
10	How to Implement – Decide how each control will be put into effect or communicated to the personnel who will make it happen (written or verbal instruction; tactical, safety, garrison SOPs, rehearsals). Enter controls.
11	How to Supervise (Who) – This last step is not on the worksheet. Plan how each control will be monitored for implementation (continuous supervision, spot-checks) and reassess hazards as the situation changes. Determine if the controls worked and if they can be improved. Pass on lessons learned.
12	Was Control Effective? – Indicate "Yes" or "No."
13	Overall Risk Level – Select the highest residual risk level and circle it. This becomes the overall mission or task risk level. The commander decides whether the controls are sufficient to accept the level of residual risk. If the risk is too great to continue the mission or task, the commander directs development of additional controls or modifies, changes, or rejects the COA.

APPROVAL OF THE RISK MANAGEMENT WORKSHEET

C-44. The residual risk level determines who may accept the risk and sign the risk management worksheet.

- Acceptance of a risk, as confirmed by signature on the worksheet will be accompanied with the following information, based on the overall level of residual risk.
  - Extremely High. The MACOM commander will sign the worksheet of extremely high risk training.
  - High. The installation commander will sign the worksheet of high risk training.
  - Medium or Low. The major subordinate commander, director, or activity chief will sign the worksheet of medium to low risk training.
  - Medium or Low Risk Training Conducted by Reserves. The first colonel-level commander in their chain of command or the Directorate of Operations and Training (DOT) will approve medium or low-risk training conducted by Reserves or other units.
- The signature of the individual accepting the risk is entered at the bottom of page 1 of the worksheet. Requests for risk acceptance decisions at the installation or MACOM level must be properly staffed through the Safety Office, the Directorate of Public Safety (DPS), and the DOT at least 30 days before the event.
- Safety office personnel consult during the preparation of all risk management worksheets and during range inspections to ensure all hazards are identified, and appropriate control measures are implemented. Risk management worksheets that have been assigned a residual overall risk level of medium or lower must be signed by the appropriate individual authorized to accept the risk.

PREPARATION OF DAILY RISK ASSESSMENT CHECKLIST

C-45. The purpose of this checklist is to evaluate those conditions that may have changed since the worksheet was completed. It also identifies any new hazards not addressed on the worksheet, and serves as a final check to ensure an operation's safety.

- The daily risk assessment checklist will be completed immediately before the execution phase of the operation or training. For those operations conducted on a repetitive basis, the checklist will be done before each day's training.
- The daily risk assessment checklist is used in conjunction with the risk management matrix (Table C-11).
- Factors listed represent key concerns that may affect the risk level of an operation between the planning and execution phases. Other factors that change from iteration to iteration for operations and training events of a repetitive nature are also noted in the list. The assessing organization may tailor the factors and point totals for categorizing the operation or training as extreme, high, medium, or low risk to fit the mission of the particular organization. For example, the unit may want to add additional factors. They may want to change the extreme, high, medium, or low criteria for one or more factors, or increase the point total requirements in the last row.
- The following conditions require consultation with and approval by the individual who signs the risk management worksheet before a planned training or operation begins.
  - The overall risk level for the operation or training, as determined using the checklist, is extreme or high.
  - Any factors are rated as extreme risk, or more than one factor is rated as high.
  - Any controls listed on the worksheet are not in place.
  - Hazards are present that are not listed on the worksheet. Table C-12 lists possible risk factors. See Figure C-5 for an uncompleted risk management worksheet.

Table C-11. Risk assessment matrix.

RISK ASSESSMENT MATRIX						
		PROBABILITY				
Severity		**Frequent A**	**Likely B**	**Occasional C**	**Seldom D**	**Unlikely E**
Catastrophic	**I**	E	E	H	H	M
Critical	**II**	E	H	H	M	L
Marginal	**III**	H	M	M	L	L
Negligible	**IV**	M	L	L	L	L

Table C-12. Risk examples.

