FM 44-20

FIELD MANUAL

SERVICE PRACTICE

FOR

AIR DEFENSE

ARTILLERY UNITS

HEADQUARTERS, DEPARTMENT OF THE ARMY

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SERVICE PRACTICE FOR AIR DEFENSE ARTILLERY UNITS

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides general guidance for commanders conducting live-firing exercises (hereafter referred to as service practice) of air defense artillery units for training or as part of an army training test (ATT), operational readiness training test (ORTT), or army training and evaluation program (ARTEP).

b. This manual does not contain detailed evaluation or scoring procedures. Major commanders will provide supplementary procedures and detailed scoring instructions for the conduct of service practice within their commands. When a unit's service practice is being evaluated as part of an ARTEP, commanders should insure that the evaluation standards and conditions specified in the ARTEP are met by the unit in addition to following the general guidance provided by this manual.

c. Chapters 2 through 4 provide general rules for service practice, safety requirements, and the organization and responsibilities of typical evaluation teams.

d. Chapters 5 through 10 contain specific guidance for conducting service practice for Nike Hercules, Hawk, Improved Hawk (IH), Chaparral, Vulcan, and ADA M-42 gun units.

1-2. Adaptation to Local Conditions

The commander ordering a service practice may change the provisions of this manual as necessary to meet local requirements. However the provisions of AR 385-62, AR 385-63, and other applicable Department of the Army publications concerning safety during live firing exercises may not be modified except as provided in those publications.

1-3. Recommended Changes and Comments

Users of this manual are encouraged to submit recommended changes and comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commandant, US Army Air Defense School, ATTN: ATSA-TD-TL, Fort Bliss, Texas 79916.

1-4. References

Appendix A lists reference publications pertinent to service practice of air defense artillery units.

1-5. Small Arms Air Defense

Apendix B describes a combined arms air defense exercise which provides general guidance to commanders who desire to test the ability of infantry, armor, or artillery units to defend themselves against air attack with their organic and supporting weapons. The exercise may also be used for training units in small arms air defense techniques with or without normal supporting air defense weapons described in the exercise.

CHAPTER 2

GENERAL RULES FOR SERVICE PRACTICE

2-1. General

a. If the service practice is to provide maximum training and a valid evaluation of the unit's ability, it is mandatory that personnel concerned thoroughly understand their responsibilities, scoring be accurate, required reports be submitted, and a critique be held after the service practice to advise the unit of results.

b. A unit will use only equipment authorized by its TOE. Exceptions to this rule must be authorized by the commander ordering the service practice.

c. Service practice offers an excellent opportunity for commanders to improve and increase individual MOS and unit training proficiency. If current directives should limit the number of participants, unit commanders should select for participation those individuals with the greatest potential for retention in the service.

d. Air defense artillery units normally participate in a service practice once a year. Units that fail to perform satisfactorily should repeat the service practice if missiles and ammunition are available. To provide time to correct deficiencies, the unit should not be subject to recall for at least 60 days following the unsatisfactory service practice.

e. Once begun, a service practice should be completed within the time allowed. It should not be postponed except for deficiencies in materiel that cannot be immediately corrected, emergencies affecting the unit's mission, or unforeseen difficulties, such as adverse weather or lack of targets.

2-2. Responsibility

The responsibilities of service practice officials include, but are not limited to, the following:

a. Commanders Ordering Service Practice. This reference includes both the commander ordering service practice for units of his command and the commander under whose jurisdiction other units conduct service practice. If a unit moves to another command for service practice, the host commander assumes all or part of the responsibilities that pertain to the conduct of service practice. These responsibilities are—

(1) Conducting service practice in accordance with appropriate directives.

(2) Specifying the date, time, and place of the practice; personnel limitations; missile and ammunition requirements, reports required; and any other requirements necessary for proper planning by participants.

(3) Appointing officials and providing assistants as needed for the practice.

(4) Making arrangements with proper authorities for the use of land, sea, and airspace.

(5) Arranging for tracking missions and target control.

(6) Authorizing adaptations to local conditions.

(7) Prescribing safety measures.

(8) Making available all locally published directives concerning range operations and testing upon request.

(9) Specifying the method scoring (adjectival, numerical, or both), and providing scoring instructions and materials.

b. Range Commander. Responsibilities of the range commander include—

(1) Maintaining firing sites and operational systems for units participating in service practice when it is not possible for units to use their own equipment. Support will include missiles, ammunition, tools, repair parts, test equipment, applicable technical manuals, and necessary forms.

(2) Supplying target simulators, targets, target control, and calibration and tracking flights.

(3) Furnishing technical, administrative, and logistical support to participants and officials.

(4) Prescribing local range safety procedures and enforcing safety regulations that are not specifically the responsibility of the chief evaluator.

(5) Providing adequate security of the firing range and equipment.

(6) Supplying survey and range safety data.

(7) Establishing necessary safety communications.

c. Chief Evaluator. Normally appointed by the commander ordering the service practice, the chief evaluator is responsible for—

(1) Executing directives of the commander ordering the service practice.

(2) Acting as the contact between par-

ticipants and other officials (e.g., range commander, commander ordering service practice).

(3) Organizing and supervising the service practice staff.

(4) Procuring sufficient evaluators for efficient evaluation of participating units.

(5) Enforcing safety regulations.

(6) Furnishing units with survey data and primary target lines.

(7) Arranging for early warning information.

(8) Arranging for calibration and tracking flights, and informing the target controller of target requirements and courses.

(9) Coordinating with the appropriate commander to insure availability and operational readiness of target simulators to include operator personnel.

(10) Arranging with target simulator personnel for programing of simulated target courses and exercises.

(11) Consolidating the evaluation report, conducting the critique, and forwarding the report and recommendations to the commander ordering the service practice.

d. Senior Battery Evaluator. Responsibilities of the senior battery evaluator are—

(1) Execution of orders from the chief evaluator.

(2) Supervision of battery evaluators.

(3) Assumption of the duties of the trajectory safety officer at missile launch.

(4) Enforcing safety regulations.

(5) Resolving differences of opinion.

(6) Maintaining time record for timed exercises.

(7) Assumption of operational control of firing battery during practice or actual firing exercises.

(8) Evaluation of fire control crews during engagement exercises and actual firings.

(9) Assisting the chief evaluator in computing score and ratings, and completing the evaluation report.

(10) Assisting the chief evaluator in conduct of the postfiring critique.

e. Battalion Commander. The battalion commander is responsible for—

(1) Insuring that fire units of his command maintain the required state of training.

(2) Informing fire units of special range requirements, such as safety and range limitations, sufficiently in advance so that necessary training may be conducted.

(3) Furnishing fire unit commanders with sufficient information to insure an orderly service practice. As a minimum, this information should include time, date, and place of the service practice; safety regulations; missile and ammunition requirements; communications; required reports, and personnel limitations.

(4) Coordinating with the chief evaluator the use of participants as safety personnel.

(5) Coordinating with chief evaluator to provide target simulators AN/TPQ-T-1, AN/TPQ-21, AN/TPQ-29, Chaparral simulator evaluator (CSE), and Vulcan target selector group, target control XM-10 (VGTE), support for the service practice evaluation when applicable.

(6) Assuming all responsibilities, when operating independently, of the commander ordering the service practice.

f. Battery Commander. The battery commander is responsible for—

(1) Insuring that his unit maintains the required state of training.

(2) Following applicable Department of the Army publications, training directives, range regulations, and instructions of the chief evaluator.

(3) Coordinating his unit's tactical standing operating procedure with the chief evaluator.

(4) Security of the equipment, and denying area access to persons not connected with the service practice, except as directed by higher authority.

2-3. Scoring

a. General. Evaluators score and evaluate a unit in accordance with instructions provided in this manual and supplementary instructions provided by the commander ordering the service practice. The completed forms, assembled with all other forms of recorded firing data (e.g., data recorder sheets), are submitted to the chief evaluator. He, in turn, adds his comments, computes an overall score, and prepares a service practice evaluation report (para 2-5) for the commander ordering the service practice.

b. Awarding of Scores. Final scores awarded are numerical and/or adjectival as shown in tables 2-1 through 2-6.

Table 2-1. Service Scores (Nike Hercules)

Total points earned	Percent of maximum score	Service practice rating
1,400-2,000	70% - 100%	SATISFACTORY
Less than 1,400	Less than 70%	UNSATISFACTORY

Table 2-2. Service Practice Scores (Hawk)

Total points earned	Percent of maximum score	Service practice rating
1,400-2,000	70% - 100%	SATISFACTORY
Less than 1,400	Less than 70%	UNSATISFACTORY

Table 2-3. Service Practice Scores (Improved Hawk)

Total points earned	Percent of maximum score	Service practice rating
1,400-2,000	70% - 100%	SATISFACTORY
Less than 1,400	Less than 70%	UNSATISFACTORY

Table 2-4. Service Practice Scores (Chaparral)

Total points earned	Percent of maximum score	Service practice rating
2,520-3,600	70% - 100%	SATISFACTORY
Less than 2,520	Less than 70%	UNSATISFACTORY

Table 2-5. Service Practice Scores (Vulcan)

Total points earned	Percent of maximum score	Service practice rating
2,520 - 3,600	70% - 100%	SATISFACTORY
Less than 2,520	Less than 70%	UNSATISFACTORY

Table 2-6. Service Practice Scores (ADA Gun M42)

Total points earned	Percent of maximum score	Service practice rating
3,360-4,800	70% - 100%	SATISFACTORY
Less than 3,360	Less than 70%	UNSATISFACTORY

2-4. Conduct of Critique

a. As soon as practicable after the service practice, the chief evaluator should conduct a critique. Prior to the critique the chief evaluator will issue copies of the service practice evaluation report (para 2-5) to the battalion and battery commanders. Deficiencies and remarks contained in the report should be thoroughly understood by all commanders concerned prior to the conclusion of the critique.

b. Battery commanders should be allowed to submit comments concerning issues raised by the report. These may be made orally during the critique to the chief evaluator. Comments may also be submitted in writing by the battery commander thru channels, to the commander ordering the service practice. Notification of intent to reclama should be provided the chief evaluator prior to departure from the range.

CHAPTER 3

SAFETY

3-1. General

a. If a service practice is to be conducted without personnel injury or equipment damage and at the same time be of maximum training value, it is necessary that—

(1) Basic safety requirements be established and followed by all concerned.

(2) All persons concerned be aware of their responsibilities and trained thoroughly in the duties specified in this manual and in applicable directives.

b. Instructions for range planning are contained in AR 385-62 and AR 385-63. These regulations contain detailed explanations of range safety chart construction and the latest information on safety requirements for missiles, heavy rockets, automatic weapons, and guns.

c. Safety is the responsibility of every person concerned with the service practice. Overall safety is the responsibility of the commander ordering the service practice. The range commander and chief evaluator have an evaluator staff, assigned safety officers, and all commanders and participants concerned to assist them in the safe conduct of each phase of the practice. The responsibilities assumed by these individuals overlap in many cases but in general are as follows:

(1) Safety officers delineate the firing area, render the firing area safe, and authorize firing only when all conditions are safe.

(2) Evaluators observe checks and adjustments that affect safety during each phase of the service practice. Deficiencies are noted so that they may be corrected immediately if an unsafe condition exists. If deficiencies noted do not cause an unsafe condition, correction may be deferred and the operation continued to the point where an unsafe condition would result. To achieve maximum training benefit and economy of materiel, as well as to insure safe operation, a unit will not be allowed to fire if an unsafe condition exists.

(3) Commanders insure that all personnel follow and execute applicable safety procedures.

(4) All persons connected with the service practice observe required safety precautions; order, CEASE FIRING, whenever an unsafe condition is observed, and report unsafe conditions to the person in charge of the operation.

(5) When total safety requirements are not clearly the responsibility of one commander, agreements must be reached between commanders as to responsibility for specific items.

(6) Accidents resulting in injury to personnel during the service practice will be recorded and reported as required by AR 385-40.

3-2. Safety Officers

The safety officers listed below are considered the minimum necessary for efficient range operations. In some cases the safety officer may also be an evaluator. The dual role prevents confusion and congestion, and economizes overhead for small scale range operations. Figure 3-1 shows typical locations for safety officers during service practice.

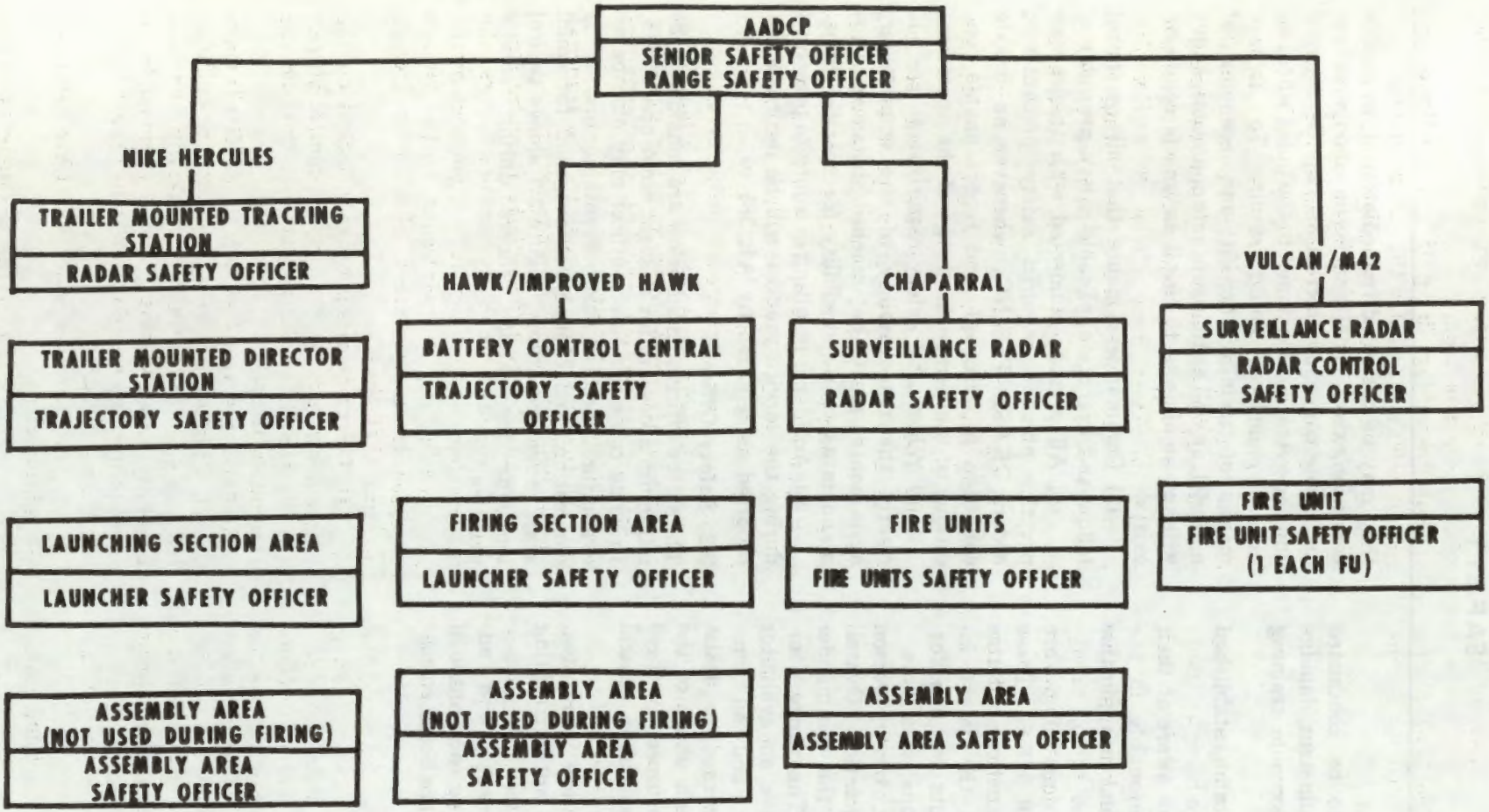


Figure 3-1. Typical safety officer locations.

a. Senior Safety Officer. The senior safety officer may be the chief evaluator. He is responsible for safety during all phases of the service practice to include—

(1) Insuring that a safety officer is appointed for each required position and that he is instructed thoroughly in his duties.

(2) Making arrangements with the participating unit commander for personnel to be used in meeting safety requirements (e.g., unit safety officers and road guards).

(3) Authorizing firing only when all safety regulations and requirements have been satisfied.

(4) Arranging for necessary medical and firefighting support.

b. Range Safety Officer. Stationed at the AADCP (or range control), the range safety officer assists the senior safety officer. His duties include—

(1) Arranging for radar surveillance of the entire range area during firing.

(2) Arranging for an aircraft sweep of the range area prior to firing.

(3) Supervising the clearing of the range prior to firing and maintaining clearance throughout the firing.

(4) Coordinating the firing with other interested agencies (e.g., USAF, FAA, local AADCP).

(5) Insuring that required safety communications are established and are separated from tactical and administrative communications.

(6) Furnishing necessary overlays of range safety limits for use of fire control personnel during firing.

(7) Insuring that all warning procedures are followed.

(8) Coordinating all reports from range sweep aircraft, surveillance radars, and other safety officers.

(9) Visually or electronically observing the missile in flight, as far as possible, and ordering the destruction of an unsafe or erratic missile.

c. Trajectory Safety Officer (Missile Units Only). The trajectory safety officer may be the senior battery evaluator. Stationed in the trailer-mounted director station for Nike Hercules firing, in the battery control central or at the assault fire command console for Hawk firing, or at the firing line command post for Chaparral firing, he must be thoroughly familiar with the range limitations. His duties include—

(1) Insuring that all checks involving safety are accomplished.

(2) Verifying orientation and alinement of radars.

(3) Verifying setting of the offset angle if the offset method is used.

(4) Preventing firing if the predicted intercept point is not within the safe firing area.

(5) Observing the trajectory of the missile and destroying the missile when warranted by safety regulations or ordered to do so by the range safety officer.

d. Launcher (Fire Unit) Safety Officer (Missile Units Only). Normally a member of the participating unit, except in Chaparral firings, the fire unit or launcher safety officer is stationed in the launching area during Nike Hercules firings, in the firing section area during Hawk firings, and at the launching station within safety distance in Chaparral firings. His duties include—

(1) Enforcing safety regulations in the launching/firing section area (e.g., smoking, use of open flame).

(2) Clearing the launching/firing section area of all unnecessary persons prior to firing, posting necessary guards to prevent unauthorized access during firing, and insuring that necessary participants are protected in revetted areas.

(3) Checking launcher azimuth setting in the section simulator group (SSG) of Nike Hercules launchers (during emergency procedures).

(4) Checking alinement of Hawk launchers, installation of azimuth fire cutout clips, or setting of azimuth fire cutout switches, and setting of elevation fire interrupter.

(5) Insuring that missiles will be launched within the right and left range limits.

e. Radar Safety Officer (Nike Hercules Units Only). Required for Nike Hercules firings, the radar safety officer, normally a member of the participating unit, is stationed in the trailer-mounted tracking station. His duties include insuring that the—

(1) Target tracking radar is locked on the target designated by the battery control officer.

(2) Missile tracking radar is locked on the designated missile.

f. Assembly Area Safety Officer (Missile Units Only). This officer; warrant officer, or qualified noncommissioned officer is normally the unit assembly area supervisor. He is responsible for safety during all missile operations except firing. His duties included—

(1) Observing each step in missile assembly and checkout.

(2) Insuring that all persons understand and

comply with safety restrictions and that only qualified persons assemble, check, and prepare the missile for firing.

(3) Supervising the movement of the missile and components from the assembly area to the launching/firing section area or firing points.

(4) Authorizing firing or practice firing only after determining that crews are proficient in the use of their weapon (Chaparral only).

(5) Insuring that remote firing circuit switches are utilized during firing (Chaparral only).

(6) Selecting ammunition storage areas as prescribed in TM 9-1300-200.

g. Radar Safety Officer (AW Units Only). When necessary, a radar safety officer (commissioned or noncommissioned) will be stationed at the surveillance radar of the range command. His duties and responsibilities are as follows:

(1) Immediately notify the range safety officer of the approach and intrusion of any aircraft within the prescribed range safety limits.

(2) Maintain continuous plots on such aircraft until it is clear of the danger area.

(3) Inform the range safety officer when the intruding aircraft is clear of the prescribed range safety limits.

h. Fire Unit Safety Officer (AW Units Only). Fire unit safety officers (commissioned or noncommissioned) are appointed by the commander of the unit using the range. A safety officer is located at each weapon to insure that all target tracking and firing is conducted within the prescribed safety limits. He may, if so designated, also function as the fire unit evaluator. His other duties and responsibilities are to—

(1) Establish visible firing safety limits for each weapon.

(2) Inform the fire unit commander of the exact location of firing limits for each weapon.

(3) Detect and note any errors or omissions committed by crewmembers prior to and/or during firing which create unsafe conditions for firing.

(4) Insure that crewmen correct any noted discrepancies, such as erratic tracking, to safeguard property and personnel.

(5) Prevent firing at any time that the red range streamer on the safety officer's tower is lowered or whenever an unsafe condition is observed.