E – Extremely High: Loss of ability to accomplish the mission if hazards occur during mission. A *frequent* or likely probability of catastrophic loss (IA or IB) or *frequent* probability of *critical* loss (IIA) exists. **Example:** A commander finds that one of his implied tasks to attack an objective involves crossing a normally shallow riverbed. After looking at the factors of METT-TC, he discovers that three days of intense rain have raised the water level to rise above flood stage, with currents far in excess of his ability to safely ford with armored vehicles. After discussing COAs with his staff, he determines the accident risk is extremely high because of the likely probability and catastrophic severity of losing vehicles and killing Soldiers. His conclusions are based on his experience with and knowledge of fording armored vehicles, under the existing conditions of water depth and current speed.
H – High: Significant degradation of mission capabilities in terms of the required mission standard, inability to accomplish all parts of the mission, or inability to complete the mission standard if hazards occur during the mission. *Occasional*-to-*seldom* probability of catastrophic loss (IC or ID) exists. A *likely* to *occasional* probability exists of a critical loss (IIB or IIC) occurring. *Frequent* probability of *marginal* losses (IIIA) exists. **Example:** During a preplanned ambush, the leader discovers that the force he intends to ambush has significantly more combat power than his force can accommodate. He realizes that he could only delay rather than destroy the enemy. He knows his casualty estimates would be very high if the enemy reorganized and counterattacked. He also knows that the size of the enemy force could seriously impact adjacent units conducting a movement to contact. He determines the situation is *high risk* because he estimates (based on his training and experience) there is a likely probability of the enemy reorganizing and counterattacking, and the severity of loss to his unit would be critical.
M – Moderate: Expected degraded mission capabilities in terms of the required mission standard will have a reduced mission capability if hazards occur during mission. An *unlikely* probability of catastrophic loss (IE) exists. The probability of a *critical* loss is seldom (IID). *Marginal* losses occur with a *likely* or *occasional* probability (IIIB or IIIC). A *frequent* probability of negligible (IVA) losses exists. **Example:** A commander in a defensive position receives a warning order to be prepared to counterattack if the enemy attacks again. He chooses to use pre-positioned ammunition caches to support his defense, as opposed to moving his ammunition resupply forward by truck. He determines that the severity of not having an immediate resupply of ammunition available during the counterattack will have a *critical* impact on his combat power. He realizes that if the enemy forces him to abandon his forward positions, the severity of the loss of his ammunition caches will critically impact his combat power. He considers that his unit is deployed in excellent defensive positions. He has repelled two attacks that resulted in the destruction of an estimated 50 percent of the enemy's combat power. He receives information that the probability of the enemy attacking is *likely*, but that the probability of the enemy being reinforced and attacking in overwhelming force is *remote* (seldom). The commander concludes that the risk of conducting a counterattack with limited ammunition is greater than the *moderate* risk of the enemy pushing him back.
L – Low: Expected losses have little or no impact on accomplishing the mission. The probability of *critical* loss is *unlikely* (IIE), while that of *marginal* loss is *seldom* (IIID) or *unlikely* (IIIE). The probability of a *negligible* loss is *likely* or *less* (IVB through (IVE). **Example:** A mechanized task force (TF) conducting a movement to contact in a desert environment is overtaken by nightfall before reaching its limit of advance (LOA). The terrain along the axis of advance is flat and open. Visibility is about 800 meters under a clear sky illuminated by a full moon. Estimates put the enemy, which has been hastily withdrawing for the past three days, at approximately 30 percent strength. Contact has been light with no defensible terrain along the TF's axis. The TF commander considers all the factors. In addition, the TF is 100 percent operational in using night vision devices. The TF commander estimates that it is *unlikely* that his unit will incur losses of *critical* severity by being surprised by the enemy or lose *critical* combat power due to an accident. He estimates the risk to his force in continuing a nighttime movement is *low*

COMPOSITE RISK MANAGEMENT WORKSHEET

For use of this form, see FM100-14; the proponent agency is TRADOC.

1. MSN/TASK	2a. DTG BEGIN	2b. DTG END	3. DATE PREPARED *(YYYYMMDD)*
Conduct a Defense	Begin:010035R May XX	End:010600R May XX	20050401

4. PREPARED BY

a. LAST NAME	b. RANK	c. POSITION
Jones	LT	Plt Ldr

5. SUBTASK	6. HAZARDS	7. INITIAL RISK LEVEL	8. CONTROLS	9. RESIDUAL RISK LEVEL	10. HOW TO IMPLEMENT	11. HOW TO SUPERVISE (WHO)	12. WAS CONTROL EFFEC-TIVE?
Construct nonstandard antivehicle wire hazard	Back injuries and wire cuts during material offload	M	Use proper lift and carry methods and wear concertina wire gloves and safety goggles	L	Unit TASOP ARTEP 7-5-MTP (p 5-68)	Squad Leader	Y
	Blunt trauma and wire cuts in pounding of U-shaped pickets	M	Wear helmet and increase situational awareness	L	Unit TASOP ARTEP 7-5-MTP (p 5-68)	Squad Leader	Y
	Cuts when unrolling concertina	M	Wear concertina wire gloves and maintain situational awareness	L	Unit TASOP ARTEP 7-5-MTP (p 5-68)	Squad Leader	Y
	Cuts when installing concertina wire	M	Wear concertina wire gloves and maintain situational awareness	L	Unit TASOP ARTEP 7-5-MTP (p 5-68)	Squad Leader	Y
	Cuts when installin barbed wire	M	Wear concertina wire gloves and maintain situational awareness	L	Unit TASOP ARTEP 7-5-MTP (p 5-68)	Squad Leader	Y
	Cuts from walking into wire during hours of darkness	M	Use engineer tape or other devices to mark wire enabling it to be seen from a distance	L	Unit TASOP ARTEP 7-5-MTP (p 5-68)	Squad Leader	Y

Additional space for entries in Items 5 through 11 is provided on Page 2.

13. OVERALL RISK LEVEL AFTER CONTROLS ARE IMPLEMENTED *(Check one)*

[X] LOW [ ] MODERATE [ ] HIGH [ ] EXTREMELY HIGH

DA FORM 7566, APR 2005

Figure C-5. Example risk management worksheet for squad/platoon.

GLOSSARY

AAL	additional authorization list
AAR	after-action report
ADACG	Arrival/Departure Airfield Control Group
ADTDL	Army Doctrine and Training Digital Library
ANCOC	Advanced Noncomissioned Officer Course
AO	area of operations
AoA	add-on-armor
ARTEP	Army Training Evaluation Program
ATGMV	antitank guided missile vehicle
BAD	blast attenuator device
BII	basic issue items
BMC	brigade movement coordinator
BN	battalion
BNCOC	Basic Noncommissioned Officer Course
CASCOM	Combined Arms Support Command
CBRN	chemical, biological, radiological, and nuclear
CFF	call for fire
CI	commander's interface
COE	contemporary operating environment
COEI	components of end item
CTIS	central tire inflation system
CV	commander's vehicle
DAGR	defense advanced GPS reciever
DOF	direction of fire
DPS	Directorate of Public Safety
EMI	electromagnetic interference
EOD	explosive ordinance demolition
EOM	end of mission
ESV	engineer squad vehicle
FDC	fire direction center
FFE	fire for effect
FIST	fire support team
FO	forward observer
FP	firing point
FPF	final protective fire
FSCM	fire support coordination measure

FO	forward observer
FT	firing table
GPFU	gas particular filtration unit
GPS	global positioning system
HET	heavy equipment transporter
IAW	in accordance with
IBOLC	Infantry Basic Officer Leadership Course
ICV	Infantry carrier vehicle
IMLC	Infantry Mortar Leader Course
IPCC	Infantry Pre-Command Course
ITO	installation transportation officer
JOPES	Joint Operation Planning and Execution System
LFX	live-fire exercise
LHMBC	lightweight handheld mortar ballistic computer
LOA	limit of advance
MBC	mortar ballistic computer
MC3	Maneuver Captains Career Course
MCV	mortar carrier vehicle
METL	mission-essential task list
METT-TC	mission, enemy, terrain and weather, troops and support available, time available, civil considerations
MFCS	Mortar Fire Control System
MILES	Multiple Integrated Laser Engagement System
MTP	mission training plan
NBC-RV	nuclear, biological, chemical-reconnaissance vehicle
NCOPD	noncommissioned officer professional development
OPD	officer professional development
OPFOR	opposing force
OSUT	One Station Unit Training
P	practice
PE_D	probable errors deflection
PE_R	probable errors range
PLGR	Position Lightweight GPS Reciever
PMCS	preventive maintanance checks and service
RHA	rolled homogenous armor
RPG	rocket propelled grenade
RSTA	reconnaissance, surveillance, targeting, and acquistion
RWS	remote weapons station
SBCT	Stryker Brigade Combat Team
SDZ	surface danger zone
SOP	standing operating procedure

STX	simulated training exercise
T	trained
T&EO	training and evaluation outline
TADSS	training aids, devices, simulators, and simulations
TEA	Transportation Engineering Agency
TF	task force
TTP	tactics, techniques, and procedures
U	untrained
UMC	unit movement coordinator
UXO	unexploded ordnance
VDT	video display terminal

REFERENCES

REQUIRED PUBLICATIONS

These are the sources quoted or paraphrased in this publication. All must be available to the intended users of this publication.

ARMY REGULATIONS

AR 385-10. *The Army Safety Program.* 23 August 2007.

AR 385-63. *Range Safety {MCO 3570.1B}*. 19 May 2003.

DA Pam 385-63. *Range Safety.* 20 April 2003.

DA Form 2399-R. *Computer's Record,* February 2005, or DA Form 2188-R *Data Sheet*. March 1991.

DA Form 2408-4. *Weapon Record Data*. January 1979.

DA Form 5964-R.*Gunner's Examination Scorecard-Mortars*. Sep 1990. See FM 3-22.90. *Mortars*. December 2007

DA Form 7566. *Composite Risk Management Worksheet*. April 2005.