3-3. Safety for Unit Personnel

a. All personnel concerned must be familiar with the correct safety procedures to be followed in case of a misfire or stoppage. The safety procedures for misfires or stoppages of automatic weapons are contained in FM 44-61, TM 9-1005-286-10-1, and TM 9-2350-300-10. Safety procedures for misfires and/or hangfires of missile systems are described in the appropriate system technical manuals.

b. For ground target firing safety, AR 385-63 and FM 6-140 will be followed. Local range safety regulations may supplement these regulations, but in no instance will any practice contrary to these directives be permitted.

c. All persons connected with the service practice will observe all safety precautions; order, CEASE FIRING, whenever an unsafe condition is observed; and report all unsafe conditions to the officer in charge.

d. Weapons will be kept unloaded except when personnel are firing or about to fire.

e. Personnel will always pass to the rear of the weapons.

f. The gunner will keep his hands (or feet) away from the firing triggers (or pedal) until the weapon has been loaded and permission to fire has been given.

g. Warning notices will be published as far in advance of the firing as possible. Local news media, as well as installation daily bulletins, should be used. At the firing range, warning procedures will include the use of sentries, roadblocks (if required), warning signs around the danger area(s), warning orders, and the prominent display of a red danger streamer prior to and during firing. During night firing (if permitted) a flashing red beacon will be displayed.

CHAPTER 4

ORGANIZATION OF EVALUATION TERM

4-1. General

Whether the service practice accurately measures the unit's ability to perform its mission depends on the quality of the evaluation. Evaluators must be carefully selected and instructed thoroughly in their duties so that they can evaluate the unit fairly, be alert continually for safety violations, and discover reasons for any deficiencies.

4-2. Evaluation Team Selection

a. Composition of an evaluation team will vary according to the type of unit being tested, the size and nature of the firing range, the type of firing (air defense or ground support), and the number of weapon systems on the firing line firing simultaneously.

No.	*MOS*
1	1180 (Air Defense Missile Unit Commander).
1	222B (Air Defense Missile System Fire Control Tech, Nike).
1	222B or 24Q40 (Nike Hercules Fire Control Mechanic).
1	221B (Missile Assembly Tech, Nike).
1	221B or 24U40 (Hercules Electronics Mechanics).

b. If more than one battery is evaluated simultaneously, additional personnel are required.

c. The Nike Hercules evaluation team should have an evaluator with unit personnel at all times in each assembly and service area, battery control area, and launching area. The senior battery evaluator can usually supervise the evaluation of two batteries as he is directly involved with the evaluation of a unit's prefire phase and firing phase operations. However, he should have an additional fire control evaluator accompany him to evaluate completely the actions of the operators at the target radar and missile radar control consoles during the prefire and firing phases. In situations where the assembly and service operations of more than two units are evaluated simultaneously or the assembly and service area of a unit is too remote from the battery control and launching areas for a senior battery evaluator to supervise evaluators, a senior evaluator should be assigned not only to supervise but to assist with assembly and service area evaluations.

b. Because the success and validity of a service practice depends in part on the quality of the evaluation, personnel selected for the team should be the most experienced and technically qualified available. No exceptions should be made if these prerequisites are not met.

c. As a minimum the team should include a chief evaluator, a senior battery evaluator (per battery), and necessary missile-launcher and fire control assistants.

4-3. Evaluation Team, Nike Hercules

a. The number of evaluators, their MOS, and areas of responsibility of a typical Nike Hercules evaluation team are as follows:

No.	*MOS*	*Area of responsibility*
1	1180 (Air Defense Missile Unit Commander).	Battery area—Director station during firing.
1	222B (Air Defense Missile System Fire Control Tech, Nike).	IFC area—Tracking station trailer during firing.
1	222B or 24Q40 (Nike Hercules Fire Control Mechanic).	IFC area—Director station trailer or tracking station trailer during firing.
1	221B (Missile Assembly Tech, Nike).	Missile assembly area—Assembly and service area during firing or may be used as safety officer.
1	221B or 24U40 (Hercules Electronics Mechanics).	Launching section, down range—Personnel and section control equipment shelter during firing.

4-4. Evaluation Team, Hawk, SP Hawk, and IH

a. Number of evaluators, their MOS, and area of operation for a Hawk or SP Hawk evaluation team are listed below. If more than two fire units (one battery) are to be evaluated simultaneously, additional evaluators are necessary.

No.	*MOS*	*Area of responsibility*
1	1180 (Air Defense Missile Unit Commander).	Battery area—BCC or AFCC during firing.
1	223C (Air Defense Missile System Tech, Hawk).	All areas. Battery control central or pulse acquisition radar—Battery control central or platoon command post during firing.
2	24F40 (Hawk Fire Control Mech).	Pulse acquisition radar or range-only radar—Battery control central during firing.
2	24B40 (Hawk Continuous-Wave Radar Mech).	Continuous-wave acquisition radar or continuous-wave illuminator radar—Assault fire command console or platoon command post during firing.
2	24D40 (Hawk Missile-Launcher Mech).	Missile assembly area and launcher section—Launching section control box or interconnecting box during firing.

b. Number of evaluators, their MOS, and area of responsibility for an Improved Hawk evaluation team are listed below. If more than two fire units (one battery) are evaluated simultaneously, additional assistants are necessary.

No.	*MOS*	*Area of responsibility*
1	1180 (Air Defense Missile Unit Commander).	Battery area—IBCC or IPCP during firing.
1	223D (Air Defense Missile System Tech, Improved Hawk).	All areas, battery control central or Improved pulse acquisition radar—Improved battery control central or Improved platoon command post during firing.
2	24E40 (Improved Hawk Fire Control Mech).	Improved pulse acquisition radar, Improved range-only radar, Improved battery control central—Improved battery control central during firing.
2	24G40 (Improved Hawk Information Coordination Central Mech).	Improved continuous-wave acquisition radar, information coordination central, Improved platoon command post—Improved platoon command post and/or information coordination central during firing.
4	24C40 (Improved Hawk Firing Section Mech).	Missile assembly, firing section—Improved launching section control box during firing (2—missile assembly area, 1—each firing section).

4-5. Evaluation Team (Chaparral)

Number of evaluators, their MOS, and area of responsibility are listed below. If more than one fire unit is to be evaluated simultaneously, additional personnel are required.

No.	*MOS*	*Area of responsibility*
2	1174 (Light Air Defense Artillery Unit Commander).	Missile preparation and squad prefire evaluation area (1—range tower during firing, 1—firing point during firing).
1	224B (Chaparral/Vulcan System Tech) or 24N40 (Chaparral System Mech).	Missile assembly, preparation and squad prefire evaluation area—as directed by senior evaluator during firing.

4-6. Evaluation Team, Vulcan/ M42

a. Number of evaluators, their MOS, and area of responsibility for Vulcan or M42 gun unit is listed below. If more than one fire unit is evaluated simultaneously, additional evaluators are required.

No.	*MOS*	*Area of responsibility*
2	1174 (Light Air Defense Artillery Unit Commander).	Squad prefire testing evaluation area (1—range tower during firing, 1—firing point during firing).
2	16R40 (Vulcan Crewman) or 16F40 (Light Air Defense Artillery Crewman)	Squad prefire testing evaluation area—Line or lead evaluator during firing.
3*	Any	Recorders (3 per fire unit).

*Optional

b. During firing, the line evaluator is stationed behind the fire unit; the lead evaluator is off to one flank of the fire unit. Both should be knowledgeable in tracer observation. Miss distance indicators, if available, may be substituted for these two evaluators.

c. Recorders, if used, should be knowledgeable in the application of checklists and scoresheets used for each phase of the service practice. They should also be capable of recording performance data derived from miss distance indicator equipment if used.

CHAPTER 5

NIKE HERCULES SERVICE PRACTICE

Section I. GENERAL

5-1. Scope

A Nike Hercules service practice is divided into three phases: preparation, prefire testing, and firing. Each phase is conducted and evaluated separately. To provide maximum training value, planners should arrange for targets; select target courses; and require siting, connections, and operation of equipment in a manner that will measure unit ability to perform under conditions and situations that may be encountered in combat.

5-2. Application

Material contained in this chapter is applicable to all Nike Hercules units organized under 44-series TOE.

5-3. Targets and Courses

a. Maximum use will be made of the air defense artillery engagement simulator (guided missile system radar-signal simulator station AN/MPQ-T-1 (Nike Hercules) during the prefire testing. The simulator enables fire control operators to experience target conditions that they may encounter in combat. Operators not only receive training in target detection, selection, and tracking, but gain experience countering enemy electronic countermeasures (ECM) techniques and target evasive maneuvers.

b. Target courses should include targets that are difficult to detect, recognize, track, and engage. Course design factors to consider are:

(1) Capabilities of the system as described in TM 9-1400-250-10 and TM 9-1400-250-10-2.

(2) Safety.

(3) Range requirements and limitations.

(4) Target type, characteristics, and availability.

(5) Target speed.

c. When engagement simulators are not available, high-performance unmanned aerial targets, operated by troop units or furnished by contract personnel, will be substituted.

5-4. Equipment and Missiles

a. If Nike Hercules equipment and missiles at the home station differ from equipment and missiles at the range, battery commanders will make known those differences prior to start of service practice to forestall imposition of penalties.

b. CTA 23-100-6 prescribes allocation of missiles for Nike Hercules service practice. Because CTA 23-100-6 authorizes substitution of Nike Ajax missiles for Nike Hercules missiles, units may request assistance from the range support unit to accomplish firing phase requirements.

Section II. CONDUCT OF NIKE HERCULES SERVICE PRACTICE

5-5. Preparation Phase

a. Purpose. The purpose of the preparation phase is to evaluate the ability of battery personnel to assemble and prepare live missiles for firing and prepare associated equipment for an engagement.

b. Procedures.

(1) When the firing battery is to use equipment other than its own, the battery will be allowed a reasonable amount of time for inspection and checking of the equipment (without adjustment) before accepting the system and beginning the preparation phase. The system should be energized and operational before it is turned over to the service practice unit. If the battery is to use its own equipment, unit personnel will be allowed a reasonable time to energize and check equipment before entering the preparation phase. The preparation phase will begin when the battery commander announces that his battery is ready to assume a higher status or when the allotted equipment check and inspection time has expired.

(2) Major commanders, using appropriate

system technical and procedural manuals, and guidance provided herein, will prescribe actions and procedures to be performed by service practice units during the preparation phase. As a minimum the preparation phase will include the assembly and testing of one or more missiles and daily, weekly, and prefire checks of fire control equipment and launchers.

(3) The battery is allowed 11 hours to complete missile assembly, 7 hours to complete FC area preparation, and 5 hours to complete launcher area preparation. Preparation time will stop when the battery commander announces that his unit is ready to assume a higher alert status or when the specified time limit has expired. At this time, the evaluation team will inspect each major item of equipment by performing certain critical checks as directed by the chief evaluator. If the equipment is found to be operational, the battery will assume a 20-minute status and begin the prefire testing phase. While performing the above inspection, the evaluators will deduct points for deficiencies as directed by the commander ordering the service practice.

(4) The firing battery must finish preparing the minimum equipment described in *c* below during the preparation phase. If at the end of the preparation phase the unit has not met the minimum equipment requirements and it is determined that the failure is due to crew error, points will be deducted for overtime as prescribed by the commander ordering the service practice. Failure of the battery to meet the minimum equipment requirement and assume alert status within a reasonable time after overtime begins will be cause for declaring the unit NON-OPERATIONAL. In this case the chief evaluator may recommend that the unit be returned to its home station for additional training.

(5) In the event of equipment failure, which is determined not to be caused by crew error, time will be stopped, the equipment repaired, and the test resumed with no points assessed against the battery.

(6) Unused preparation time will be retained by the ASP unit. Repair time used during the prefire testing and firing phases will be charged against the unused preparation time if malfunction is attributed to personnel error. If no preparation time remains, repair time caused by personnel error will be charged as overtime in accordance with instructions in section III.

c. Minimum Equipment Requirements to Assume Alert Status. To assume an alert status, the battery must have the following major items of equipment operational at the end of the preparation phase:

Battery control area	*Launcher area*
Low-power acquisition radar.	Launching control station
Computer	Section control cabinet
	Two launchers (2d 1chr is backup)
RF test set	One missile
Target tracking radar	Flight simulator group
Missile tracking radar	
Target ranging radar	

5-6. Prefire Testing Phase

a. Purpose. The purpose of the prefire testing phase is to determine: the ability of the battery crew(s) to conduct target engagements under simulated combat conditions; and to evaluate the proficiency of battery fire control crew(s) to detect, identify, and engage difficult targets under ECM conditions.

b. Scope.

(1) The prefire testing phase is divided into two series. Each series consists of three target courses.

(2) The TEE consists of two series of three courses each. Raid size may be single, multiple, or both. All targets should use ECM. Battery crew(s) will demonstrate their state of training in—

(a) Detection, identification, and engagement of hostile targets through moderate to severe chaff, and transmission jamming; and destroying the target or targets prior to penetration of the defended area.

(a) Selection of appropriate ECCM fix, video mode, and radar frequency.

(c) Track-on-jam techniques.

(d) Use of target ranging radar (TRR).

(e) Recognition of chaff dispersion.

(f) Application of rules of engagement and target correlation.

c. Procedures.

(1) This phase begins only after successful completion of the preparation phase. Target courses and specific areas for evaluation and scoring will be provided by the commander ordering the service practice. Maximum use will be made of the engagement simulator (AN/TPQ-1) for this phase as it provides more realistic targets than the use of live drones, i.e., ECM, multiple targets, pop-up targets, etc.

(2) Listed below are four typical targets which may be used for target course design—

(a) Low-altitude target(s), under 15,000 feet altitude, at speeds of 400-600 knots.

(b) Medium-altitude target(s), from 15,000-40,000 feet, at speeds of 600-1,000 knots.

(c) High-altitude target(s), above 40,000 feet, at speeds in excess of 1,000 knots.

(d) Pop-up targets, high speed.

(3) Time required to complete this phase will not be charged.

(4) Time to repair equipment malfunctions, if caused by personnel error, will be charged against unused preparation time. If no preparation time remains, repair time, due to personnel error, will be charged as overtime as explained in section III.

(5) No points will be charged for delays due to lack of repair parts or direct support.

d. Evaluation. During the TEE, only the FC crew is evaluated. The FC crew will be observed and evaluated on—

(1) Detection, identification, and engagement of hostile targets through moderate to serve ECM.

(2) Destruction of the target or targets prior to penetration of the defended area.

(3) Proper use of ECCM techniques and fixes.

(4) Operator track-on-jam techniques.

(5) Use of target ranging radar.

(6) Recognition of chaff dispersion.

(7) Application of rules of engagement.

5-7. Firing Phase

a. Purpose. The purpose of the firing phase is to evaluate the ability of the battery to successfully engage a simulated hostile target with a live missile within the alert status time.

b. Scope. The firing phase is conducted in two parts; a simulated engagement using the flight group simulator and a drone aircraft as a target; and an actual engagement using a live drone aircraft as a target.

c. Procedures (Simulated Engagement).

(1) This phase begins only after successful completion of the prefire testing phase. The target parameters, altitude, speed, and direction will be decided by the chief evaluator. Specific areas for evaluation and scoring instructions will be provided by the commander ordering the service practice.

(2) Firing, actual or simulated, will be conducted in accordance with procedures below, as modified by the commander ordering the service practice.

(a) The chief evaluator orders the range cleared of unauthorized personnel.

(b) The senior battery evaluator commands, BLAZING SKIES, to begin the engagment.

(c) If live targets are available, the chief evaluator orders the target started on course for the first engagement (simulated).

(d) The battery commander orders his unit to BLAZING SKIES by sounding the siren.

(e) At BLAZING SKIES the senior battery evaluator assumes operational control of the battery and provides early warning to the BCO.

(f) Battery crews perform crew drill and prepare to engage.

(g) While maintaining continuous communication with the chief evaluator, the senior battery evaluator will designate a target at maximum range for the battery to engage.

(h) The BCO acquires the target and assigns it to the target tracking radar.

(i) When the TTR is locked on target, the BCO begins correlation.

(j) When target correlation is completed and all other safety requirements are met, the senior battery evaluator, on order of the chief evaluator, declares, TARGET HOSTILE to the BCO. This authorizes the BCO to fire.

(k) When the target is in range, and before it reaches the minimum launch range (determined by the chief evaluator), the BCO will count down to fire by commanding, ABOUT TO ENGAGE, 5, 4, 3, 2, 1, FIRE. This completes the simulated engagement.

d. Actual Engagement Procedures.

(1) At this time, the second crew, if applicable, will assume the stations and duties of the first crew, and repeat the above procedures except that the battery will be brought to BATTLE STATIONS and a live missile used for the engagement.

Note. The chief evaluator will insure that, prior to allowing the battery to engage—using a live missile, the range is cleared, the red safety flag is displayed, surveillance radar is operating, roadguards are posted, and a range sweep is completed by aircraft.

(2) At launch, the senior battery evaluator, who is also the trajectory safety officer, closely observes the flight of the missile and target by means of the plotting boards in the director station. Should safety requirements make it necessary to destroy the missile, the BCO will self-destruct the missile when ordered to do so by the trajectory safety officer.

Section III. SCORING OF NIKE HERCULES SERVICE PRACTICE

5-8. General

a. Purpose. This section establishes minimum requirements, scoring weights, and procedures, by phase, for evaluation of the Nike Hercules battery service practice. The weight given each phase of the service practice is based on a maximum possible score of 2,000 points per missile battery. Only general scoring procedures are provided for scoring the service practice and for determining an overall service practice rating. Based on this guidance, and appropriate system technical and field manuals (app A), the commanders ordering service practice will provide detailed scoring instructions and procedures, including scoring materials, for the evaluation team.

b. Policy. Missile and/or equipment malfunctions resulting from personnel errors or omissions are chargeable against the battery being tested. For malfunctions other than those caused by personnel error or omission, no points will be assessed. The point value for each procedure on each major item of equipment will be based on the relative importance of that procedure to the overall operation of the system. Errors of commission or omission are classified as either major or minor. Major errors are those operations or checks, which if performed incorrectly or omitted, could cause equipment failure. Minor errors are those operations or checks, which if performed incorrectly or omitted, are in violation of prescribed procedures. Safety violations are acts of commission or omission which expose personnel to injury or death.

c. Maximum Penalties. Maximum point penalties which can be deducted are explained in (1) through (5) below:

(1) Safety violations—25 points each violation.

(2) Major errors—20 points each.

(3) Minor errors—5 points each.

(4) Misuse of tools or test equipment—5 points each.

(5) Overtime—5 points per minute, are not to exceed 50 points per occurrence.

5-9. Preparation Phase

a. Maximum Points. The maximum points a battery may be awarded or penalized during this phase is 600 points weighted as follows:

Missile assembly and checkout	300 points
System preparation	300 points
Total	600 points

b. Missile Assembly and Checkout.

(1) Time for scored operations in the missile assembly area begins after the battery has accepted the test equipment and tools have been issued. Eleven hours are allocated for the completion of missile assembly and checkout.

(2) Assembly area evaluators will observe and score—

(a) Decanning and assembly of one missile

(b) Missile checkout.

(c) Movement of missiles in the assembly area.

(d) Use of tools and test equipment.

(e) Safety.

Note. Time to transport missile downrange is not chargeable against the battery.

(3) Missiles found to be NO GO will be replaced by the range support unit. Battery assembly personnel will assemble and check the replacement missile without loss of points except for safety violations and misuse of tools and test equipment to the same place the NO-GO missile was checked.

(4) Errors detected by battery personnel may be corrected without penalty; however, no adjustment in time will be made.

(5) Errors not detected by battery personnel will be brought to their attention by the evaluator at the completion of the major step and prior to starting the next major step. The time required to correct the error will be charged and points deducted for the error.

(6) Missile assembly time will end when one missile is ready to be transported downrange. Final preparation of the missile on the launcher will be charged to system preparation time.

(7) Scoring of assembly area operations will be according to instructions provided by the commander ordering the service practice.

c. System Preparation.

(1) During system preparation, battery personnel must perform daily, weekly, and prefire checks on all battery fire control area and launcher area equipment. Minimum equipment requirements, as described in paragraph 5-5*c*, must be met during the preparation phase.

(2) A minimum of two evaluators is required to score this phase. One evaluator will station himself where he can observe the fire control crew and one where he can observe the launcher crews. Points will be assessed for safety violations, and misuse of tools and test equipment, and

deficiencies, while the battery is preparing the equipment. Scoring will be in accordance with policy explained in paragraph 5 through 8 above.

(3) After the battery has completed missile assembly and system preparation, the evaluation team will inspect the system and perform checks explained in paragraph 5-5 *b* (3) and assess point deductions as directed by the commander ordering the service practice. If an item of equipment is found to be NONOPERATIONAL during this inspection, time required to repair it will be charged if due to personnel error. If not caused by personnel error, time to repair will not be charged.

(4) If the battery, due to personnel error, is unable to meet the minimum equipment requirements within a reasonable amount of time, after overtime begins, the chief evaluator may declare the battery NONOPERATIONAL and recommend to the commander ordering the service practice that the battery be returned to home station for further training. If the failure to meet the minimum requirement is due to nonavailability of repair parts or lack of direct support, the minimum equipment requirement may be waived by the chief evaluator provided the nonoperational equipment is not mission essential. If repair parts or direct support are not available for mission essential equipment, then the equipment will be replaced and no points assessed against the battery.

5-10. Prefire Testing Phase

a. Completion Time. Time to complete this phase, except for alert status time, is not charged against the battery.

b. Maximum Points. The maximum points that a battery may be awarded or penalized is 900 points.

c. Tactical Effectiveness Evaluation.

(1) Time required to complete the TEE is not charged. Evaluators will evaluate and score only battery fire control personnel during the TEE.

(2) The launcher crews will not be evaluated during the TEE.

(3) Scoring of the TEE will be in accordance with instructions provided by the commander ordering the service practice.

(4) If equipment becomes nonoperational during the TEE, the BCO will declare, OUT OF ACTION. If the malfunction is determined to be caused by personnel error, time to repair will be added to preparation time. If it is determined not to be due to personnel error, time to repair will not be assessed. When repair is completed, the battery will continue the TEE.

5-11. Firing Phase

a. The maximum points a battery may be awarded or penalized during the firing phase is 600 points weighted as follows:

First engagement (simulated)	300 points
Second engagement (actual)	300 points
Total	600 points

b. The battery will be rated operational if it achieves a successful missile launch within the alert status time. A successful launch consists of timely detection and identification of the target, target transfer, and launching the missile. If the missile is successfully launched, no penalty will be assessed if the missile fails in flight. If the equipment fails during the engagement, no points will be assessed unless it can be determined that the malfunction was caused by crew error.

c. Time to complete the firing phase, except for alert status time, is not chargeable.

d. Crew errors will be considered minor errors unless it can be determined that, if not corrected, they could cause an unsuccessful mission or constitute a safety violation.

e. Evaluators will observe and evaluate crew performance in all areas of the battery during both the simulated and actual engagements. Using appropriate technical and field manuals (app A), and instructions provided by the commander ordering the service practice, they will evaluate crew drill, reaction time (alert status time), and safety.

Section IV. SERVICE PRACTICE RATING AND CRITIQUE

5-12. General

Evaluators score and evaluate the battery in accordance with guidance provided in this chapter and instructions provided by the commander ordering the service practice. Completed score sheets and other recorded data (e.g., data recorder sheets) are submitted to the chief evaluator. He will, in turn, add his comments, compute the overall score, prepare a service practice rating and a written evaluation report for the commander ordering the service practice. Contents of the evaluation report will include—scores attained for each phase, point deductions for each phase, overall score, and any other

pertinent material. The report may include copies of the score sheets with deficiencies referenced to the appropriate technical manual, field manual, regulation, or directive not complied with.

5-13. Computation of Service Practice Rating

The chief evaluator, after computing the overall battery score, will compute the service practice rating in accordance with table 2-1.

5-14. Conduct of Critique

a. As soon as practicable after the service practice, the chief evaluator will conduct a critique for the battery commander and key personnel of the service practice unit. A copy of the evaluation report and score sheets will be provided to the battery commander in sufficient time for analysis prior to the critique.

b. Deficiencies and remarks in the report should be thoroughly understood by all concerned prior to the conclusion of the critique.

c. Battery commanders may submit comments for discussion concerning issues raised by the report. Comments may also be submitted in writing by the battery commander to the commander ordering the service practice. Notification of intent to reclama will be made to the chief evaluator prior to departure from range.

CHAPTER 6

HAWK SERVICE PRACTICE

Section I. GENERAL

6-1. Scope

A Hawk service practice is divided into three phases: preparation, prefire, and firing. Each phase is conducted and evaluated separately. Planners arrange for targets, select target courses, and require an equipment configuration that Hawk missile batteries will employ in combat.

6-2. Application

Material contained in this chapter is applicable to Hawk and self-propelled Hawk air defense artillery batteries organized under the 44-series TOE. The term "Hawk" includes towed Hawk and self-propelled Hawk (SP Hawk), except where explained otherwise.

6-3. Targets and Courses

a. Numerous types of high-performance drone targets, operated by troop units or furnished and operated by contract personnel, are available for Hawk service practice. When available, the target engagement simulator (AN/TPQ-21) should be used to the maximum extent in prefire testing exercises. The simulator enables fire control operators to experience target conditions that may be encountered in combat. Operators not only receive training in target detection, selection, and tracking, but gain experience countering enemy electronic countermeasures (ECM) techniques and target evasive maneuvers.

b. To insure realism, courses should include targets that are difficult to detect, identify, track, and engage. Factors to consider when designing courses are—

(1) Capabilities of the systems as described in TM 9-1400-500-10.

(2) Safety restrictions.

(3) Range limitations.

(4) Target types, characteristics, and availability.

(5) Availability of ECM equipped targets.

c. Determining factors for a qualified firing phase target are that it—

(1) Originates as a track at a range and altitude that will require the fire unit to use maximum acquisition and tracking capabilities within the range limits of the equipment.

(2) Continues for one firing run to the minimum launch range.

d. Equipment should be sited, interconnected, and subsequently evaluated in its normal tactical configuration to provide a realistic test of the unit's ability to prepare the system for an engagement.

e. Units should be required to use tactical power on the firing range to conform to a tactical situation.

f. If missiles are available, one additional operational missile per launcher section may be loaded and armed for the firing run. In cases where the unit encounters a hang-fire with not enough time to make an additional pass with the drone target, the tactical control officer (TCO) may direct the firing console operator (FCO) to select the second launcher with loaded missile and fire. This procedure will prevent the loss of a drone target and provide a realistic engagement sequence.

g. The illuminator radar mentioned throughout this text is the high-powered illuminator radar (HIPIR) AN/MPQ-39 (Towed and SP Hawk).

h. Ammunition allowances are contained in CTA 23-100-6.

6-4. Annual Service Practice at Night for Hawk ADA Missile Batteries

a. The Hawk missile system is, by design, an all-weather air defense system and is capable of detecting, identifying, and engaging targets during the hours of darkness or poor visibility.

b. Commanders may direct annual service practice to be conducted at night for Hawk units which have not previously fired at night. Notice should be given to the firing battery commander far enough in advance to conduct training necessary in emplacing and orienting and alining the battery at night.

6-5. Procedures

Procedures for detection, identification, and engagement at night are identical to procedures

during daylight. However, for emplacement, orientation and alinement, and crew drill for battle stations, additional precautionary measures, such as use of flashlights, headcount before firing, and etc. are necessary. For detailed procedures for emplacement, and orientation and alinement, see TM 9-1400-500-12/1, paragraph 175.

Section II. CONDUCT OF HAWK SERVICE PRACTICE

6-6. Preparation Phase

a. Purpose. The purpose of the preparation phase is to evaluate the ability of battery personnel to assemble and test missiles for firing and prepare associated equipment for an engagement.

b. Procedures.

(1) When the firing battery is to use equipment other than its own, the battery will be allowed a reasonable amount of time for inspection and checking of the equipment (without adjustment) before accepting the system and beginning the preparation phase. The system should be energized and operational before it is turned over to the service practice unit. If the battery is to use its own equipment, unit personnel will be allowed a reasonable time to energize and check equipment before entering the preparation phase. The preparation phase will begin when the battery commander announces that his battery is ready to assume a higher status or when the allotted equipment check and inspection time has expired.

(2) Major commanders, using appropriate system technical and procedural manuals, and guidance provided herein, will prescribe actions and procedures to be performed by service practice units during the preparation phase. As a minimum the preparation phase will include the assembly and testing of one or more missiles and daily, weekly, and prefire checks of fire control equipment and launchers.

(3) The battery is allowed 7 hours to complete missile assembly and 8 hours to complete system preparation. Preparation time will stop when the battery commander announces that his unit is ready to assume a higher alert status or when the specified time limits have expired. At this time, the evaluation team will inspect each major item of equipment by performing certain critical checks as directed by the chief evaluator. If the equipment is found to be operational, the battery will assume a 15- or 20-minute status and begin the prefire testing phase. While performing the above inspection, the evaluators will deduct points for deficiencies as directed by the commander ordering the service practice.

(4) The firing battery must finish preparing the minimum equipment described in *c* below during the preparation phase. If at the end of the preparation phase, the unit has not met the minimum equipment requirements and it is determined that the failure is due to crew error, points will be deducted for overtime as prescribed by the commander ordering the service practice. Failure of the battery to meet the minimum equipment requirement and assume alert status within a reasonable time after overtime begins will be cause for declaring the unit NONOPERATIONAL. In this case the chief evaluator may recommend that the unit be returned to its home station for additional training.

(5) In the event of equipment failure which is determined not to be caused by crew error, time will be stopped, the equipment repaired, and the test resumed with no points assessed against the battery.

(6) Unused preparation time will be retained by the battery. Repair time used during the prefire testing and firing phase, if caused by personnel error, will be charged against the unused preparation time. If no preparation time remains, repair time, due to personnel error will be charged as overtime as explained in section III.

c. Minimum Equipment Requirements to Assume Alert Status. To assume an alert status the battery must have the following major items of equipment operational at the end of the preparation phase:

Battery control central (BCC)
Pulse acquisition radar (PAR)
Range-only radar (ROR)
High powered illuminator radar (HIPIR)
Two launchers (minimum) w/msl, 45-kw generators as required
Assault fire command console (AFCC)
Continuous-wave acquisition radar (CWAR)

6-7. Prefire Testing Phase

a. Purpose. The purpose of the prefire testing phase is to determine equipment readiness; the ability of the battery crew(s) to conduct target engagements within specified time limits, and to

evaluate the proficiency of battery fire control crew(s) to detect, identify, and engage difficult targets under ECM conditions.

b. Scope.

(1) The prefire testing phase is divided into two parts; an operational readiness evaluation (ORE) and a tactical effectiveness evaluation (TEE).

(2) The ORE will consist of one or more target runs during which the battery must perform target engagement exercises within specified time limits, hereafter referred to as alert status time. The engagement will consist of crew drill in both launcher and FC areas; detection, identification, and transfer of a target; and the simulated launch of a missile within the alert status time.

(3) The TEE will consist of two or more target courses. Raid size may be single, multiple, or both. All targets should use ECM. Battery crew(s) will demonstrate their state of training in—

(a) Detection, identification, and engagement of hostile targets through moderate to severe chaff; and transmission jamming; and destroying the target or targets prior to penetration of the defended area.

(b) Selection of appropriate ECCM fix, video mode, and radar frequency.

(c) Track-on-jam techniques.

(d) Use of range-only radar (ROR).

(e) Recognition of chaff dispersion.

(f) Application of rules of engagement and target correlation.

c. Procedures.

(1) This phase begins only after successful completion of the preparation phase. Target courses and specific areas for evaluation and scoring will be provided by the commander ordering the service practice. Maximum use will be made of the engagement simulator (AN/TPQ-21) for this phase as it provides more realistic targets than the use of live drones, i.e., ECM, multiple targets, pop-up targets, etc.

(2) Listed below are typical targets which may be used for target course design—

(a) Medium altitude, below 10,000 feet at speeds of 200-400 kmph.

(b) Medium altitude, below 10,000 feet at speeds of 400-1,600 kmph.

(c) Low altitude, below 500 feet at speeds of 200-400 kmph.

(d) Low altitude, below 500 feet at speeds of 400-1,600 kmph.

(e) Pop-up targets, high speed.

(3) Time required to complete this phase is not charged.

(4) Time to repair equipment malfunctions, if caused by personnel error, will be charged against unused preparation time. If no preparation time remains, repair time due to personnel error will be charged as overtime as explained in section III.

(5) No points will be deducted for delays due to lack of parts or direct support.

d. Evaluation. During the ORE, crew drill will be observed and evaluated in both the fire control and launcher areas. During the TEE, only the FC crew is evaluated.

(1) The crew will be evaluated on—

(a) Crew response time.

(b) Crew performance.

(c) Safety.

(2) During the TEE, the fire control crew will be evaluated on—

(a) Detection, identification, and engagement of hostile targets through moderate to severe ECM.

(b) Destruction of the target(s) prior to penetration of the defended area.

(c) Selection of proper ECCM techniques.

(d) Operator track-on-jam techniques.

(e) Use of ROR.

(f) Recognition of chaff dispersion.

(g) Application of rules of engagement.

6-8. Firing Phase

a. Purpose. The purpose of the firing phase is to evaluate the ability of the battery to successfully engage a simulated hostile target with a live missile within the alert status time.

b. Scope. The firing phase is conducted in two parts; a simulated engagement using a miniature missile simulator, and a live drone aircraft as a target; and an actual engagement using a live missile, and a drone aircraft as a target.

c. Procedures (Simulated Engagement).

(1) This phase begins only after successful completion of the prefire testing phase. The target parameters, altitude, speed, and direction will be determined by the chief evaluator. Specific areas for evaluation and scoring instructions will be provided by the commander ordering the service practice.

(2) Firing, actual or simulated, will be conducted in accordance with procedures below, as modified by the commander ordering the service practice.

(a) The chief evaluator orders the range cleared of unauthorized personnel.

(b) The senior battery evaluator com-

mands, BLAZING SKIES, to begin the simulated engagement.

(c) If live targets are available, the chief evaluator orders the target started on course for the first engagement (simulated).

(d) The battery commander orders his unit to BLAZING SKIES by sounding the siren.

(e) At BLAZING SKIES the senior battery evaluator assumes operational control of the battery and provides early warning to the tactical control officer (TCO).

(f) While maintaining continuous communication with the chief evaluator, the senior battery evaluator will designate a target at maximum range for the battery to engage.

(g) The TCO acquires the target and assigns it to a firing section.

(h) When the HIPIR is locked on target, the TCO begins correlation.

(i) When target correlation is completed and all other safety requirements are met, the senior battery evaluator, on order of the chief evaluator declares, TARGET HOSTILE, to the TCO. This authorizes the TCO to fire.

(j) When the target is in range, and before it reaches the minimum launch range (determined by the chief evaluator), the TCO will count down to fire by commanding, ABOUT TO ENGAGE, 5, 4, 3, 2, 1, FIRE. This completes the simulated engagement.

d. Procedures (Actual Engagement).

(1) At this time, the second crew, if applicable, will assume the stations and duties of the first crew, and repeat the above procedures except that the battery will be brought to BATTLE STATIONS and a live missile used for the engagement.

Note. The chief evaluator will insure that, prior to allowing the battery to engage—using a live missile, the range is cleared, the red safety flag is displayed, the surveillance radar is operating, roadguards are posted, and a range sweep is completed by aircraft.

(2) At launch, the senior battery evaluator, who is also the trajectory safety officer, closely observes the flight of the missile and target by means of the scope presentations in the battery control central. The missile also is observed by the range safety officer. Should safety requirements make it necessary to destroy the missile, the TCO will self-destruct the missile when ordered to do so by either the trajectory safety officer or the range safety officer.

Section III. SCORING OF HAWK SERVICE PRACTICE

6-9. General

a. Purpose. This section establishes minimum requirements, scoring weights and procedures, by phase, for evaluation of the Hawk battery service practice. The weight given each phase of the service practice is based on a maximum possible score of 2,000 points per missile battery. Only general scoring procedures are provided for scoring the service practice and for determining an overall service practice rating. Based on this guidance, and appropriate system technical and field manuals, commanders ordering service practice will provide detailed scoring instructions and procedures, including scoring materials, for the evaluation team.

b. Policy. Missile and/or equipment malfunctions resulting from personnel errors or omissions are chargeable against the battery being tested. Points will be assessed only for malfunctions that are caused by personnel error or omission. The point value for each procedures on each major item of equipment will be based on the relative importance of that procedure to the overall operation of the system. Errors of commission or omission are classified as either major or minor. Major errors are those operations or checks, which, if performed incorrectly or omitted, could cause equipment failure, Minor errors are those operations or checks, which, if performed incorrectly or omitted, are in violation of prescribed procedures. Safety violations are acts of commission or omission which expose personnel to injury or death.

c. Maximum Penalties. Maximum point penalties which can be assessed are detailed below:

(1) Safety violations—25 points each violation.

(2) Major crew errors—20 points each error.

(3) Minor errors—5 points each error.

(4) Misuse of tools, equipment, or test equipment—5 points each.

(5) Overtime—5 points per minute for a maximum of 50 points per occurrence.

6-10. Preparation Phase

a. Maximum Points. The maximum points a battery may be awarded or penalized during this phase is 600 points weighted as follows:

Missile Assembly and Checkout	*Points*
1st missile	150
2d missile	150
Total	300
System Preparation	
Fire control area equipment	200
Launcher area equipment	100
Total	300
Aggregate total	600

b. Missile Assembly and Checkout.

(1) Time for scored operations in the missile assembly area begins after the battery has accepted the test equipment and tools have been issued. Seven hours are allowed for missile assembly and checkout.

(2) Assembly area evaluators will observe and score—

(a) Decanning and assembly of two missiles.

(b) Missile checkout.

(c) Movement of missiles in the assembly area.

(d) Use of tools and test equipment.

(e) Safety.

Note. Time to transport missiles downrange is not chargeable against the battery.

(3) Missiles found to be NO GO will be replaced by the range support unit. Battery assembly personnel will assemble and check the replacement missile without loss of points, except for safety violations and misuse of tools and test equipment, to the same point the NO-GO missile was checked.

(4) Errors detected by battery personnel may be corrected without penalty.

(5) Errors not detected by battery personnel will be brought to their attention by the evaluator before the missile is moved. Time required to correct the error will be charged and points deducted for the error.

(6) Missile assembly time will end when two missiles are ready to be transported downrange. Final preparation of the missiles on the launchers will be charged to system preparation time.

(7) Scoring of assembly area operations will be according to instructions provided by the commander ordering the service practice.

c. System Preparation.

(1) During system preparation, battery personnel must perform daily, weekly, and prefire checks on all battery fire control area and launcher area equipment. Minimum equipment requirements as described in paragraph 6-6c must be accomplished during the preparation phase.

(2) A minimum of two evaluators is required to score this phase. One evaluator will station himself where he can observe the fire control crew and one where he can observe the launcher crews. Points will be assessed for safety violations, misuse of tools and test equipment, and deficiencies. Scoring willl be in accordance with policy explained in paragraph 6-9 *b*.

(3) After the battery has completed missile assembly and system preparation, the evaluation team will inspect the system and perform checks explained in paragraph 6-6 *b* and assess point deductions as directed by the commander ordering the service practice. If an item of equipment is found to be NONOPERATIONAL during this inspection, time required to repair will be charged to preparation time if due to personnel error. If not caused by personnel error, time to repair will not be charged.

(4) If due to personnel error, the battery is unable to meet the minimum equipment requirements within a reasonable amount of time, after overtime begins, the chief evaluator may declare the battery NONOPERATIONAL and recommend to the commander ordering the service practice that the battery be returned to home station for further training. If the failure to meet the minimum equipment requirement is due to nonavailability of repair parts or lack of direct support, the minimum equipment requirement may be waived by the chief evaluator provided the nonoperational equipment is not mission essential. If repair parts or direct support are not available for repair of mission essential equipment, then the equipment will be replaced and no points assessed against the battery.

6-11. Prefire Testing Phase

a. Completion Time. Time to complete this phase, except for alert status time, is not charged against the battery.

b. Maximum Points. The maximum points that a battery may be awarded or penalized is 1000 points weighted as follows:

Operational readiness evaluation 700 points
Tactical effectiveness evaluation 300 points
Total ..... 1000 points

c. Operational Readiness Evaluation.

(1) The ORE will begin when the battery commander announces that his unit is ready to assume an alert status. If equipment becomes nonoperational during the ORE, the time will be stopped and a determination made as to whether the malfunction is due to personnel error. If it is determined to be caused by personnel error, time will be stopped, the battery returned to the preparation phase, and the time used to repair

will be charged to unused preparation time. If no preparation time remains, time to repair will be charged as explained in paragraph 6-10*c* (3). If not caused by personnel error, time to repair will not be assessed. After the malfunction is repaired, the ORE is resumed.

(2) Evaluators will be present in both the fire control area and launcher area during the ORE. Battery fire control and launcher crews will perform crew drill as prescribed by appropriate directives to achieve a simulated missile launch within the alert status time.

(3) The evaluators will observe and evaluate, as a minimum, those procedures prescribed in FM 44-99 and—

(a) Crew performance.

(b) Reaction time.

(c) Safety.

(d) Use of tools and test equipment.

(4) The battery will be awarded a rating of OPERATIONAL if it achieves a simulated missile launch during the second engagement, within the alert status time.

(5) If the battery fails to achieve a simulated missile launch within the alert status time, crew performance will be rated UNSATISFACTORY and 200 points deducted. In this event, the chief evaluator may return the battery to the preparation phase for correction of deficiencies or he may recommend to the commander ordering the service practice that the battery be returned to home station for further training.

d. Tactical Effectiveness Evaluation.

(1) Time required to complete the TEE is not charged. Evaluators will evaluate and score only battery fire control personnel during the TEE.

(2) The launcher crews will not be evaluated during the TEE.

(3) Scoring of the TEE will be in accordance with instructions provided by the commander ordering the service practice. A deduction of more than 25 points for crew errors during one attack indicates inadequate training and will result in a crew performance rating of UNSATISFACTORY for that attack. A total deduction of more than 100 points for crew errors during the TEE will indicate a lack of training and will result in a rating of UNSATISFACTORY for crew performance during the TEE, and 400 points will be assessed against the battery.

(4) If equipment becomes nonoperational during the TEE, the TCO will declare, OUT OF ACTION, and time will stop for that attack. If the malfunction is determined to be caused by personnel error, time to repair will be added to preparation time. If it is determined to be due to causes other than personnel error, time to repair will not be assessed. When repair is completed, the battery will continue the TEE.

6-12. Firing Phase

a. The maximum points a battery may be awarded or penalized during the firing phase is 400 points weighted as follows:

First engagement (simulated)	200 points
Second engagement (actual)	200 points
Total	400 points

b. The battery will be rated operational if it achieves missile launch within the alert status time. A successful launch consists of timely detection and identification of the target, target transfer, and launching the missile. Provided the missile is successfully launched, no penalty will be assessed if the missile fails in flight. If the equipment fails during the engagement, no points will be assessed unless it can be positively determined that the malfunction was caused by crew error.

c. Time to complete the firing phase, except for alert status time, is not chargeable.

d. Crew errors will be considered minor errors unless it can be determined that, if not corrected, they could cause an unsuccessful mission.

e. Evaluators will observe and evaluate crew performance in all areas of the battery during both the simulated and actual engagements. Using appropriate technical and field manuals (app A), and instructions provided by the commander ordering the service practice, they will evaluate crew drill, reaction time (alert status time), and safety.

Section IV. SERVICE PRACTICE RATING AND CRITIQUE

6-13. General

Evaluators score and evaluate the battery in accordance with guidance provided in this chapter and instructions provided by the commander ordering the service practice. Completed score sheets and other recorded data are submitted to the chief evaluator. He will, in turn, add his comments, compute the overall score, prepare a service practice rating and a written evaluation report for the commander ordering the service

practice. Contents of the evaluation report will include—scores attained for each phase, point deductions for each phase, overall score, and any other pertinent material. The report may include copies of the score sheets with deficiencies referenced to the appropriate technical manual, field manual, regulation or directive not complied with.

6-14. Computation of Service Practice Rating

The chief evaluator, after computing the overall battery score, will compute the service practice rating in accordance with table 2-2.

6-15. Conduct of Critique

a. As soon as practicable after the service practice, the chief evaluator will conduct a critique for the battery commander and key personnel of the service practice unit. A copy of the evaluation report and score sheets will be provided to the battery commander in sufficient time for analysis prior to the critique.

b. Deficiencies and remarks in the report should be thoroughly understood by all concerned prior to the conclusion of the critique.

c. Battery commanders may submit comments for discussion concerning issues raised by the report. Comments may also be submitted in writing by the battery commander to the commander ordering the service practice. Notification to reclama should be provided the chief evaluator prior to departure for home station.

CHAPTER 7

IMPROVED HAWK SERVICE PRACTICE

Section I. GENERAL

7-1. Scope

Improved Hawk service practice is divided into three phases: preparation, prefire, and firing. Each phase is conducted and evaluated separately. Planners arrange for targets, select target courses, and require an equipment configuration that Improved Hawk missile batteries will employ in combat.

7-2. Application

Material contained in this chapter is applicable to Improved Hawk air defense artillery batteries organized under the 44-series TOE.

7-3. Targets and Courses

a. Numerous types of high-performance drone targets, operated by troop units or furnished and operated by contract personnel, are available for Improved Hawk service practice. When available, the target engagement simulator (AN/TPQ-29) should be used to the maximum extent in prefire testing exercises. The simulator enables fire control operators to experience target conditions that may be encountered in combat. Operators not only receive training in target detection, selection and tracking, but gain experience countering enemy electronic countermeasures (ECM) techniques and target evasive maneuvers.

b. To insure realism, courses should include targets that are difficult to detect, identify, track, and engage. Factors to consider when designing courses are—

(1) Capabilities of the systems as described in TM 9-1425-525-1 and TM 9-1425-525-2.

(2) Safety restrictions.

(3) Range limitations.

(4) Target types, characteristics, and availability.

(5) Availability of ECM-equipped targets.

c. Determining factors for a qualified firing phase target are that it—

(1) Originates as a track at a range and altitude that will require the fire unit to use maximum acquisition and tracking capabilities within the range limits of the equipment.

(2) Continues for one firing run to the minimum launch range.

d. Equipment should be sited, interconnected, and subsequently evaluated in its normal tactical configuration to provide a realistic test of the unit's ability to prepare the system for an engagement.

e. Units should be required to use tactical power on the firing range to conform to a tactical situation.

f. If missiles are available, one additional operational missile per launcher section may be loaded and armed for the firing run. In cases where the unit encounters a hangfire with not enough time to make an additional pass with the drone target, the tactical control officer (TCO) may direct the firing console operator (FCO) to select the second launcher with loaded missile and fire. This procedure will prevent the loss of a drone target and provide a realistic engagement sequence.

g. The illuminator radar mentioned throughout this text is the Improved high-powered illuminator radar (IHIPIR) AN/MPQ-46.

h. Ammunition allowances are contained in CTA 23-100-6.

7-4. Annual Service Paractice at Night For Improved Hawk ADA Missile Batteries

a. The Improved Hawk missile system is, by design, an all-weather air defense system and is capable of detecting, identifying, and engaging targets during the hours of darkness or poor visibility.

b. Commanders may direct annual service practice to be conducted at night for Improved Hawk units which have not previously fired at night. Notice should be given to the firing battery commander far enough in advance to conduct training necessary in emplacing and orienting and alining the battery at night.

7-5. Procedures

Procedures for detection, identification, and engagement at night are identical to procedures during daylight. However, for emplacement, orientation and alinement, and crew drill for battle stations, additional precautionary

measures, such as use of flashlights, headcount before firing, and etc., are necessary. For detailed procedures for emplacement, and orientation and alinment, see TM 9-1425-525-12-1, paragraph 6-3.

Section II. CONDUCT OF IMPROVED HAWK SERVICE PRACTICE

7-6. Preparation Phase

a. Purpose. The purpose of the preparation phase is to evaluate the ability of battery personnel to assemble and test missiles for firing and prepare associated equipment for an engagement.

b. Procedures.

(1) When the firing battery is to use equipment other than its own, the battery will be allowed a reasonable amount of time for inspection of the equipment, without adjustment, before accepting the system and beginning the preparation phase. The system should be energized and operational before it is turned over to the service practice unit. If the battery is to use its own equipment, unit personnel will be allowed a reasonable time to energize and check equipment before entering the preparation phase. The preparation phase will begin when the battery commander announces that his battery is ready to assume a higher status or when the time allotted for equipment inspection has expired.

(2) Major commanders, using appropriate system technical and procedural manuals (app A), and guidance provided herein, will prescribe actions and procedures to be performed by service practice units during the preparation phase. As a minimum the preparation phase will include the assembly and safety testing of one or more missiles and daily, weekly, and prefire checks of fire control equipment and quarterly checks on the launchers.

(3) The battery is allowed 4 hours to complete missile assembly and 10 hours to complete system preparation. Preparation time will stop when the battery commander announces that his unit is ready to assume a higher alert status or when the 10-hour time limit has expired. At this time, the evaluation team will inspect each major item of equipment by performing certain ciritical checks as directed by the chief evaluator. If the equipment is found to be operational, the battery will assume a 15- or 20-minute status and begin the prefire testing phase. While performing the above inspection, the evaluators will deduct points for deficiencies as directed by the commander ordering the service practice.

(4) The firing battery must finish preparing the minimum equipment described in *c* below during the preparation phase. If at the end of the preparation phase (10 hours), the unit has not met the minimum equipment requirements and it is determined that the failure is due to crew error, points will be deducted for overtime as prescribed by the commander ordering the service practice. Failure of the battery to meet the minimum equipment requirement and assume alert status within a reasonable time after overtime begins will be cause for declaring the unit NONOPERATIONAL. In this case the chief evaluator may recommend that the unit be returned to its home station for additional training.

(5) In the event of equipment failure which is determined not to be caused by crew error, time will be stopped, the equipment repaired, and the test resumed with no points assessed against the battery.

(6) Unused preparation time will be retained by the battery. Repair time used during the prefire testing and firing phases, if caused by crew error, will be charged against the unused preparation time. If no preparation time remains, repair time due to crew error will be charged as overtime as explained in section III.

c. Minimum Equipment Requirements to Assume Alert Status. To assume an alert status the following major items of equipment operational at the end of the preparation phase:

Improved battery control central (IBCC).

Improved pulse acquisition radar (IPAR).

Improved range-only radar (IROR).

Improved high-powered illuminator radar (IHIPIR).

Information coordination central (ICC).

Two improved launchers (minimum) w/msl, 45-kw generators as required.

Improved continuous-wave acquisition radar (ICWAR).

7-7. Prefire Testing Phase

a. Purpose. The purpose of the prefire testing phase is to determine: equipment readiness; the ability of the battery crew(s) to conduct target engagements within specified time limits; and to evaluate the proficiency of battery fire control crew(s) to detect, identify, and engage difficult targets under ECM conditions.

b. Scope.

(1) The prefire testing phase is divided into two parts, an operational readiness evaluation (ORE) and a tactical effectiveness evaluation (TEE).

(2) The ORE will consist of one or more target runs during which the battery must perform target engagement exercises within specific time limits, hereafter referred to as alert status time. The engagement will consist of crew drill in both FC and launcher areas, detection, identification, and transfer of a target, and the simulated launch of a missile within the alert status time.

(3) The TEE will consist of two or more target courses. Raid size may be single, multiple, or both. All targets should use ECM. Battery crew(s) will demonstrate their state of training in—

(a) Detection, identification, and engagement of hostile targets through moderate to severe chaff, D-band, F-band, and I-band jamming, and to destroy the target or targets prior to penetration of the defended area.

(b) Selection of appropriate ECCM fix, video mode, and radar frequency.

(c) Track-on-jam techniques.

(d) Use of Improved range-only radar (IROR).

(e) Recognition of chaff dispersion.

(f) Application of rules of engagement and target correlation.

c. Procedures.

(1) This phase begins only after successful completion of the preparation phase. Target courses and specific areas for evaluation and scoring will be provided by the commander ordering the service practice. Maximum use will be made of the engagement simulator (AN/TPQ-29) for this phase as it provides more realistic targets than the use of live drones, i.e., ECM, multiple targets pop-up targets, etc.

(2) Listed below are typical targets which may be used for target course design—

(a) Medium altitude, below 10,000 feet at speeds of 0-600 kmph.

(b) Medium altitude, below 10,000 feet at speeds of 600-3,000 kmph.

(c) Low altitude, below 500 feet at speeds of 0-600 kmph.

(d) Low altitude, below 500 feet at speeds of 600-3,000 kmph.

(e) Pop-up targets, high speed.

(3) Time required to complete this phase is not charged.

(4) Time to repair equipment malfunctions, if attributed to crew error, will be charged against unused preparation time. If no preparation time remains, time to repair caused by crew error will be charged as overtime as explained in section III.

(5) No points will be deducted for delays due to lack of repair parts or direct support.

7-8. Firing Phase

a. Purpose. The purpose of the firing phase is to evaluate the ability of the battery to successfully engage a simulated hostile target with a live missile within the alert status time.

b. Scope. The firing phase is conducted in two parts; a simulated engagement using a miniature missile simulator, and a live drone aircraft as a target; and an actual engagement using a live missile, and a drone aircraft as a target.

c. Procedures (Simulated Engagement).

(1) This phase begins only after successful completion of the prefire testing phase. The target parameters, altitude, speed, and direction will be determined by the chief evaluator. Specific areas for evaluation and scoring instructions will be provided by the commander ordering the service practice.

(2) Firing, actual or simulated, will be conducted in accordance with procedures below, as modified by the commander ordering the service practice.

(a) The chief evaluator orders the range cleared of unauthorized personnel.

(b) The senior battery evaluator commands, BLAZING SKIES, to begin the simulated engagement.

(c) If live targets are available, the chief evaluator orders the target started on course for the first engagement (simulated).

(d) The battery commander orders his unit to BLAZING SKIES by sounding the siren.

(e) At BLAZING SKIES the senior battery evaluator assumes operational control of the battery and provides early warning to the tactical control officer (TCO).

(f) Battery crews perform crew drill and prepare to engage.

(g) While maintaining continuous communication with the chief evaluator, the senior battery evaluator will designate a target at maximum range for the battery to engage.

(h) The TCO acquires the target and assigns it to a firing section.

(i) When the IHIPIR is locked on target, the TCO begins correlation.

(j) When target correlation is completed

and all other safety requirements are met, the senior battery evaluator, on order of the chief evaluator, declares, TARGET HOSTILE to the TCO. This authorizes the TCO to fire.

(k) When the target is in range and before it reaches the minimum launch range (determined by the chief evaluator), the TCO will count down to fire by commanding, ABOUT TO ENGAGE, 5, 4, 3, 2, 1, FIRE. This completes the simulated engagement.

d. Procedures (Actual Engagement).

(1) At this time, the second crew, if applicable, will assume the stations and duties of the first crew, and repeat the above procedures except that the battery will be brought to battle stations and a live missile used for the engagement.

Note. The chief evaluator will insure that, prior to allowing the battery to engage,—using a live missile, the range is cleared, the red safety flag is displayed, the surveillance radar is operating, roadguards are posted, and a range sweep is completed by aircraft.

(2) At launch, the senior battery evaluator, who is also the trajectory safety officer, closely observes the flight of the missile and target by means of the scope presentations in the battery control central. The missile also is observed by the range safety officer. Should safety requirements make it necessary to destroy the missile, the TCO will self-destruct the missile when ordered to do so by either the trajectory safety officer or the range safety officer.

Section III. SCORING OF IMPROVED HAWK SERVICE PRACTICE

7-9. General

a. Purpose. This section establishes minimum requirements, scoring weights and procedures, by phase, for evaluation of the Improved Hawk battery service practice. The weight given each phase of the service practice is based on a maximum possible score of 2,000 points per missile battery. Only general scoring procedures are provided for scoring the service practice and for determining an overall service practice rating. Based on this guidance, and appropriate system technical and field manuals (app A). the commanders ordering service practice will provide detailed scoring instructions and procedures, including scoring materials, for the evaluation team.

b. Policy. Missile and/or equipment malfunctions resulting from personnel errors or omissions are chargeable against the battery being tested. No points will be assessed for malfunctions that are not caused by personnel error or omission. The point value for each procedure on each major item of equipment will be based on the relative importance of that procedure to the overall operation of the system. Errors of commission or omission are classified as either major or minor. Major errors are those operations or checks, which, if performed incorrectly or omitted, could cause equipment failure. A maximum of 20 points will be assessed for each major error. Minor errors are those operations, which, if performed incorrectly or omitted, are in violation of prescribed procedures. Safety violations are acts of commission or omission which expose personnel to injury or death.

c. Maximum Penalties. Maximum point penalties which can be assessed against the battery are detailed below:

(1) Safety violations—25 points each violation.

(2) Major crew errors—20 points each error.

(3) Minor errors—5 points each error.

(4) Misuse of tools, equipment, or test equipment—5 points each.

(5) Overtime—5 points per minute for a maximum of 50 points per occurrence.

7-10. Preparation Phase

a. Maximum Points. The maximum points a battery may be awarded or penalized during this phase is 600 points weighted as follows:

Missile Assembly and Checkout		*Points*
1st missile		150
2d missile		150
	Total	300
System Preparation		200
Fire control area equipment		100
Launcher area equipment	Total	300
	Aggregate total	600

b. Missile Assembly and Checkout.

(1) Time for scored operations in the missile assembly area begins after the battery has accepted the test equipment and tools have been issued. Four hours are allowed for missile assembly and safety checks.

(2) Assembly area evaluators will observe and score—

(a) Decanning and assembly of two missiles.

(b) Missile safety checks.

(c) Movement of missiles in the assembly area.

(d) Use of tools and test equipment.

(e) Safety.

Note. Time to transport missiles downrange is not chargeable against the battery.

(3) Missiles found to be unsafe will be replaced by the range support unit. Battery assembly personnel will assemble and check the replacement missile without loss of points, except for safety violations and misuse of tools and test equipment, to the same point the unsafe missile was checked.

(4) Errors detected by battery personnel may be corrected without penalty.

(5) Errors not detected by battery personnel will be brought to their attention by the evaluator before the missile is moved. Time required to correct the error will be charged and points deducted for the error.

(6) Missile assembly time will end when two missiles are ready to be transported downrange. Final preparation of the missiles on the launchers will be charged to system preparation time.

(7) Scoring of assembly area operations will be according to instructions provided by the commander ordering the service practice.

c. System Preparation.

(1) During system preparation, battery personnel must perform daily, weekly, and prefire checks on all battery fire control equipment and quarterly checks on all launchers. Minimum equipment requirements, as described in paragraph 7-6*c*, must be accomplished during the preparation phase.

(2) A minimum of two evaluators is required to evaluate this phase. One evaluator will station himself where he can observe the fire control crew and one where he can observe the launcher crews. Points will be assessed only for safety violations and misuse of tools and test equipment while the battery is preparing the equipment. Scoring will be in accordance with policy explained in paragraph 7-9.

(3) After the battery has completed missile assembly and system preparation, the evaluation team will inspect the system and perform checks explained in paragraph 7-6*b* and assess point deductions as directed by the commander ordering the service practice. If an item of equipment is found to be NONOPERATIONAL during this inspection, time required to repair it will be charged to the preparation phase if due to personnel error. If not caused by personnel error, time to repair will not be charged.

(4) If due to personnel error, the battery is unable to meet the minimum equipment requirements within a reasonable amount of time, after overtime begins, the chief evaluator may declare the battery NONOPERATIONAL. In that event, he may recommend to the commander ordering the service practice that the battery be returned to home station for further training. If the failure to meet the minimum equipment requirement is due to nonavailability of repair parts or lack of direct support, the minimum equipment requirement may be waived by the chief evaluator provided the nonoperational equipment is not mission essential. If repair parts or direct support are not available for repair of mission essential equipment, then the equipment will be replaced and no points assessed against the battery.

7-11. Prefire Testing Phase

a. Completion Time. Time to complete this phase, except for alert status time, is not charged against the battery.

b. Maximum Points. The maximum points that a battery may be awarded or penalized is 1000 points weighted as follows:

Operational readiness evaluation	300 points
Tactical effectiveness evaluation	700 points
Total	1000 points

c. Operational Readiness Evaluation.

(1) The ORE will begin when the battery commander announces that his unit is ready to assume an alert status. If equipment becomes nonoperational during the ORE, the time will be stopped and a determination made as to whether the malfunction is due to personnel error. If it is determined to be caused by personnel error, time will be stopped, the battery returned to the preparation phase, and the time used to repair will be charged to unused preparation time. If no preparation time remains, time to repair will be charged against the battery preparation time as explained in 7-9*b*. If caused by other than personnel error, time to repair will not be assessed. After the malfunction is repaired, the ORE is resumed.

(2) Evaluators will be present in both the fire control area and the launcher area during the ORE. Battery fire control and launcher crews will perform crew drill as prescribed by appropriate directives to achieve a simulated missile launch within the alert status time.

(3) The evaluators will observe and evaluate, as a minimum, those procedures prescribed in FM 44-101.

(a) Crew performance.

(b) Reaction time.

(c) Safety.

(d) Use of tools and test equipment.

(4) The battery will be awarded a rating of OPERATIONAL if it achieves a simulated missile launch during the second engagement, within the alert status time.

(5) If the battery fails to achieve a simulated missile launch within the alert status time, crew performance will be rated UNSATISFACTORY, and 300 points deducted. In this event, the chief evaluator may return the battery to the preparation phase for correction of deficiencies or he may recommend to the commander ordering the service practice that the battery be returned to home station for further training.

d. Tactical Effectiveness Evaluation.

(1) Time required to complete the TEE is not charged. Evaluators will evaluate and score only battery fire control personnel during the TEE.

(2) The launcher crews will not be evaluated during the TEE.

(3) Scoring of the TEE will be in accordance with instructions provided by the commander ordering the service practice. A deduction of more than 20 points for crew errors during one attack indicates inadequate training and will result in a crew performance rating of UNSATISFACTORY for that attack. A total deduction of more than 75 points for crew errors during the TEE will indicate a lack of training and will result in a rating of UNSATISFACTORY for crew performance during the TEE.

(4) If equipment becomes nonoperational during the TEE, the TCO will declare, OUT OF ACTION, and time will stop for that attack. If the malfunction is determined to be caused by personnel error, time to repair will be added to preparation time. If it is determined to be due to other than personnel error, time to repair will not be assessed. When repair is completed, the battery will continue the TEE.

7-12. Firing Phase

a. The maximum points a battery may be awarded or penalized during the firing phase is 400 points weighted as follows:

First engagement (simulated)	200 points
Second engagement (actual)	200 points
Total	400 points

b. The battery will be rated operational if it achieves missile launch within the alert status time. A successful launch consists of timely detection and identification of the target, target transfer, and launching the missile. Provided the missile is successfully launched, no penalty will be assessed if the missile fails in flight. If the equipment fails during the engagement, no points will be assessed unless it can be positively determined that the malfunction was caused by crew error.

c. Time to complete the firing phase, except for alert status time, is not chargeable.

d. Crew errors will be considered minor errors unless it can be determined that, if not corrected, they could cause an unsuccessful mission.

e. Evaluators will observe and evaluate crew performance in all areas of the battery during both the simulated and actual engagements. Using appropriate technical and field manuals (app A), and instructions provided by the commander ordering the service practice, they will evaluate crew drill, reaction time (alert status time), and safety.

Section IV. SERVICE PRACTICE RATING AND CRITIQUE

7-13. General

When the firing phase is completed, evaluators will complete score sheets in accordance with instructions provided by the commander ordering the service practice. Completed score sheets and other recorded data are submitted to the chief evaluator. He will, in turn, add his comments, compute the overall score, prepare a service practice rating of Unsatisfactory or Satisfactory, and a written evaluation report for the commander ordering the service practice. Contents of the evaluation report will include scores attained for each phase, point deductions for each phase, overall score, and any other pertinent information. The report may include copies of the score sheets with deficiencies referenced to the appropriate technical manual, field manual, regulation, or directive not complied with.

7-14. Computation of Service Practice Rating

The chief evaluator, after computing the overall

battery score, will compute the service practice rating in accordance with table 2-3.

7-15. Conduct of Critique

a. As soon as practicable after the service practice, the chief evaluator will conduct a critique for the battery commander and key personnel of the service practice unit. A copy of the evaluation report and score sheets will be provided to the battery commander in sufficient time for analysis prior to the critique.

b. Deficiencies and remarks in the report should be thoroughly understood by all concerned prior to the conclusion of the critique.

c. Battery commanders may submit comments for discussion concerning issues raised by the report. Comments may also be submitted in writing by the battery commander to the commander ordering the service. Notification to reclama will be provided the chief evaluator prior to departure for home station.

CHAPTER 8

CHAPARRAL SERVICE PRACTICE

Section I. GENERAL

8-1. Scope

Chaparral service practice is divided into three phases: missile preparation, squad prefire testing, and firing. Each phase is conducted and evaluated separately. To provide maximum training value, service practice planners should arrange targets; design target courses; and require siting and operation of the equipment that will measure the unit's ability to perform its combat mission. It is recommended that, as part of the service practice, selected Chaparral squads fire during the hours of darkness.

8-2. Application

Material in this chapter is applicable to Chaparral batteries organized under all 44-series TOE. It does not include guidance on the use of the forward area alerting radar (FAAR) and the target alert data display set (TADDS).

8-3. Targets and Courses

a. The ballistic aerial target system (BATS) is normally used for Chaparral firing.

b. Within range safety limitations, target courses should—

(1) Be flown within the capabilities of the Chaparral system.

(2) Exercise the system and crew at their maximum capability.

(3) Vary target range, speed, course, and altitude.

c. For further information concerning BATS target course design and performance characteristics see FM 44-102 and TM 9-1340-418-12.

8-4. Ammunition Requirements

Ammunition allocations are contained in CTA 23-100-6.

8-5. Organization for Service Practice

a. A successful Chaparral evaluation requires careful planning and coordination between the unit and the range. Although the physical layout of ranges may vary, the following stations should be designated.

(1) *Preparation station.* This is a station where service practice personnel assemble and are briefed on procedures and safety, the squads check completeness of equipment and perform required maintenance.

(2) *Missile assembly station.* This is the station where missiles to be fired are received, inspected, checked, and prepared for issue. The battery system maintenance and ammunition section is evaluated at this station.

(3) *Prefire testing station.* At this station each squad is evaluated on how they perform examine equipment drill, missile loading drill, and preparation for action drill.

(4) *Firing station.* This station is the firing point where live missiles are received, loaded on the launch rails, and fired.

(5) *Final station.* At this station squads are critiqued on their performance during the service practice. Each squad should be critiqued individually as soon as it leaves the firing line.

b. Battery TOE equipment should be used for the service practice, if practicable. Each squad should use its assigned weapon system for all phases of the service practice. Battery organization structure should be maintained to encourage squad and platoon competition.

Section II. CONDUCT OF CHAPARRAL SERVICE PRACTICE

8-6. General

a. Equipment.

(1) If the firing battery is to use equipment other than its own, the battery will be allowed a reasonable amount of time for inspection of the equipment before accepting the equipment and beginning missile preparation and squad prefire test phases. The equipment will be energized and operational before it is turned over to the unit. If using its own equipment, the battery will be

allowed time to check the equipment before beginning the missile preparation and prefire testing phases.

(2) Scored operations will begin when the battery commander announces he is ready to begin the service practice, or when alloted time for equipment check and inspection has expired.

b. Time Limits. Normally there is no time limit, except for the missile loading drill. The prefire testing and missile preparation phases end when all squads have completed their examine equipment procedures, loading exercises, preparation for action drills, and the maintenance and ammunition section has completed missile assembly and checkout. The evaluators then determine that each system is operational. As each squad completes the squad prefire test phase, the squad will prepare to begin the firing phase.

8-7. Missile Preparation Phase

a. Purpose. The purpose of this phase is to evaluate the ability of the battery system maintenance/ammunition section to assemble and test missiles for firing.

b. Procedures. The missile preparation phase consists of the receipt, inspection, assembly, and test of missiles to be fired. Missile receipt, inspection, handling, disassembly, test, and assembly procedures are contained in TM 9-1410-585-24 and TM 9-4953-587-12.

c. Evaluation. During this phase, the systems maintenance/ammunition section will be evaluated on the receipt, inspection, disassembly, testing, and assembly of missiles to be fired.

d. Detailed Procedures. Commanders ordering service practice may prescribe detailed actions and procedures for this phase. As a minimum, they must follow the guidance prescribed in *b* above.

8-8. Squad Prefire Testing Phase

a. Purpose. The purpose of this phase is to evaluate the ability of the squads to perform.

(1) Examine equipment drill.

(2) Missile loading drill.

(3) Preparation for action drill.

b. Procedures. Each squad will perform examine equipment drill on their weapon; a timed missile loading exercise; and preparation for action drill. Procedures are in FM 44-4, and TM 9-1440-585-10, and TM 9-1450-585-10.

c. Evaluation. During this phase each squad will be evaluated on their performance of examine equipment drill, the timed missile loading drill, and preparation for action drill. The timed loading exercise must be accomplished in eight minutes or less. All operations will be scored for proper procedures, crew performance, and safety.

d. Detailed Procedures. Commanders ordering service practice, may prescribe detailed actions and procedures to be performed during this phase. As a minimum, they must follow the guidance prescribed in *b* above.

8-9. Firing Phase

a. Purpose. The purpose of this phase is to evaluate the ability of the battery to deliver effective fire against simulated hostile targets.

b. Procedures.

(1) Loading of live missiles will be done on the firing line before the firing phase begins. Only safety will be scored.

(2) Each squad will be evaluated separately. Target engagement drill will be performed in accordance with FM 44-4, TM 9-1440-585-10, and detailed instructions provided by the commander ordering the service practice.

(3) During firing, the squad leader will position himself as near the launcher as safety permits. The safety officer will be in position to enforce safety and act as trajectory safety officer when the missile is launched.

(4) When the squad is ready, the senior battery evaluator will announce an air defense warning RED, and weapons control status of WEAPONS TIGHT.

(5) The chief evaluator will insure that the range is cleared of unauthorized personnel, the range flag is raised, the surveillance radar is radiating, and all safety and control personnel are in position.

(6) When the above actions have been accomplished, the chief evaluator will order the target launched. The squad leader assumes control of his squad and engages the target.

c. Evaluation. During this phase each squad will be evaluated on crew performance, successful launch, and safety.

Section III. SOCRING OF CHAPARRAL SERVICE PRACTICE

8-10. General

a. Purpose. This section establishes minimum requirements, scoring weights, and procedures, by phase, for evaluation of the Chaparral battery

service practice. The weight given each phase is based on a maximum possible score of 3,600 points (250 points per squad and 600 points for missiles prepared). Only general scoring procedures are provided to determine an overall rating. Based on this guidance, and appropriate system technical manuals and field manuals, commanders ordering service practice should provide detailed scoring instructions and scoring materials for the evaluation team.

b. Policy. Missile and/or equipment malfunctions resulting from screw errors or omissions are chargeable against the battery. For malfunctions that are not caused by personnel error or omission no points will be deducted. The point value for each procedure will be based on the relative importance of that procedure to the overall operation of the system. Errors of commission or omission are classified as either major or minor. Major errors are operations or checks, performed incorrectly or omitted, that would cause mission failure. Minor errors are those operations or checks, performed incorrectly or omitted, that are in violation of prescribed procedures. Safety violations are acts of commission or omission which expose personnel to injury or death. Maximum point deductions are as follows:

(1) Major crew errors—10 points each error.

(2) Minor crew errors—5 points each error.

(3) Safety violations—15 points each.

(4) Misuse or improper use of tools, equipment, or test equipment—5 points each.

(5) Overtime (missile reloading exercise)—5 points for each 10 seconds or portions thereof in excess of 8 minutes.

c. Maximum Scores. Batteries can score a total of 250 points for each available squad and 600 points for missiles prepared, for a maximum score of 3,600 points if a complete battery (12 squads) is evaluated. Batteries with a lesser number of squads can score a maximum of 250 points multiplied by the number of squads available for service practice, plus the number of points that can be earned by the system maintenance and ammunition section. Weights of the three phases are described below.

Phase	Maximum points possible system maintenance ammunition section	Maximum points per squad	Maximum points per battery
Missile preparation	600 (See note 2)		600
Squad prefire test		(150)	1800
Examine equipment drill		50	
Missile loading drill		50	
Preparation for action drill		50	
Firing		(100)	1200
Target engagement drill		100	
Total possible score	600 (System Maintenance ammunition section)	250	3600

Notes:

1. If any phase above is evaluated at less than 70% of maximum possible score, the battery will be rated UNSATISFACTORY.
2. The missile preparation evaluation is based on the assembly and checkout of one missile per participating squad.

8-11. Missile Preparation Phase

a. Maximum Points. The maximum that may be awarded during this phase is 600 points for a 12-squad battery.

b. Evaluation.

(1) Procedures for missile preparation are in TM 9-1410-585-24 and TM 9-4935-587-12.

(2) The assembly and testing of missiles is not a timed exercise. Evaluators will observe and score:

(a) Decanning, inspection, and assembly of a Chaparral missile.

(b) Missile testing.

(c) Movement of missiles.

(d) Use of tools, equipment, and test equipment.

(e) Safety.

(3) Missiles found to be unsafe or nonoperational will be replaced or repaired by the direct support unit. Battery personnel will assemble and test the replacement missile, without loss of points, to the same point the unsafe or nonoperational missile was tested, except for safety violations and misuse of tools or test equipment.

(4) Errors detected by battery missile assembly personnel may be corrected without penalty.

(5) Errors not detected by battery missile assembly personnel will be pointed out by the evaluator.

8-12. Squad Prefire Testing Phase

a. Maximum Points. The maximum points a battery may earn for this phase is 1,800 points (150 points per squad for a 12-squad battery) weighted as follows:

	Points per squad
Examine equipment drill	50
Missile loading (8 minutes or less)	50
Preparation for action drill	50

b. Evaluation.

(1) Procedures to be evaluated are in FM 44-4, TM 9-1440-585-20, and TM 9-1450-585-10, and local range regulations.

(2) During this phase Chaparral squads will be evaluated on—

(a) Checkout of the carrier, launching station, and related subsystems including communications using *examine equipment* procedures in FM 44-4.

(b) A timed loading of four missiles from the carrier storage compartments to the launcher rails. Point deductions for overtime will be 5 points for each 10 seconds or portion thereof in excess of 8 minutes.

(c) Preparation for action drill.

(d) Use of tools, equipment, and test equipment.

(e) Completion of required maintenance forms.

(f) Safety.

8-13. Firing Phase

a. References. Procedures are in FM 44-4 and TM 9-1440-585-20.

b. Maximum Points. The maximum points a battery can earn is 1,200 points (100 points per squad).

c. Evaluation. Evaluators will observe and score each squad on crew performance, successful launch, and safety.

Section IV. SERVICE PRACTICE RATING AND CRITIQUE

8-14. General

When the firing phase is completed, evaluators will complete the score sheets in accordance with instructions provided by the commander ordering the service practice. Completed score sheets and other recorded data are submitted to the chief evaluator. He will in turn add his comments, compute the overall score, prepare a service practice rating of satisfactory or unsatisfactory, and a written evaluation report for the commander ordering the service practice. Contents of the report will include scores for each phase, point deductions, overall score, and any other pertinent information. The report may include copies of score sheets with deficiencies referenced to the appropriate field manual, technical manual, regulation, or other directive.

8-15. Squad/ Section Rating

If a squad/section scores 70 percent or more of the maximum possible score for each phase evaluated, a rating of SATISFACTORY will be awarded to that squad.

8-16. Computation of Battery Service Practice Rating

The chief evaluator, after computing the overall score, will compute a service practice rating for the battery in accordance with table 2-4.

8-17. Conduct of Critique

a. As soon as practicable after the service practice, the chief evaluator will conduct a critique for the battery commander and key personnel of the service practice unit. A copy of the evaluation report and score sheets will be provided to the battery commander in sufficient time for analysis prior to the critique.

b. Battery commanders may submit comments for discussion concerning the report. Reclamas will be submitted in writing by the battery commander through channels, to the commander ordering the service practice. Notification of intent to reclama will be made to the chief evaluator prior to departure from the range.

CHAPTER 9

VULCAN SERVICE PRACTICE

Section I. GENERAL

9-1. Scope

a. Vulcan service practice is divided into three phases; prefire testing, air defense firing, and ground firing. Each phase is conducted and evaluated separately. To provide maximum training value, service practice planners should arrange targets, design target courses, and require siting and operation of equipment in a manner that will measure the unit's ability to perform its combat mission.

b. It is recommended that, as part of the service practice, selected squads fire during the hours of darkness.

9-2. Application

Material in this chapter is applicable to Vulcan batteries organized under all 44-series TOE. It does not include guidance on the use of the forward area alerting radar (FAAR) and target alert data display set (TADDS).

9-3. Targets and Courses

Refer to table 9-1.

a. The ballistic aerial target system (BATS) is the target normally used for Vulcan firing. Other type targets are available and may be used. Salvage vehicles are normally used for ground firing targets. (Table 9-1 lists several suggested target courses for air defense and ground firing.)

b. Within range safety limitations, target courses should—

(1) Be flown within the capabilities of the Vulcan system.

(2) Exercises the system and crew at their maximum capabilities.

(3) Vary target range, speed, course, and altitude.

c. For detailed information on target courses for Vulcan and characteristics of BATS, see FM 44-102 and TM 9-1340-418-12.

Table 9-1. Target Courses, Vulcan Gun M163/M167

AIR DEFENSE FIRING PHASE

Target course	Altitude (feet)		Range (meters)		Mode of control	Practice	Record
	Max	Min	Max	Min			
Crossing Level	1,000	500	1,600	800	Radar Manual	10 5	1 1
Crossing Diving	1,500	500	1,600	800	Radar External	15 5	1 1
Incoming Diagonal	1,000	500	1,600	800	Radar	15	2
Outgoing Diagonal	1,000	500	1,600	800	Radar	15	2
					Total Courses	65	8

GROUND FIRING PHASE

Target Course	Range (meters)	Practice	Record
Direct Fire, Stationary Target	800-1,500	15	2
Direct Fire, Moving Target	1,500 closing to 600	20	3
Static Fire	1,000-2,000	10	2

9-4. Ammunition Requirements

Suggested ammunition for the air defense and ground firing phase are listed in table 9-2. Ammunition authorization is detailed in CTA 23-100-6.

Table 9-2. Ammunition Requirements for Vulcan Weapon Systems M163/M167

Type firing	Rd each mount	No. of courses	Total rd per mount	No. of fire units	Battery total
AIR DEFENSE FIRING PHASE (See Note 1)					
Air Defense Practice	30	40	1,200	12	14,400
Air Defense Practice	60	25	1,500	12	18,000
ATT Firing Phase or ASP	60	8	480	12	5,760
			Subtotal		38,160
GROUND FIRING PHASE (See Note 2)					
Direct Fire, Stationary Target-Practice	30	15	450	12	5,400
Direct Fire, Stationary Target-ATT or ASP	30	2	60	12	720
Direct Fire, Moving Target-Practice	30	20	600	12	7,200
Direct Fire, Moving Target-ATT or ASP	30	3	90	12	1,080
Static Fire-Practice	(60)	(10)	(600)	(12)	(7,200)
Static Fire-ATT or ASP	(60)	(2)	(120)	(12)	(1,440)
			Subtotal		23,040
			Total Rd		46,440 TP 14,200 61,200*

* Fifteen percent of total may be added for contingency needs (e.g., test firing and repeat courses).

Notes.

1. Ammunition M220 TP-T is used for aerial fire.
2. Ammunition mix of seven ball, M56A3 to one ball, M220 TP-T is used for ground fire on stationary targets. Use M220 TP-T for ground fire on moving target in lieu of ball M56A3.
3. The table is intended as a guide for the planning of service practices. Ammunition allowances to support these firings are authorized in CTA 23-100-6.

9-5. Organization for Service Practice

a. A successful Vulcan evaluation requires careful planning and coordination between the unit and the range. Facilities must be provided for both aerial and ground target firing. To avoid confusion, stations, as listed below, will facilitate a meaningful service practice.

(1) *Preparation station.* At this station, unit personnel are briefed as to the sequence of events to follow, procedures, and safety. The squads check completeness of equipment and perform required maintenance.

(2) *Ammunition station.* Ammunition to be fired is inspected and loaded by each squad.

(3) *Prefire station.* At this station, the fire units are placed on the firing line where squad proficiency and the operational status of the equipment are verified. A timed ammunition loading exercise is also performed.

(4) *Firing station.* Live firing is performed. However, if time permits and ammunition is available, crews should be allowed some practice firing before commencing live firing exercises. If range facilities permit, both aerial and ground targets may be engaged from the same firing point. Moving targets are necessary for ground firing. Firing techniques for direct fire are explained in FM 44-5 or FM 44-100, and FM 44-62.

(5) *Final stations.* At this station squads are critiqued on their performance after completing the firing phases.

b. Equipment. Battery TOE equipment should be used for service practice if practicable. Each squad should use its assigned weapon system for all phases of the service practice. Battery organization should be maintained to encourage squad and platoon competition.

Section II. CONDUCT OF VULCAN SERVICE PRACTICE

9-6. General

a. Equipment.

(1) If the battery is to use equipment other than its own, battery personnel will be allowed a reasonable amount of time for inspection of the equipment before beginning scored operations. Equipment should be energized and operational when turned over to the battery. If the battery uses its own equipment, the battery will be allowed time to inspect and check the equipment before beginning scored operations.

(2) When the inspection of the equipment is completed, and the battery commander declares his unit ready, the prefire testing phase may begin.

b. Time Limits. Normally there is no time limit, except for the ammunition loading drill. The prefire testing phase ends when all squads have completed the ammunition loading and preparation for action drills. As each squad completes this phase, the squad will prepare to begin the firing phases.

9-7. Prefire Testing Phase

a. Purpose. The purpose of the prefire testing phase is to evaluate the ability of the squads to check and service weapon systems, inspect and load ammunition, and perform emplacement and prefire checks and adjustments.

b. Procedures. Each squad will perform emplacement drill of its weapon system, and prefire checks and adjustment procedures. When prefire checks have been completed, each squad will load ammunition (M167-300 rounds in 5 minutes; M163-500 rounds in 5 minutes). Loading procedures are contained in FM 44-5 and FM 44-100.

c. Evaluation. During this phase each squad will be evaluated in their performance of the timed ammunition loading drill, and preparation for action drill. The timed loading exercise must be accomplished in 5 minutes or less. All operations will be scored for proper procedures, crew performance, and safety.

d. Detailed Procedures. Commanders ordering service practice, using FM 44-5 and FM 44-100, appropriate system technical manuals, and guidance provided herein, will prescribe detailed actions and procedures to be performed by the battery during the prefire testing phase. As a minimum each Vulcan squad will perform those events described in *b* above.

9-8. Air Defense Firing Phase

a. Purpose. The purpose of the air defense firing phase is to evaluate the proficiency of the battery to deliver effective fire against simulated hostile aricraft. This phase will require each Vulcan squad to perform live ammunition loading (evaluated for safety only) and target engagement drill.

b. Procedures.

(1) Each squad will begin the air defense firing phase upon successful completion of the prefire testing phase. Target engagement drill will be conducted as described in FM 44-5 or FM 44-100, or as directed by the commander ordering the service practice. This drill should be conducted on the firing line.

(2) A typical firing range is shown in figure 9-1. When the squad leader declares his fire unit ready for action, the senior battery evaluator will insure that safety personnel are in position, the red flag is hoisted, and the range is clear of aircraft and personnel. When these actions have been completed, the senior evaluator will request the chief evaluator to launch the target. An OIC, who may also act as safety officer, will be with each fire unit during the firing. When the senior evaluator requests the target to be launched, he will announce weapons control status "weapons tight," early warning information, and air defense warning RED. A fire unit safety officer will control the fire of each weapon by use of the external arm-safe switch to enable or disable the weapon. The weapon will be enabled only when pointed down range inside the safe field of fire. He will authorize the gunner to fire the weapon only when the target has entered the left or right limit of the safe field of fire, and will disable the weapon when it leaves the safe field of fire. At this time the gun should be elevated to 30° and pointed down range until the next firing run.

SURFACE DANGER ZONE

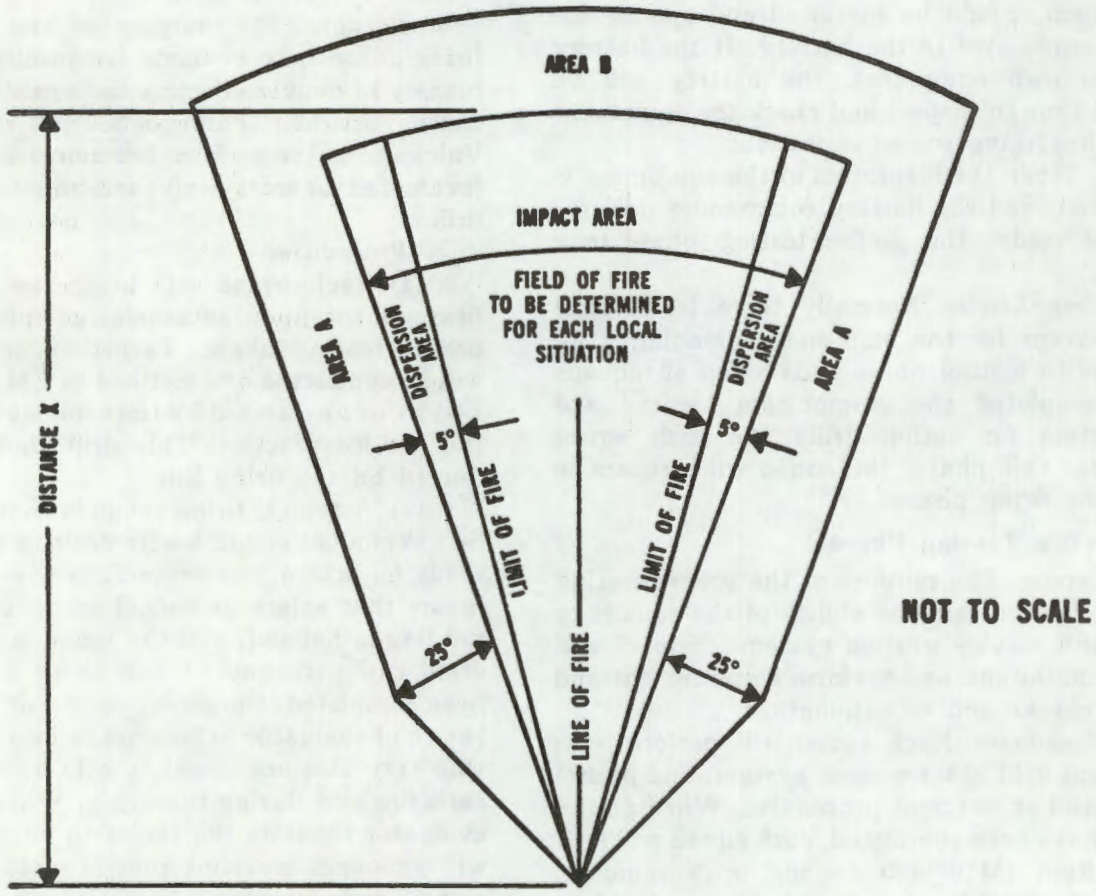


Figure 9-1. For weapons firing at aerial targets.

Note. The fire unit evaluator-safety officer may, at this point, climb aboard the carrier to monitor the crew intercom, operate the SAFE-ARM switch, and observe the engagement from behind the gunner. He should dismount before the vehicle is moved.

(3) When the chief evaluator requests the launching of the target, the fire unit safety officer will alert the squad on the intercom that a hostile target is approaching from azimuth_____ (azimuth to target launch site). The squad leader will order the gunner to slew the gun to the azimuth announced by the safety officer and prepare to track. When the target is airborne, and the squad leader sights the target, he issues the engagement command by repeating the target azimuth to the gunner. The fire unit safety officer will enable the gun as the target crosses into the safe-fire zone and inform the squad leader that he is free to fire. At this time, the squad leader commands, HOSTILE-ENGAGE. The gunner will fire as soon as he has a smooth track on the target and has a ready-to-fire lamp lit. He continues tracking and firing bursts until the target is destroyed or until the safety officer disables the weapon, or until the squad leader commands, CEASE FIRE. The gunner then slews the gun to the center of the safe field of fire and elevates it to 30 °.

(4) Amount and type of ammunition to be

fired by each squad, target parameters, and specific range procedures will be provided by the commander ordering the service practice. Suggested target courses are shown in table 9-1. Suggested ammunition requirements are shown in table 9-2.

c. Evaluation. During this phase evaluators will observe and evaluate each crew on the following:

(1) Volume of fire.
(2) Line performance.
(3) Lead performance.
(4) Crew performance.
(5) Safety.

9-9. Ground Firing Phase

a. Purpose. The purpose of the ground firing phase it to evaluate the effectiveness of Vulcan squads to deliver effective fire against stationary and moving ground targets using live ammunition.

b. Procedures.

(1) Each squad will move to the ground target firing range, if appropriate, when it has completed the air defense firing phase. Emplacement and prefire check and adjustments will be performed before beginning this phase to insure that the equipment is operational and ready for action. Ammunition loading will be performed on the firing line.

(2) If a suitable moving target is not available, the move-stop-fire-move method may be used for SP Vulcan. A modified firing range for using this technique is depicted in figure 9-2 and explained in (3) below.

Warning. **The MOVE-STOP-FIRE-MOVE method requires the evaluator/ safety officer to mount and ride on the outside of the tracked carrier for approximately 200 meters at stop and go speeds up to 15 mph. Because of the inherent danger in riding on the outside of any moving vehicle, this method should not be used if a moving target range is available. However, if used, a seat and safety harness should be provided for the evaluator/ safety officer. He should mount the vehicle at the ARM-START point and dismount at the end of the firing run (STOP-DISARM point, fig 9-2).**

Note. The dual vision device, used for gunner and driver training, contains a portable padded seat which can be attached to the vehicle. This seat allows an instructor or evaluator/safety officer to ride outside the vehicle in comparative safety.

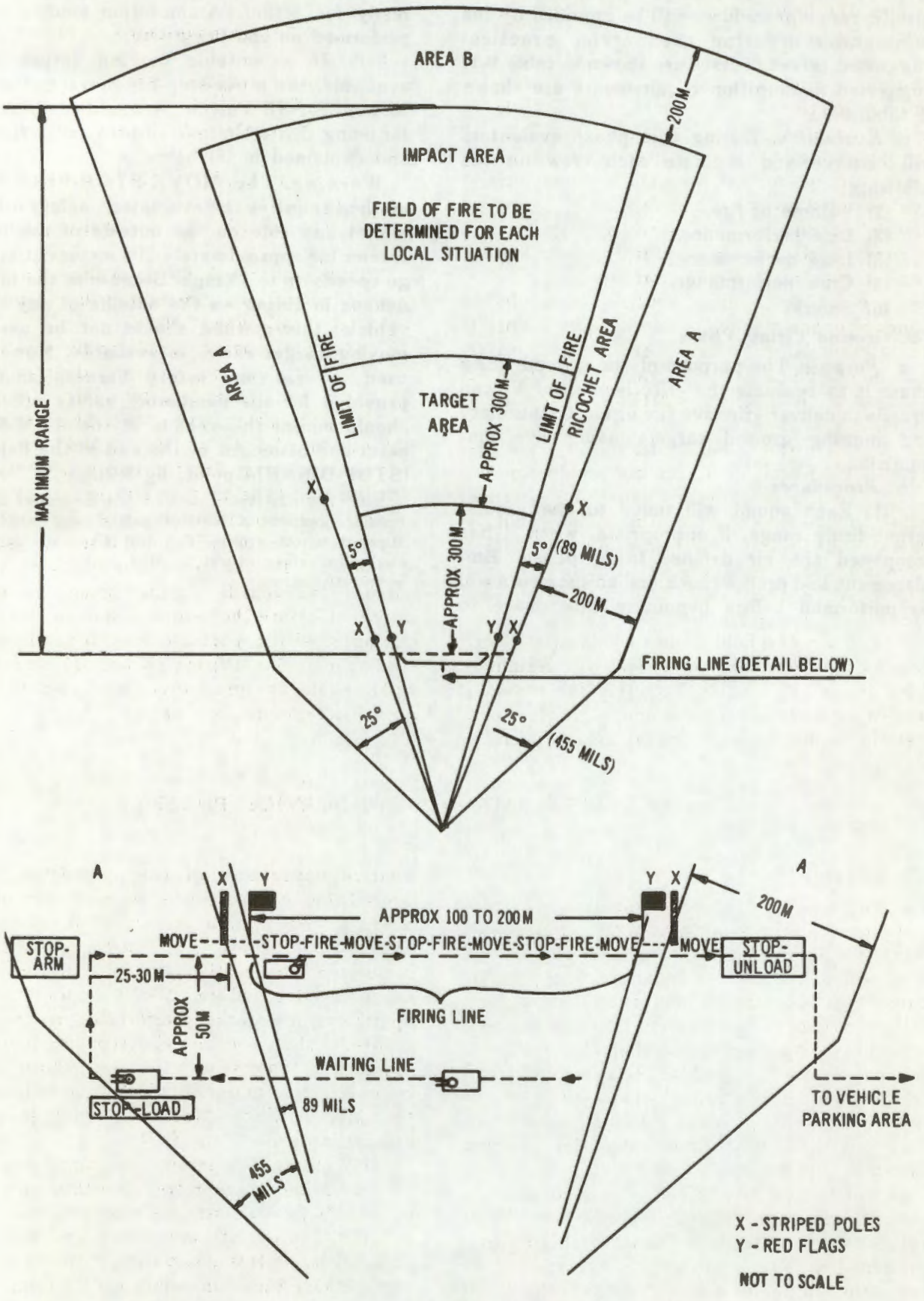


Figure 9-2. Firing range layout for MOVE-STOP-FIRE-MOVE ground firing course.

(3) To use the MOVE-STOP-FIRE-MOVE method, the firing range layout (fig 9-2) will be used.

(a) The vehicle course is parallel to the firing line (approximately perpendicular to the angle of fire to the target area) and from 100 to 200 meters in length between the firing limit red flags. The angles subtending the ricochet areas and secondary danger area (A) and the width of each secondary danger area (A and B) are as shown in figure 9-2. All other dimensions are approximate to permit use of this type of modified range at any surface firing range.

(b) Poles painted with high-visibility stripes or bands will be placed to clearly delineate the right and left outer limits of the ricochet area near the firing line and down range. Red flags on the firing line indicate the start-fire and cease-fire points.

(4) When the squad leader declares his fire unit ready for action, the fire unit evaluator will direct the squad leader to move his weapon system to the firing point. Ammunition will be loaded at the firing line. Weapons should be sited a minimum of 14 meters apart if more than one weapon is on the firing line. Firing mission procedures are explained below.

(5) When the field of fire is reported clear, the senior evaluator/safety officer will designate which fire unit will conduct the first fire mission. He also alerts the other fire unit evaluators and safety personnel. In addition, the following safety precautions should be taken before the firing begins:

(a) All weapons oriented on known datum point.

(b) All weapons pointed down range, elevated to 30°.

(c) Arm-safe switch connected and in safe position.

(d) The GUN CLEAR switch set at AUTO.

(e) Azimuth limit stakes properly positioned.

(6) When the above procedures have been accomplished, each fire unit will conduct fire missions as described below:

(a) Stationary targets using direct fire.

(b) Moving targets using direct fire.

(c) Stationary targets using static fire.

(7) Crew procedures and drill contained in FM 44-5 or FM 44-100, and FM 44-62 will be followed to accomplish the above fire missions. Number and type targets and range, type ammunition, and specific procedures will be provided by the commander ordering the service practice.

Warning. **If the evaluator/ safety officer mounts the vehicle during firing, he should dismount before the vehicle is moved unless it is equipped with a portable seat and safety belt.**

c. Evaluation. During this phase each squad will be evaluated on observed hits, volume of fire, crew performance, and safety.

Section III. SCORING OF VULCAN SERVICE PRACTICE

9-10. General

a. Purpose. This section establishes minimum requirements, scoring weights and procedures, by phase, for Vulcan service practice. The weight given each phase is based on a maximum possible score of 3,600 points (300 points per fire unit) for a Vulcan firing battery. Only general scoring procedures are provided. Based on this guidance, and appropriate field and technical manuals (app A), commanders ordering service practice for their units will provide detailed scoring instructions and procedures, including scoring materials.

b. Policy. Ammunition or equipment malfunctions resulting from crew errors or omissions are chargeable against the battery being tested. For malfunctions not caused by crew error, no points will be deducted. The point value for each procedure will be based on the relative importance of that procedure to the overall operation of the system. Errors of commission or omission are classified as either major or minor. Major errors are operations or checks, performed incorrectly or omitted, that would cause mission failure. Minor errors are those operations or checks, performed incorrectly or omitted, that are in violation of prescribed procedures. Safety violations are those acts of commission or omission which expose personnel to injury or death. Maximum point deductions are listed below:

(1) Major crew errors—10 points each error.

(2) Minor crew errors—5 points each error.

(3) Safety violations—15 points each.

(4) Misuse of improper use of tools, equipment, or test equipment—5 points each.

(5) Overtime (ammunition loading exer-

cise)—3 points for each 10 seconds or portion thereof in excess of 5 minutes.

c. Maximum Scores. Batteries can score a total of 300 points for each available fire unit for a maximum of 3,600 points for a 12-squad battery. Batteries with a lesser number of squads can score a maximum of 300 points multiplied by the number of squads available for service practice. Weights of the three phases are as shown below:

Phase	Maximum points possible per squad	Maximum points per battery
Prefire testing	(90)	1,080
Ammunition loading	30	(360)
Preparation for action	60	(720)
Air Defense Firing	150	1,800
Ground Firing (Direct Fire).	60	720
	300	3,600

Note. If any phase above is evaluated at less than 70 percent of maximum possible score, the battery will be rated UNSATISFACTORY.

9-11. Prefire Testing Phase

a. The maximum points that may be awarded during this phase are 1,080 for a 12-squad battery or 90 per squad (30 points per squad for ammunition loading and 60 points per squad for preparation for action drill). Batteries with less than 12 squads may earn up to 90 points per available squad.

b. Evaluation.

(1) Procedures to be evaluated for towed Vulcan are in FM 44-100, TM 9-1005-286-10-1, and local range regulations.

(2) Procedures for self-propelled Vulcan are in FM 44-5, TM 9-2350-300-10, and local range regulations.

(3) During this phase each squad will be evaluated on:

(a) A timed ammunition loading drill of 300 rounds for towed Vulcan and 500 rounds for self-propelled Vulcan in 5 minutes or less. Point deductions for overtime will be three points for each 10 seconds or portion thereof in excess of 5 minutes.

(b) Preparation for action drill.

(c) Use of tools, equipment, and test equipment.

(d) Safety.

9-12. Air Defense Firing Phase

a. References. Engagement procedures are contained in FM 44-5 or FM 44-10, and FM 44-62.

b. Maximum Points. The maximum points the battery may earn during this phase is 150 points per squad. A 12-squad battery can earn up to 1,800 points.

c. Evaluation. Evaluators will observe and score each squad during target engagement drills. Practice firing may be conducted before beginning record firing if ammunition is available. Practice firing is scored for safety violations only. During scored firing evaluators should evaluate and score—

(1) Volume of fire.
(2) Line performance.
(3) Lead performance.
(4) Crew performance.
(5) Safety.

9-13. Ground Firing Phase

a. References. Procedures for ground firing are contained in FM 44-5 or FM 44-100, and FM 44-62.

b. Maximum Points. Maximum points a battery may earn during the ground firing is 60 points per squad. A 12-squad battery may earn 720 points.

c. Evaluation. Evaluators observe and score each squad for—

(1) Observed hits.
(2) Volume of fire.
(3) Crew performance.
(4) Safety.

Section IV. SERVICE PRACTICE RATING AND CRITIQUE

9-14. General

Evaluators score and rate the battery in accordance with guidance provided in this chapter and instructions provided by the commander ordering the service practice. Completed score sheets and other recorded data are submitted to the chief evaluator. He will, in turn, add his comments, compute the overall score, and prepare a service practice raging and a written evaluation report for the commander ordering the service practice. Contents of the evaluation report will include scores attained for each phase, point deductions for each phase, overall score, and any other pertinent material. The report may include copies of the score sheets with deficiencies referenced to the appropriate technical manual, field manual, regulation, or other directive.

9-15. Squad Rating

If, after deductions, a squad scores 70 percent or

more of the maximum possible score for each phase, a rating of SATISFACTORY will be awarded.

9-16. Computation of Battery Service Practice Rating

The chief evaluator, after computing the overall battery score, will compute the service rating in accordance with table 2-5.

9-17. Conduct of Critique

a. As soon as practicable after the service practice, the chief evaluator will conduct a critique for the battery commander and key personnel of the service practice unit. A copy of the evaluation report and score sheets will be provided to the battery commander in sufficient time for analysis prior to the critique.

b. Battery commander may submit comments for discussion concerning the report. Reclamas will be submitted in writing by the battery commander through channels to the commander ordering the service practice. Notification of intent to reclama will be made to the chief evaluator prior to departure from the range.

CHAPTER 10

ADA GUN M42 SERVICE PRACTICE

Section I. GENERAL

10-1. Scope

a. ADA gun M42 service practice is divided into three phases: prefire testing, air defense firing, and ground firing. Each phase is evaluated separately.

b. It is suggested that as part of the service practice, selected squads fire during hours of darkness.

10-2. Application

The procedures provided in this chapter are applicable to all ADA AW units organized under TOE 44-85. These procedures may also be used during training for service practice scheduled in ATP 44-85 and ATT 44-85.

10-3. Targets and Courses

a. The ballistic aerial target system (BATS) is the target normally used for M42 service practice. Other type targets are available and may be used. Table 10-1 lists suggested target courses for air defense and ground firing.

b. Within range safety limitations, aerial target courses should—

(1) Be flown within the capabilities of the M42 system.

(2) Exercise the system and crew at their maximum capability.

(3) Vary target range, altitude, and speed.

c. For detailed information on target courses for ADA gun M42 and characteristics of BATS see FM 44-2, FM 44-102, and TM 9-1340-418-12.

Table 10-1. Target Courses, ADA Gun M42

AIR DEFENSE FIRING PHASE

	Altitude((ft)		Range (meters)				
Target Course	Max	Min	Max	Min	Mode of Control	Practice	Record
Crossing Level	1,000	500	1,600	500	Power Manual/SR Sights	10 5	2 1
Crossing Diving	1,500	500	1,600	600	Power Manual/SR Sights	10 5	2 1
Incoming Diagonal	1,000	500	1,600	500	Power	5	1
Outgoing Diagonal	1,000	500	1,600	500	Power	5	1
					Total Courses	40	8

GROUND FIRING PHASE

Target Courses	Range (meters)	Practice	Record
Indirect Fire	2,000-3,500	10	2
*Direct Fire Stationary Target	800-1,500	15	2
**Direct Fire Moving Target	1,000 closing to 600	20	3
***Static Fire	1,500-2,000	5	2

*Use manual control with speedring sights.

**Use manual control with speedring sights for two engagements: one engagement in power control with reflex sight M24C.

***Use in lieu of indirect fire when firing range is limited in size.

10-4. Ammunition Requirements

Suggested ammunition for the air defense and ground firing phase is listed in table 10-2. Ammunition authorization is detailed in CTA 23-100-6.

Table 10-2. Ammunition Requirements for ADA Gun M42 Service Practice

Type Firing	Rd Each Mount	No. of Courses	Total Rd Per Mount	No. of Fire Units	Battery Total
AIR DEFENSE FIRING PHASE					
Air Defense Practice	12	25	300	16	4,800
Air Defense Practice	24	15	360	16	5,760
ATT Firing Phase or ASP	24	8	192	16	3,072
			Subtotal		13,632
GROUND FIRING PHASE					
Indirect Firing—Practice	8*	10	80	16	1,280
Indirect Firing Phase—ATT or ASP	8	2	16	16	256
Direct Fire, Stationary Target—Practice	4*	15	60	16	960
Direct Fire, Stationary Target—ATT or ASP	4	2	8	16	128
Direct Fire, Moving Target—Practice	4*	20	80	16	1,280
Direct Fire, Moving Target—ATT or ASP	4	3	12	16	192
Static Fire—Practice ***	(8*)	(10)	(80)	(16)	(1,280)
Static Fire—ATT or ASP ***	(8)	(2)	(16)	(16)	(256)
			Subtotal		4,096
			Total Rd		17,728**

* Single barrel, alternate between courses.
** Fifteen percent of total may be added for contingency needs (e.g., test firing and repeat courses).
*** To be used in lieu of indirect firing mission.
Notes.
1. HE-T ammunition is used for all firing.
2. This table is a guide for the planning of service practices. Ammunition allowances to support these firings are authorized in CTA 23-100-6.

10-5. Organization for Service Practice

a. A successful evaluation of ADA gun M42 service practice requires careful planning and coordination between the service practice unit and the range unit personnel. Facilities must be provided for both aerial and ground target firing. To avoid confusion, stations, as listed below, will facilitate a smooth, meaningful service practice.

(1) *Preparation station.* At this station unit personnel are briefed as to the sequence of events to follow, procedures, and safety. The squads check completeness of equipment and perform required maintenance.

(2) *Ammunition station.* Ammunition to be fired is inspected and clipped by each squad during the preparation phase.

(3) *Prefire station.* At this station the fire units are placed on the firing line where squad proficiency and the operational status of the equipment are verified.

(4) *Firing station.* Live firing is performed. However, if time permits and ammunition is available, squads should be allowed some practice firing before commencing live firing exercises. If range facilities permit, both aerial and ground targets may be engaged from the same firing point. Moving targets are necessary for ground firing. Gunnery techniques are explained in FM 44-62.

(5) *Final station.* After the firing phase is completed, key personnel are assembled for a critique of the service practice.

Section II. CONDUCT OF ADA GUN M42 SERVICE PRACTICE

10-6. General

a. Equipment.

(1) If the battery is to use equipment other than its own, battery personnel will be allowed a reasonable amount of time for inspection of the equipment before beginning scored operations. Equipment should be energized and operational before being turned over to the battery. If the battery uses its own equipment, the battery should be allowed time to inspect and check the equipment before beginning scored operations.

(2) When the inspection of the equipment is completed, and the battery commander declares his unit ready, the preparation phase may begin.

(3) Battery TOE equipment should be used for service practice if practicable. Each squad should use its assigned weapons system for all phases of the service practice. Battery organization should be maintained to encourage squad and platoon competition.

b. Time Limits. Normally, there is no time limit to complete the service practice. The prefire testing phase ends when all squads have completed checking their weapon systems and the battery commander declares his unit ready.

10-7. Prefire Testing Phase

a. Purpose. The purpose of the prefire testing phase is to evaluate the ability of the battery crews to check and service the weapon system; inspect, clip, and load ammunition; and perform preparation drill in accordance with FM 44-61.

b. Procedures. Each M42 gun squad will position its weapon system and perform examine equipment drill, orientation drill, prepare for action drill, and loading drill as contained in FM 44-61 and TM 9-7218 in preparation for target engagement.

c. Evaluation. During this phase each squad will be evaluated on its performance of drills in paragraph *b* above. All operations will be scored for crew performance, proper procedures and safety.

d. Detailed Actions and Procedures. Commanders ordering service practice, using FM 44-2, FM 44-61, and FM 44-62, appropriate system technical manuals (app A), and guidance provided herein, will prescribe detailed actions and procedures to be performed by the battery during the prefire testing phase. As a minimum it will include those events described in *b* above.

10-8. Air Defense Firing Phase

a. Purpose. The purpose of this phase is to evaluate the proficiency of the battery to prepare for and successfully engage simulated hostile aircraft. This phase will require each ADA gun M42 squad to perform action drill in accordance with FM 44-61.

b. Procedures.

(1) Each squad will begin the air defense firing phase upon successful completion of the prefire testing phase. Action drill will be conducted as described in FM 44-61 or as directed by the commander ordering the service practice. Action drill should be conducted at the firing line.

(2) An OIC, who may also act as safety officer, will be with each fire unit during the firing. When the senior evaluator requests that the target be launched, he will inform the squad leader that his fire unit weapons control status is "weapons tight," provide early warning information, and an air defense warning of RED.

(3) Practice target runs may be conducted for tracking if time permits. Fire units at the firing line, under supervision of the fire unit safety officer, may track the target while it is in the safe field of fire. No ammunition will be in the automatic loaders, and the hand operating levers on all guns will be latched in the SAFE position while the target is in the field of fire.

(4) When the squad leader declares his fire unit ready for action, the senior battery evaluator will insure that safety personnel are in position, the red flag is hoisted, and the range is clear of aircraft and personnel. When these actions have been completed, the chief evaluator will request that the target be launched. At this time the fire unit safety officer will alert the squad on the weapon intercom or firing line telephone network that a hostile target is approaching from azimuth _____(azimuth to target launch site). The squad leader will then command the gunner to slew the gun to that azimuth and prepare to engage. When the target is launched and the squad leader acquires the target, he commands TARGET, AZIMUTH_____. When the fire unit safety officer observes target launch, he will observe the target until it crosses into the safe field of fire at which time he notifies the squad leader that he is free to fire. The squad leader than commands, HOSTILE, ENGAGE. When he has a steady track on the target, the gunner announces ON. The squad leader commands FIRE, and the gunner begins firing. He continues firing until the target is destroyed, or until the squad leader or safety officer commands, CEASE FIRING. The

gunner then slews the gun to the center of the safe field of fire and to an elevation of 30° and announces, WEAPON CLEAR.

(5) Amount and type of ammunition to be fired, target parameters, and specific range procedures will be as directed by the commander ordering the service practice. Suggested ammunition requirements are detailed in table 10-2. Sample type targets are explained in table 10-1.

c. Evaluation. During this phase evaluators will observe and evaluate each gun crew on—

(1) Volume of fire.
(2) Line performance.
(3) Lead performance.
(4) Crew performance.
(5) Safety.

10-9. Ground Firing Phase

a. Purpose. The purpose of the ground firing phase is to evaluate the effectiveness of M42 squads, to deliver effective fire against stationary and moving ground targets.

b. Procedures.

(1) Each squad will move to the ground target firing range, if appropriate, when it has completed the air defense firing phase. Examine equipment and orientation procedures will be performed to insure the equipment is operational and ready for action. Ammunition loading will be performed on the firing line.

(2) If a suitable moving target is not available, the MOVE-STOP-FIRE-MOVE method may be used. A modified firing range for using this technique is depicted in figure 9-2 and explained in (3) below.

Warning. **The MOVE-STOP-FIRE-MOVE method requires the evaluator/ safety officer to mount and ride on the outside of the tracked carrier for approximately 200 meters at stop and go speeds up to 15 mph. Because of the inherent danger in riding on the outside of any moving vehicle, this method should not be used if a moving target range is available. However, if used, a seat and safety harness should be provided for the evaluator/ safety officer. He should mount the vehicle at the ARM-START point and dismount at the end of the firing run (STOP-DISARM point).**

(3) To use the MOVE-STOP-FIRE-MOVE method, the firing range layout (fig 9-2) will be used.

(a) The vehicle course is parallel to the firing line (approximately perpendicular to the angle of fire to the target area) and from 100 to 200 meters in length between the firing limit red flags. The angles subtending the ricochet areas and secondary danger area (A) and the width of each secondary danger area (A and B) will be as shown in figure 9-2. All other dimensions are approximate to permit use of this type of modified range at any surface firing range.

(b) Poles painted with high-visibility stripes or bands will be placed to clearly delineate the right and left outer limits of the ricochet areas near the firing line and down range. Red flags on the firing line indicate the start-fire and cease-fire points.

(4) When the squad leader declares his fire unit ready for action, the fire unit evaluator will direct the squad leader to move his weapon system to the firing point. Ammunition, if needed, will be loaded at the firing line. Weapons should be sited a minimum of 14 meters apart if more than one weapon is on the firing line. Firing mission procedures are as follows:

(5) When the field of fire is reported clear, the senior evaluator/safety officer will designate which fire unit will conduct the first fire mission. He also alerts the other fire unit evaluators and safety personnel. In addition, the following safety precautions should be taken before the firing begins:

(a) All weapons oriented on known datum point.

(b) All weapons pointed down range, elevated to 30°.

(c) Azimuth limit stakes properly positioned.

Warning. **If the evaluator/ safety officer mounts the vehicle during firing, he should dismount before the vehicle is moved unless equipped with a seat and safety belt.**

(6) When the above procedures have been accomplished, each fire unit will conduct fire missions as described below:

(a) Stationary targets using direct fire.
(b) Stationary targets using indirect fire.
(c) Moving targets using direct fire.

(7) Crew procedures and drill contained in FM 44-61 will be followed to accomplish the above fire missions. Number and type targets and range, type ammunition, and specific procedures will be provided by the commander ordering the service practice. (See tables 10-1 and 10-2 for type target courses and ammunition requirements.)

c. Evaluation. Evaluators will observe and evaluate—

(1) Reaction time.
(2) Time to complete engagement.
(3) Observed hits.
(4) Crew performance.
(5) Safety.

Section III. SCORING OF ADA GUN M42 SERVICE PRACTICE

10-10. General

a. Purpose. This section establishes minimum requirements, scoring weights, and procedures, by phase, for evaluation of ADA gun M42 service practice. The weight given each phase of the service practice is based on a maximum possible score of 2,400 points (200 points per fire unit) for ADA Gun M42 firing battery. Only general scoring procedures are provided. Based on this guidance, and appropriate field and technical manuals (app A), commanders ordering service practice for their units will provide detailed scoring instructions and procedures, including scoring materials for the evaluation team.

b. Policy. Ammunition or equipment malfunctions resulting from crew errors or omissions are chargeable against the battery being tested. For malfunctions not caused by crew error, no points will be deducted. In case of doubt, evaluators will rule in the battery's favor. The point value for each procedure on each major item of equipment will be based on the relative importance of that procedure to the overall operation of the system. Errors of commission or omission are classified as either major or minor. Major errors are those operations or checks, which if performed incorrectly or omitted, could cause equipment failure. Minor errors are those operations or checks which, if performed incorrectly or omitted, are in violation of prescribed procedures. Safety violations are those acts of commission or omission which expose personnel to injury or death. Maximum point deductions are listed below:

(1) Safety violations—25 points each.
(2) Major crew errors—20 points each error.
(3) Minor crew errors—5 points each error.
(4) Misuse of tools or test equipment—5 points each.

c. Maximum Scores. Batteries can score a total of 200 points for each available fire unit for a maximum of 2,400 points for a 12-squad battery. Batteries with a lesser number of squads can score a maximum of 200 points multiplied by the number of squads available for service practice.

10-11. Preparation Phase

a. Maximum Points. The maximum points a battery may earn during this phase is 50 points per squad (fire units) participating in the preparation phase. A battery with 12 squads may earn 600 points.

b. System Preparation. Evaluators will observe and evaluate each squad as it prepares its system. Correct procedures are contained in FM 44-61. Points should be deducted for omissions, improper procedures, and safety violations.

c. Scoring. Scoring of system preparation and specific point deductions will be in accordance with instructions provided by the commander ordering the service practice.

10-12. Air Defense Firing Phase

a. Maximum Points. The maximum points the battery may earn during this phase is 100 points per squad. A 12-squad battery can earn up to 1,200 points.

b. References. Engagement procedures and gunnery techniques are contained in FM 44-61 and FM 44-62.

c. Evaluation. Evaluators will observe and score each squad during the engagement. Practice firing may be conducted before beginning scored firing if ammunition is available. Practice firing is scored for safety violations only. During scored firing, evaluators should evaluate and score—

(1) Volume of fire.
(2) Line performance.
(3) Lead performance.
(4) Crew performance.
(5) Safety.

d. Scoring Instructions. Detailed scoring instructions and specific point deductions will be provided by the commander ordering the service practice.

10-13. Ground Firing Phase

a. Maximum Points. Maximum points a battery may earn during the ground firing is 50 points per squad. A 12-squad battery may earn 600 points.

b. References. Procedures and gunnery techniques for ground firing are contained in FM 44-61 and FM 44-62.

c. Evaluation. Evaluators observe and score each squad for—

(1) Volume of fire.
(2) Crew performance.
(3) Safety.

d. Scoring Instructions. Detailed scoring instructions and specific point deductions will be provided by the commander ordering service practice.

Section IV. SERVICE PRACTICE RATING AND CRITIQUE

10-14. General

Evaluators score and evaluate the battery in accordance with guidance provided in this chapter and instructions provided by the commander ordering the service practice. Completed score sheets and other recorded data are submitted to the chief evaluator. He will, in turn, add his comments, compute the overall score, prepare a service practice rating and a written evaluation report for the commander ordering the service practice. Contents of the evaluation report will include scores attained for each phase, operational status for each phase, point deductions for each phase, overall score, and any other pertinent material. The report may include copies of the score sheets with deficiencies referenced to the appropriate technical manual, field manual, regulation, or directive not complied with.

10-15. Computation of Service Practice Rating

The chief evaluator after computing overall battery score will compute the service practice rating in accordance with table 2-5.

10-16. Conduct of Critique.

a. As soon as practicable after the service practice, the chief evaluator will conduct a critique for the battery commander and key personnel of the service practice unit. A copy of the evaluation report and score sheets will be provided to the battery commander in sufficient time for analysis prior to the critique.

b. Deficiencies and remarks in the report should be thoroughly understood by all concerned prior to the conclusion of the critique.

c. Battery commanders may submit comments for discussion concerning issues raised by the report. Comments may also be submitted in writing by the battery commander to the commander ordering the service practice. If possible, this should be done prior to departure for home station.

APPENDIX A

REFERENCES

A-1. General

Department of the Army pamphlets of the 310-series should be consulted for the latest changes or revisions of references listed here and for new publications relating to material covered in this manual.

A-2. Army Regulations (AR)

385-40	Accident Reporting and Records.
385-62	Firing Guided Missiles and Heavy Rockets for Training, Target Practice, and Combat.
385-63	Regulations for Firing Ammunition for Training, Target Practice, and Combat.
702-5	Missile Firing Data Reports.

A-3. Department of the Army Pamphlets (DA Pam)

310-series	Indexes to military publications (as applicable).

A-4. Field Manuals (FM)

6-40	Field Artillery Cannon Gunnery.
6-140	Field Artillery Organizations.
(S) 44-1A	US Army Air Defense Artillery Employment (U).
44-1-1	US Army Air Defense Artillery Operations.
44-2	Air Defense Artillery Employment Automatic Weapons M42/M55.
44-3	Air Defense Artillery Employment, Chaparral/Vulcan.
44-4	Procedures and Drills for Chaparral Air Defense Guided Missile System.
44-5	Procedures and Drills for Vulcan Self-Propelled Weapon System.
44-30	Visual Aircraft Recognition.
44-61	Procedures and Drills for Twin 40-mm Self-Propelled Gun M42 and M42A1.
44-62	Air Defense Artillery Automatic Weapon Gunnery.
44-82	Procedures and Drills for Nike Hercules Missile Battery.
(C) 44-82A	Procedures and Drills for Nike Hercules Missile Battery (U).
44-98	Air Defense Artillery Engagement Simulator; Guided Missile System Radar Signal Simulator Station AN/TPQ-21 (Hawk).
(C) 44-98A	Air Defense Artillery Engagement Simulator; Guided Missile System Radar Signal Simulator Station AN/TPQ-21 (Hawk) (U).
44-99	Procedures and Drills for Hawk Missile Battery (Towed and Self-Propelled).
44-100	Procedures and Drills for Vulcan Towed Weapon System.
44-101	Procedures and Drills for Hawk Missile Battery (Improved).
44-102	Procedures and Drills for Ballistic Aerial Target System.
(C) 44-103	Air Defense Artillery Engagement Simluator; Guided Missile Radar Signal Simulator Station AN/TPQ-29 (Improved Hawk).

A-5. Army Training Tests (ATT)

44-85	Air Defense Artillery Automatic Weapon Units.
44-325	Air Defense Artillery Battalion, Chaparral/Vulcan, Self-Propelled.
44-725	Air Defense Artillery Battalion, Chaparral (Self-Propelled)/Vulcan (Towed)

A-6. Army Training Programs (ATP)

44-85	Air Defense Artillery Automatic Weapon Units.
44-325	Air Defense Artillery Battalion, Chaparral/Vulcan, Self-Propelled.
44-725	Air Defense Artillery Battalion, Chaparral (Self-Propelled)/Vulcan, Nondivisional (Towed).

A-7. Technical Manuals (TM)

9-1005-286-10-1	Operator's Manual for Gun, Air Defense, Artillery, Towed; 20-mm, M167.
(C) 9-1100-250-12	Operator and Organizational Maintenance (Prefire Procedures): M22, M23, and M97 Atomic Warhead Sections (U).
9-1300-200	Ammunition, General.
9-1340-418-12	Operator and Organizational Maintenance Manual for Ballistic Aerial Target System (BATS).
(C) 9-1400-250-10	Operator's Manual: Overall System Description (Nike Hercules Air Defense Guided Missile System) (U).
(C) 9-1400-250-10/2	Operator's Manual: Overall System Description (Improved Nike Hercules Air Defense Guided Missile System Nike Hercules Anti-Tactical Ballistic Missile (ABTM) System) (U).
(C) 9-1400-500-10	Operator's Manual: Description of Hawk Air Defense Guided Missile System (Hawk Air Defense Guided Missile System) (U).
9-1400-500-12/1	Operator and Organizational Maintenance Manual: Emplacement of Hawk Air Defense Guided Missile System (Hawk Air Defense Guided Missile System).
9-1400-500-12/2	Operator and Organizational Maintenance Manual: Check Procedures for Guided Missile Shop Equipment AN/MSM-43 and Air Defense Guided Missile MIM-23A (Hawk Air Defense Guided Missile System).
(S) 9-1400-500-12/3	Operator and Organizational Maintenance Manual: Electronic Countermeasures and Counter-Countermeasures (Hawk Air Defense Guided Missile System) (U).
9-1410-250-12/1	Operator's and Organizational Maintenance Manual: Intercept-Aerial Guided Missile MIM-14A, MIM-14B, MIM-14C, (Nike Hercules and Improved Nike Hercules Air Defense Guided Missile Systems).
9-1410-500-12/1	Operator and Organizational Maintenance Manual: Air Defense Guided Missile MIM-23A (Hawk Air Defense Guided Missile System).
9-1410-530-14	Operator, Organizational, Direct, and General Support Maintenance Manual: Intercept-Aerial, Guided Missile MIM-23B-1, MIM-23B-2, and MTM 23B (Improved Hawk Air Defense Guided Missile System).
(C) 9-1410-585-24	Organizational, DS, and GS, Maintenance Manual: Chaparral Intercept-Aerial, Guided Missile MIM-72A; Chaparral Training Missile M30, and Supporting Equipment (Chaparral Air Defense Guided Missile System) (U).
(C) 9-1425-525-1	Description of Improved Hawk Air Defense Guided Missile System (Improved Hawk Air Defense Guided Missile System) (U).
(S) 9-1425-525-2	Description of Improved Hawk Air Defense Guided Missile System (Improved Hawk Air Defense Guided Missile System) (U).
9-1425-525-12/1	Operator and Organizational Maintenance Manual: Emplacement of Improved Hawk Air Defense Guided Missile System (Improved Hawk Air Defense Guided Missile System).
(C) 9-1425-525-12/3	Operator and Organizational Maintenance Manual: Electronic Countermeasures and Counter-Countermeasures, Improved Hawk Air Defense Guided Missile System (U).

(C) 9-1430-251-12/1	Operator and Organizational Maintenance Manual: Check Procedures: Computer System and Multichannel Data Recorder (Nike Hercules and Improved Nike Hercules Air Defense Guided Missile System) (U).
(C) 9-1430-255-12/1	Operator and Organizational Maintenance Manual: Check Procedures: Low Power Acquisition Radar System (Improved Nike Hercules Air Defense Guided Missile System) (U).
(C) 9-1430-256-12/1	Operator and Organizational Maintenance Manual: Check Procedures: Target Tracking, Target Ranging, and Missile Tracking Radar Systems; and Radar Test Group (Improved Nike Hercules Air Defense Guided Missile System and Nike Hercules Anti-Tactical Ballistic Missile System) (U).
9-1430-501-12/1	Operator and Organizational Maintenance Manual: Check Procedures for Guided Missile Battery Control Central AN/TSW-2 (Hawk Air Defense Guided Missile System).
9-1430-502-12/1	Operator and Organizational Maintenance Manual: Check Procedures for Pulse Acquisition Radar Set AN/MPQ-35 (Hawk Air Defense Guided Missile System).
9-1430-503-12/1	Operator and Organizational Maintenance Manual: Check Procedures for Radar Set AN/MPQ-34 (Hawk Air Defense Guided Missile System).
9-1430-505-12/2	Operator and Organizational Maintenance Manual: Check Procedures for Guided Missile Assault Fire Command Console AN/TSW-4 (Hawk Air Defense Guided Missile System).
9-1430-510-12/1	Operator and Organizational Maintenance Manual: Check Procedures for Radar Set AN/MPQ-37 (Hawk Air Defense Guided Missile System).
9-1430-511-12/1	Operator and Organizational Maintenance Manual: Check Procedures for: Radar Set AN/MPQ-39 (Hawk Air Defense Guided Missile System).
9-1430-513-12/1	Operator and Organizational Maintenance Manual: Radar Set AN/MPQ-39 (BITE) (Hawk Air Defense Guided Missile System).
9-1430-513-12/2	Operator and Organizational Maintenance Manual: Check Procedures for: Radar Set AN/MPQ-39 (Hawk Air Defense Guided Missile System).
9-1430-516-12	Operator and Organizational Maintenance Manual: Check Procedures for Platoon Command Post, AN/MSW-9 (XO-1) (Self-Propelled Hawk Air Defense Guided Missile System).
9-1430-526-12/1	Operator and Organizational Maintenance Manual: Improved Guided Missile Battery Control Central AN/TSW-8 (Improved Hawk Air Defense Guided Missile System).
9-1430-527-12/1	Operator and Organizational Maintenance: Guided Missile System Information and Coordination Central AN/MSQ-95 (Improved Hawk Air Defense Guided Missile System).
9-1430-528-12/1	Operator and Organizational Maintenance Manual: Radar Set AN/MPQ-48 (Improved Hawk Air Defense Guided Missile System).
9-1430-533-12/1	Operator and Organizational Maintenance Manual: Improved High-Powered Illuminator Radar Set: AN/MPQ-46 (Improved Hawk Air Defense Guided Missile System).
9-1440-250-12/1	Operator's and Organizational Maintenance Manual: Daily, Weekly, Monthly, and Quarterly Check Procedures: Guided Missile Launching Set (Nike Hercules and Improved Nike Hercules Air Defense Guided Missile Systems).
9-1440-250-20/1	Organizational Maintenance Manual: Guided Missile Launching Set (Nike Hercules and Improved Nike Hercules Air Defense Guided Missile Systems).

(C) 9-1440-250-20/2	Organizational Maintenance Manual: Schematics and Theory: Guided Missile Launching Set (Nike Hercules and Improved Nike Hercules Air Defense Guided Missile Systems) (U).
9-1440-500-12/1	Operator and Organizational Maintenance Manual: Guided Missile Zero-Length Launcher XM78E2 and XM78E3, Guided Missile Launching Section Control Box AN/GSA-50 (Hawk Air Defense Guided Missile System).
9-1440-500-12/2	Operator and Organizational Maintenance Manual: Zero-Length Guided Missile Launcher (Hawk Air Defense Guided Missile System).
9-1440-517-12	Operator and Organizational Maintenance Manual: Carrier-Mounted Guided Missile Launcher XM754 and Interconnecting Group AN/TSA-29 (Self-Propelled Hawk Air Defense Guided Missile System).
9-1440-531-12/1	Operator and Organizational Maintenance Manual: Improved Hawk Guided Missile Zero-Length Launcher XM-192E1; Guided Missile Loading and Storage Pallet XM1E1; and Improved Guided Missile Launching Section Control Box AN/GSA-132 (Improved Hawk Air Defense Guided Missile System).
9-1440-585-20	Organizational Maintenance Manual: Intercept-Aerial, Guided Missile System, M54 (Launching Station) (Chaparral Air Defense Guided Missile System).
9-1450-500-10	Operator's Manual for Loader, Transporter, Guided Missile: XM501E2 and XM501E3 (Hawk Guided Missile System).
9-1450-585-10	Operator's Manual: Carrier, Guided Missile Equipment, Self-Propelled: M730.
9-2350-247-10	Operator's Manual for Carrier, Cargo, Tracked, 6-Ton, M548.
9-2350-300-10	Operator's Manual for Gun, Antiaircraft Artillery, Self-Propelled: 20-mm, M163.
(C) 9-4935-253-12	Organizational Maintenance Manual: Electrical Test Equipment (Nike Hercules and Improved Nike Hercules Air Defense Guided Missile Systems) (U).
9-4935-587-12	Operator and Organizational Maintenance Manual: Organizational Maintenance Guided Missile System Shop Equipment AN/TSM-95 (Chaparral Air Defense Guided Missile Systems).
9-5012-1	Operator and Organizational Maintenance: Air Defense Guided Missile M1 (Nike Ajax Air Defense Guided Missile System).
9-7218	Organizational Maintenance Manual: Gun, Antiaircraft Artillery, Self-Propelled: Twin 40-mm, M42 and M42A1.
38-750	The Army Maintenance Management System (TAMMS).

A-8. Tables of Organization and Equipment (TOE)

44-85	Air Defense Artillery Atuomatic Weapons Battalion, Self-Propelled.
44-247	Air Defense Artillery Battery, Improved Hawk.
44-267	Air Defense Artillery Battery, Hawk, TRIAD.
44-325	Air Defense Artillery Battalion, Chaparral/Vulcan, Self-Propelled.
44-725	Air Defense Artillery Battalion, Chaparral (Self-Propelled)/Vulcan (Towed).

A-9. Common Table of Allowances (CTA)

23-100-6	Ammunition, Rockets, and Missiles for Unit Training—Active Army and Reserve Components.

A-10. Other Publications

TC 23-19 (When Published)How to Train in Small Arms for Air Defense.

APPENDIX B

COMBINED ARMS AIR DEFENSE EXERCISE—RIFLE ORTANK PLATOON SUPPORTED BY FORWARD AREA AIR DEFENSE WEAPONS

B-1. General

This appendix provides guidance for the conduct of a live-firing exercise employing a rifle or tank platoon reinforced by forward area air defense weapons. The exercise will increase the ability of combat maneuver units to defend against hostile air attack.

B-2. Organization

a. Personnel and Equipment. Personnel and equipment necessary to conduct this exercise are a rifle or tank platoon with TOE equipment and available Chaparral, Redeye, and Vulcan units.

b. Control Personnel and Equipment. This exercise requires supplemental range and safety personnel because of the greater safety hazards when different sizes and types of weapons use the same range simultaneously. Personnel are also required to assemble, launch, and control targets. Personnel required and their responsibilities are—

(1) *Commander.* The responsibilities of the commander are to assign control and safety personnel, and supervise the exercise in accordance with applicable range regulations, AR385-62, and AR 385-63; arrange for targets and launch crews and provide target courses to be flown; and provide non-TOE equipment required for fire control and safety.

(2) *Chief umpire-range control officer.* The chief umpire-range control officer must assign the necessary safety personnel for the firing line; perform the duties of range control officer and senior safety officer; and organize and supervise activities of the umpire-safety officer team and the participating unit. He should also conduct an orientation on small arms air defense techniques in preparation for the exercise. It is suggested that the chief umpire-range control officer be the infantry/tank company commander.

(3) *Chaparral and Vulcan platoon leaders, and Redeye section or team chief* will station themselves behind their air defense fire units and perform safety duties and evaluation of their units. In addition, they will provide early warning and weapons control status, by voice, telephone, or radio, to the fire units prior to launching of the targets.

(4) *Individual weapon operators (small arms, machineguns, and forward area air defense weapons).* Their responsibilities are to initiate firing on command of the range control officer or when relayed by the platoon leader or squad leader; observe safety precautions as provided during the orientation and training sessions before the exercise; and cease firing when the command CEASE FIRING is given or sooner if the target crosses the right or left boundary of the safe-to-fire zone, or reaches the cease fire line (NO FIRE—NO FLY line) as shown on figure B-1.

(5) *Target controllers.* Target controllers will launch and retrieve targets (except for BATS) on command of the chief umpire-range control officer. He will cause the target to fly the courses depicted in figure B-1 through B-4.

B-3. Targets and Courses

a. Targets. Because the minimum engagement range of the Chaparral and Redeye missiles is greater than the maximum effective range of small arms, two targets are required to conduct the exercise. A BATS for Chaparral, Redeye, and Vulcan, and a miniature radio-controlled aircraft target (MIRCAT) for small arms and Vulcan. The Vulcan gunners may fire at either or both targets.

b. Courses.

(1) Two courses are to be flown using the BATS (fig B-1 and B-4) and FM 44-102 and TM 9-1340-418-12).

(2) The small arms target shown in figure B-2 presents four incoming target runs and two crossing target runs to the riflemen and machinegunners. It begins the target run from approximately 1,000 feet altitude at a range of 1,000 meters, and dives directly at a point on the firing line. It completes each run before reaching the NO FIRE—NO FLY line at about 50-feet altitude.

B-4. Ammunition Requirements

a. Air Defense Weapons. The commander will determine the total number of rounds to be fired by each Vulcan squad. Chaparral squads will fire one missile per squad. Redeye teams will fire one missile each.

b. Small Arms and Machine Guns.

(1) The volume fire technique explained in

TC 23-19 (Test) will be used for small arms firing against aircraft.

(2) The normal ratio of tracer and ball ammunition should be used. Amounts and types of ammunition to be fired will be determined by the commander.

B-5. Communications

a. A telephone hot-loop will be installed providing communications among the range control officer (chief umpire), the platoon leaders on line, and the target controllers.

b. Radio backup using organic FM radios is required.

B-6. Conduct of the Exercise

a. Organization of the Firing Line.

(1) The rifle platoon firing the first exercise will be issued ammunition before it assumes positions on the firing line. Ideally squad members should be placed in foxholes.

(2) A supporting air defense or small arms weapon (Vulcan, APC, or tank with 50 caliber HMG) will be positioned between rifle squads.

(3) Intervals for individuals and weapons are illustrated in figure B-1.

(4) Each rifle squad leader will station himself immediately to the rear of his squad to correct improper firing techniques and observe for unsafe acts by his squad. He will insure that weapons remain unloaded until ordered to load by the range control officer; all weapons are pointed downrange at all times; all firers are aware of the target's location and course, and that maximum rates of fire are employed. He will also insure that all commands from the control tower are obeyed, and that all weapons are clear before leaving the firing line.

(5) The rifle/tank platoon leader will assume a position immediately to the rear of the center squad and execute all orders from the control tower. He will maintain telephone or radio communications at all times with the range control tower and vehicular-mounted weapons. In addition, he will be constantly alert for unsafe conditions or actions and command, CEASE FIRE, when appropriate; assist in the control of firing; insure that the correct technique of fire is employed (TC 23-19); insure that all firing is kept within the left and right safety limits; and order CEASE FIRE if target is destroyed or disabled, or when it reaches the NO FIRE—NO FLY line.

b. Engagement Procedures (Chaparral, Vulcan, and Redeye).

(1) When the firing platoon and supporting AD weapons are properly positioned, the chief umpire will insure that the telephone hot loop and radios are manned and operating properly.

(2) He then orders the BATS launcher crew to prepare to launch target and immediately alerts the firing line of an imminent attack by hostile aircraft. He provides the Chaparral squad and Redeye team the general direction from which the BATS will be launched and the approximate altitude, course, and speed of the target.

(3) The Chaparral squad at one flank of the firing line will prepare to engage, and point the launcher toward the target launch site.

(4) The Redeye team at the other flank of the firing line will conduct target detection and engagement drill (FM 23-17) and will point the weapon at the right or left safety limit as appropriate.

(5) The Vulcan squad will conduct crew drill (FM 44-5) and will prepare to engage the target when it enters the safe firing zone.

(6) All small arms will remain unloaded but may track the BATS while it is in range.

(7) Only the Vulcan squad and either the Chaparral squad or the Redeye team will engage the first BATS. The other will dry run an engagement with tracking and simulated firing. The chief umpire will designate either the Chaparral and Vulcan squads or the Redeye team and Vulcan squad to fire first. For purposes of explaining these procedures, it will be assumed the chief umpire designated the Chaparral and Vulcan squads to engage the first BATS fired from the left flank (fig B-1).

(8) When squad drill is complete and safety officers and other personnel involved are ready, the chief umpire-safety officer, who is also the range control officer in the tower, commands, LAUNCH CHAPARRAL TARGET. Chaparral and Redeye target courses are shown in figures B-1 and B-4.

(9) The Chaparral and Vulcan squad leaders will begin engagement procedures as described in FM 44-4 and FM 44-5. They will command, ENGAGE, only after the target has crossed into the safe-to-fire zone.

(10) All other weapons on the firing line may perform tracking practice if the target is within range.

(11) When the Chaparral missile is launched, the chief umpire-safety officer in the range tower, will command, CEASE FIRE/CEASE TRACKING, and will alert the second BATS launching crew to prepare to launch target.

(12) The procedures above are then repeated for the Redeye team and Vulcan firing.

c. Engagement Procedures (Small Arms and Vulcan).

(1) When all riflemen, machinegunners, and the Vulcan squad are ready, the range control officer will command the MIRCAT target controller to LAUNCH TARGET.

(2) The target controller will cause the target to fly the course illustrated in figures B-3 (explained in para B-3*b* (2)).

(3) As the target turns on its first run, the chief umpire will announce COMMENCE FIRING.

(4) All weapons on the firing line, except Chaparral and Redeye, should fire continuously at the target, using techniques explained in TC 23-19.

(5) The chief umpire will command, CEASE FIRING, when the target reaches the NO FIRE—NO FLY markers.

(6) The chief umpire then orders all weapons on the firing line, CLEARED and pointed downrange.

(7) The target controller retrieves the target, counts the hit, and informs the chief umpire of results of the firing.

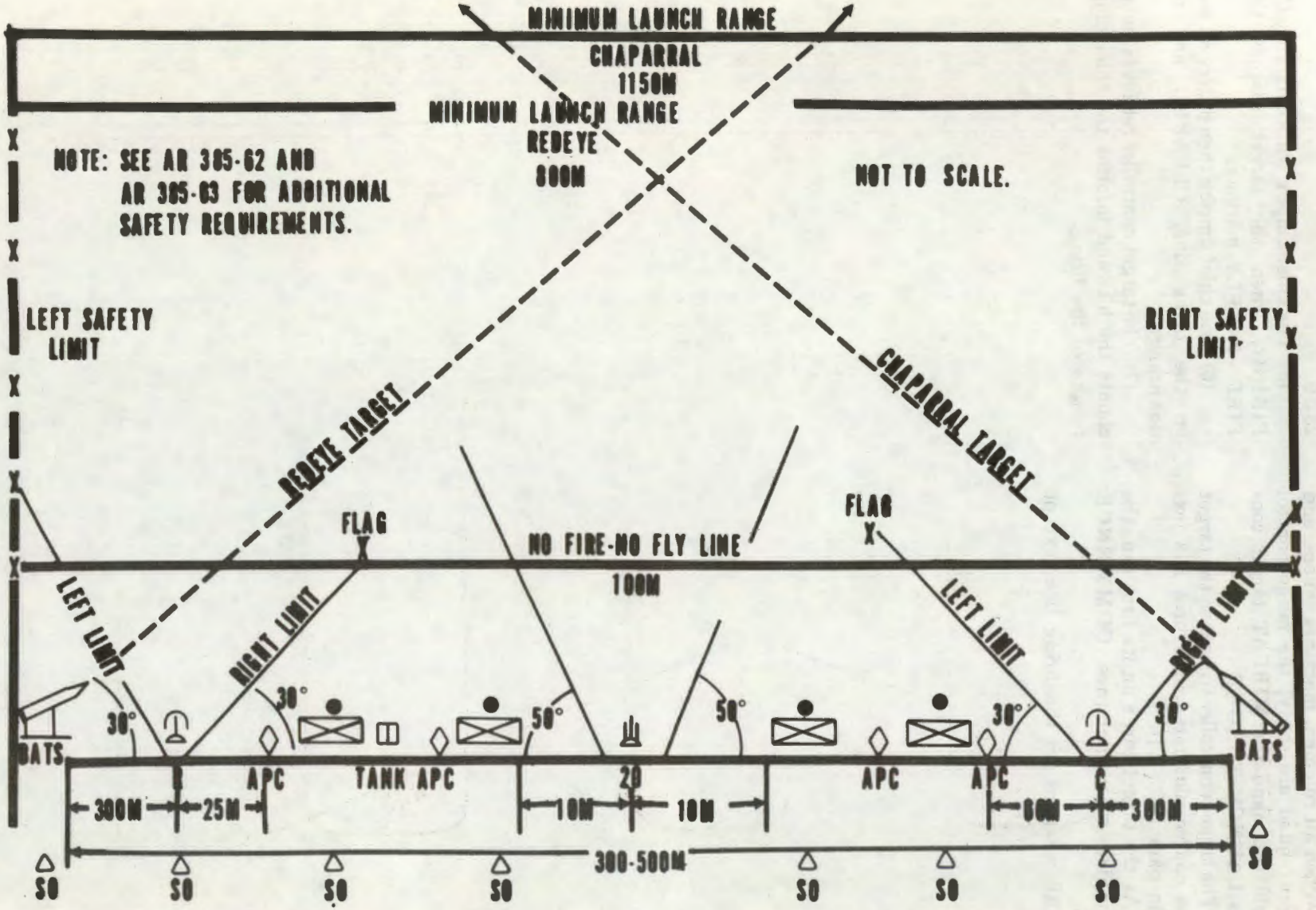
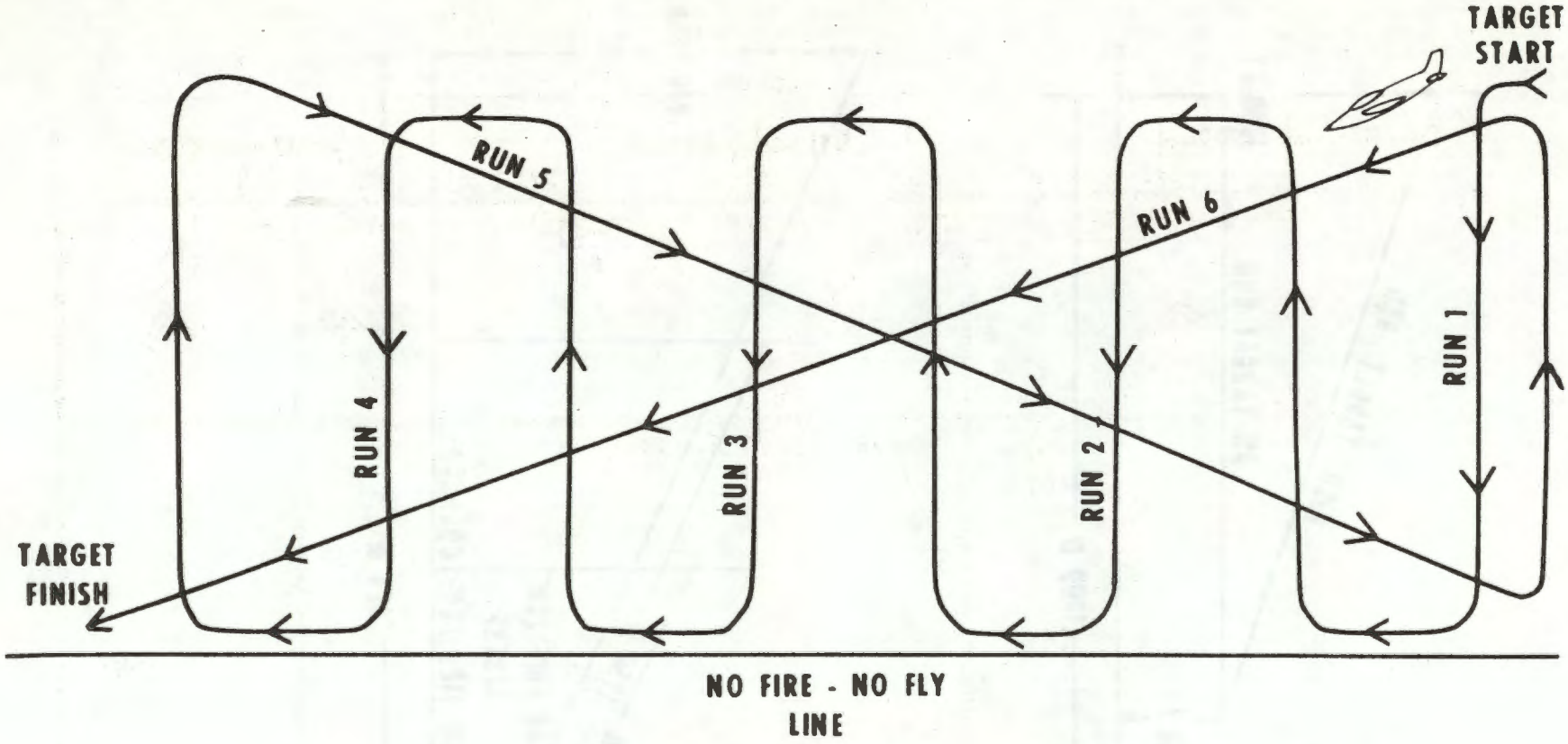


Figure B-1. Organization of the firing line, and BATS target courses.



RIFLE SQD. OR TANK SEC.	x	RIFLE SQD.	x	RIFLE SQD.	x	RIFLE SQD. OR TANK SEC.
SL		SL		SL		SL

PLATOON LEADER

Figure B-2. Small arms target courses.

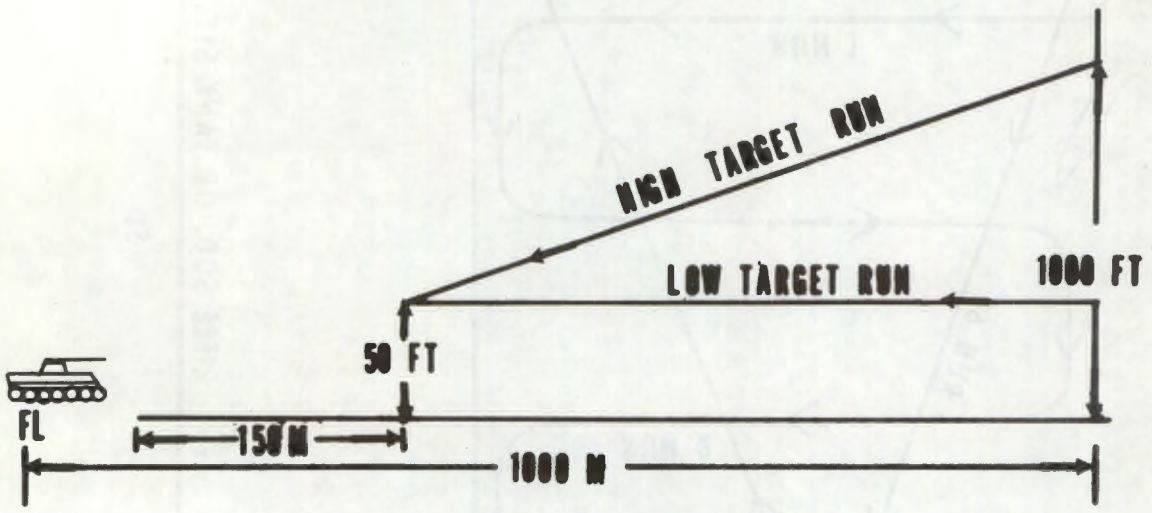


Figure B-3. MIRCAT (small arms) target runs—horizontal view.

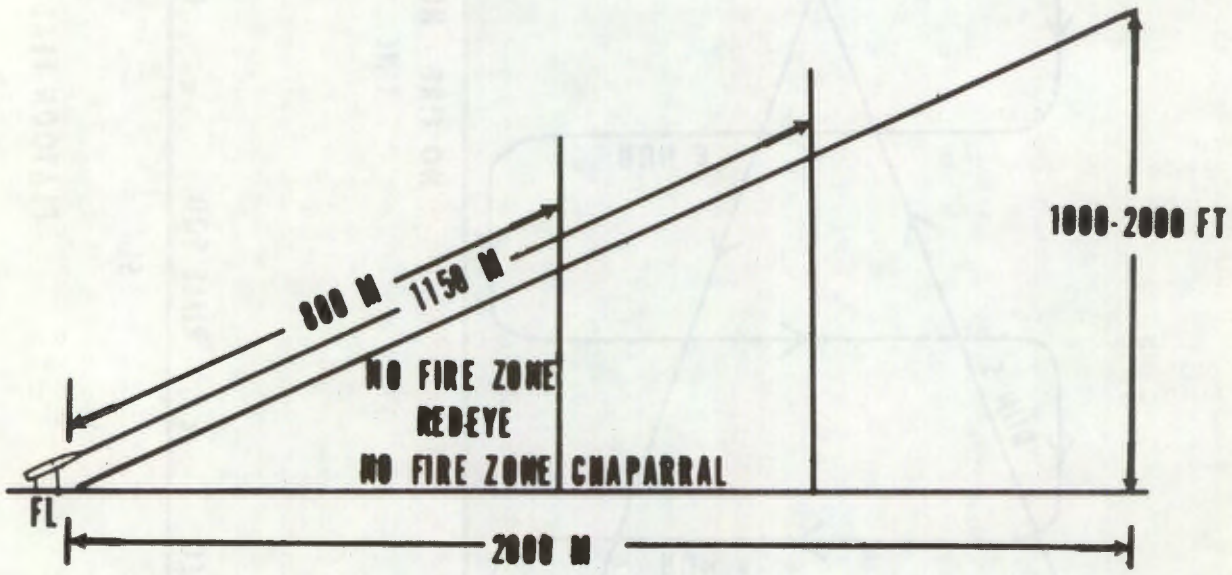


Figure B-4. BATS target runs for Chaparral, Redeye, and Vulcan—horizontal view.

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