FM 3-0 (100-5). *Operations*. 27 February 2008.

FM 3-22.90. *Mortars*. 7 December 2007.

FM 3-22.91 *Mortar Fire Direction Procedures*. July 2008.

FMI 3-35 (FM 3-35.4). *Army Deployment and Redeployment.* 15 June 2007.

FM 4-01.011. *Unit Movement Operations*. 31 October 2002.

FM 5-19 (100-14). *Composite Risk Management*. 21 August 2006.

FM 7-0. *Training the Force*. 22 October 2002.

FM 7-1. *Battle Focused Training.* 15 September 2003.

STP 7-11B1-SM-TG. *Soldier's Manual and Trainer's Guide, MOS 11B, Infantry, Skill Level 1*. 06 August 2004.

STP 7-11B24-SM-TG. *Soldier's Manual and Trainer's Guide, MOS 11B, Infantry, Skill Levels 2, 3, and 4*. 06 August 2004.

STP 7-11C14-SM-TG. *Soldier's Manual and Trainer's Guide, MOS 11C, Indirect Fire infantryman, Skill Levels 1, 2, 3, and 4*. 06 August 2004.

TC 7-21. *Stryker Driver Training*. 01 December 2006.

TRADOC Regulation 385-2. *U.S. Army Training and Doctrine Command Safety Program*. 19 December 2007.

FM 25-4. *How to Conduct Training Exercises*. 10 September 1984.

TEA PAM 55-19. *Tiedown Handbook for Rail Movements*, 6th Edition. September 2003.

TECHNICAL MANUALS
STRYKER MCV TMS ARE CURRENTLY AVAILABLE ONLY AT THE UNIT LEVEL

TM 9-1015-250-10. *Operator's Manual for Mortar, 120MM: Towed M120 (NSN 1015-01-226-1672) (EIC: 4SL) and Mortar, 120MM: CarrierMounted M121 (NSN 1015-01-292-3801) (EIC: 4SE).*

TB 9-2355-311-10-1. *Installation Instructions Crew Maintenance Level for Cupola Shield for Vehicles Fire Support Vehicle (FSV) M1131 Reconnaissance Vehicle (RV) M1127*.

TM 9-2355-311-10-2-3. *Operator's Manual, Volume 3 of 3, Infantry Carrier Vehicle (ICV), M1125, (2355-01-481-8575) (EIC: AFF), Stryker*.

TM 9-2355-311-10-3. *Operators Manual for the Mortar Carrier Vehicle (MCV) M1129A1*.

TB 9-2540-231-12. *Stryker Slat Armor for Vehicles; Commander's Vehicle (CV); M1130 Engineering Squad Vehicle (ESV); M1132 Fire Support Vehicle (FSV) and Fire Support Sensor System (FS3); M1131E1 Reconnaissance/Scout Vehicle (RV); M1127 Infantry Carrier Vehicle (ICV); M1126 Medical Evacuation Vehicle (MEV); M1133 Mortar Carrier-B (MC-B); Anti-Tank Guided Missile (ATGM) M1134*.

TB 9-2540-232-10. *Crew Maintenance Level for Slat Armor Operator for Vehicles; Infantry Carrier Vehicle (ICV); M1126 Reconnaissance Vehicle (RV); M1127 Mortar Carrier (MC); XM1129E1 Commander's Vehicle (CV); M1130 Fire Support Vehicle (FSV); M1131 Engineer Squad Vehicle (ESC); M1132 Medical Evacuation Vehicle (MEV); M1133 Anti-Tank Guided Missile (ATGM) M1134*.

Index

GUNNER'S EXAM

RMS6-L 120-mm MORTAR CARRIER

POC: TCM STRYKER, FT BENNING GA

NAME *(Last, first, middle initial)* GRADE

DATE	UNIT	QUALIFICATION

STEPS:	TIME	SCORE
PLACE MORTAR INTO ACTION:		
30 Sec or Less (20) 31-35 (19) 36-40 (17) 41-45 (16) 46-50 (14)		
DEFLECTION & ELEVATION CHANGE (MANUAL):		
15 Sec or Less (20) 16-18 (18) 19-21 (17) 22-24 (16) 25-27 (15) 28-30 (14)		
DEFLECTION & ELEVATION CHANGE (DIGITAL):		
20 Sec or Less (20) 21-25 (18) 26-30 (17) 31-35 (16) 36-40 (15) 41-45 (14)		

TOTAL SCORE_____

Qualification Scores

EXPERT GUNNER	108-120
1ST CLASS GUNNER	95-107
2ND CLASS GUNNER	84-94
UNQUALIFIED	0-83

QUALIFICATION:

VERIFIED BY: DATE: