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FM 6-25
DEPARTMENT OF THE ARMY FIELD MANUAL

29 MAR 1962

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FIELD ARTILLERY MISSILE BATTALION
(REDSTONE) (U)

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FIELD ARTILLERY MISSILE BATTALION (REDSTONE) (U)

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CHAPTER 1

GENERAL

Section I. INTRODUCTION

1. (U) Purpose and Scope

a. This manual is a guide for the battalion commander, unit commanders within the battalion, and corps and army artillery commanders in the employment of the Redstone missile system. It covers organization; command; principles of employment; reconnaissance, selection, and occupation of position; organization of position; security; communication; survey; administration and logistics; gunnery; and training.

b. The material presented herein is applicable without modification to both nuclear and nonnuclear warfare.

2. (U) Application

This manual applies to units organized under—

a. TOE 6-635E, Field Artillery Missile Battalion, Redstone.

b. TOE 6-636E, Headquarters and Headquarters Battery, Field Artillery Missile Battalion, Redstone.

c. TOE 6-637E, Field Artillery Missile Battery, Redstone.

d. TOE 5-214D, Engineer Company, Redstone.

e. TOE 9-217D, Ordnance Company, Redstone.

3. (U) Use

The organization and employment presented in this manual are based on the premise that the field artillery missile battalion, Redstone, is primarily a means of nuclear fire support. Field manuals 6-20-1, 6-20-2, 6-140, 100-5, and 101-5 should be used in conjunction with this manual, since many of the principles and techniques for employment of other types of field artillery units also apply to the Redstone organization.

4. (U) References

Appendix I contains a list of publications pertaining to the field artillery missile battalion, Redstone, and its organic units.

Section II. THE REDSTONE MISSILE SYSTEM

5. (U) Classification

Field artillery missiles are classified as short-range, medium-range, or long-range weapons (AR 525-30). The Redstone is an Army long-range, ballistic, guided missile.

6. (CMHA) Description

a. (U) *Redstone Guided Missile*. The Redstone missile is 21.12 meters in length and 1.8 meters in diameter. It consists of three main parts—the warhead unit, aft unit, and thrust unit (fig. 1). The warhead and aft units are joined together to form the missile body,

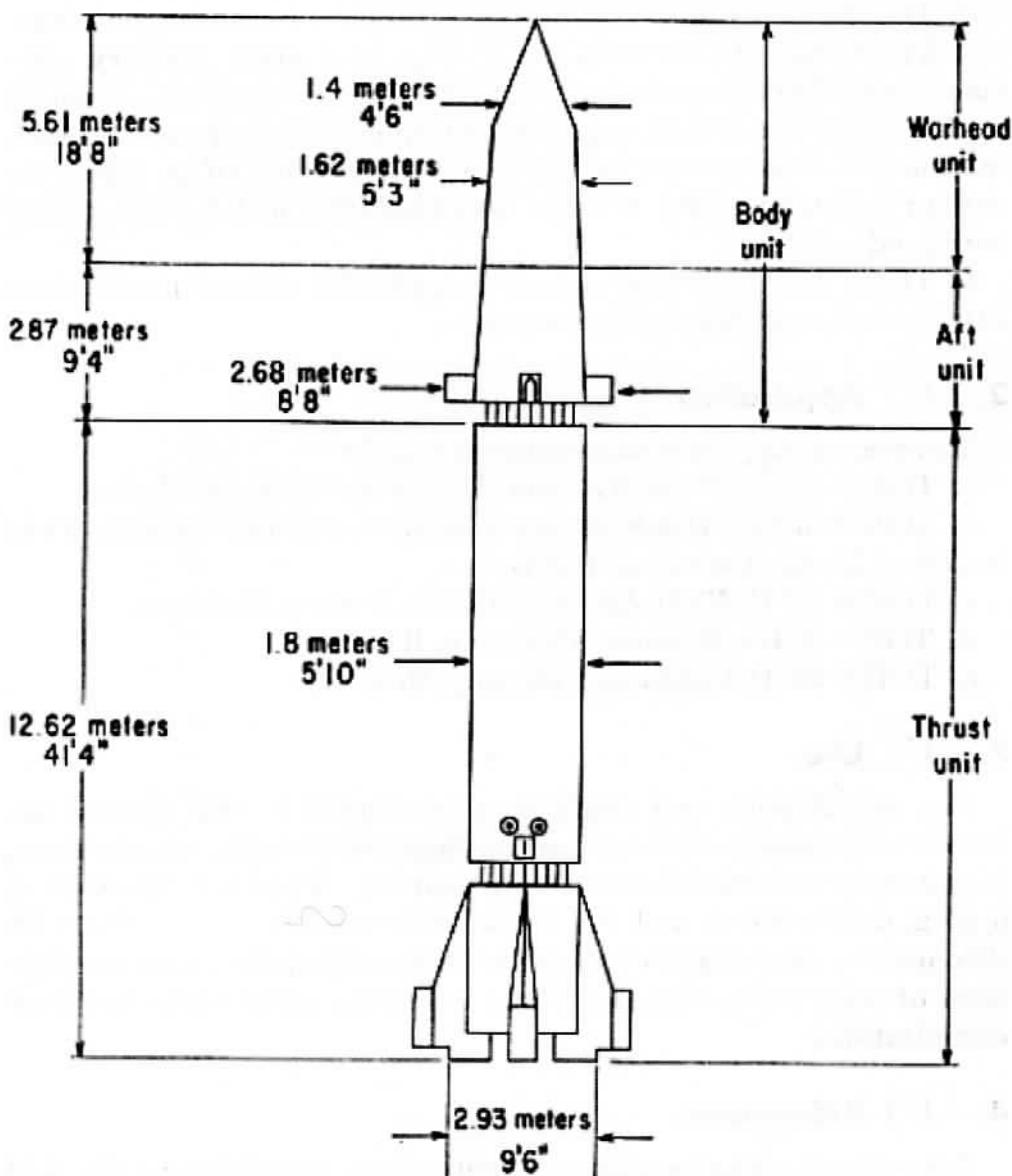


Figure 1. (U) Redstone missile nomenclature and dimensions.

that part of the missile which goes all the way to the target. The thrust unit, which contains the propulsion system, separates from the missile body after engine cutoff and falls approximately 10 miles short of the target. The missile weighs approximately 62,000 pounds when fully prepared for firing.

b. (U) Propulsion System. The Redstone missile is powered by a controlled thrust, bipropellant rocket engine that develops a constant thrust of approximately 78,000 pounds for a maximum of 121 seconds. Engine burning time is dependent on the range desired. The propellants used are an alcohol-water solution for fuel and liquid oxygen (LOX) as the oxidizer. Hydrogen peroxide (H_2O_2) is used to generate the steam required for operating the turbopump assembly that delivers the propellants to the rocket engine.

c. (CMHA) Guidance and Control System. The Redstone missile is directed in flight by a self-contained inertial guidance system. Three air bearing gyroscopes are used to position a stabilized platform so that it will maintain a fixed reference in space regardless of the position of the missile. Mounted on the stabilized platform are three potentiometers to enable attitude errors of yaw, pitch, and roll to be measured. A programming device insures that the missile has the correct pitch attitude throughout its trajectory. Also mounted on the stabilized platform are two accelerometers that send range and lateral velocity information to the range and lateral computers. Velocity and displacement errors from a predetermined flight path are thus determined. All error signals are sent into a control computer that will generate the commands to be sent to the control surfaces. Aside from certain prerecorded data pertaining to the correct flight path, no further information is utilized by the guidance and control system.

d. (U) Ground Handling Equipment. Standard army vehicles and equipment are used to the maximum extent possible in the Redstone system. Where possible, the specially designed equipment required for the system is mounted on a standard vehicle chassis or trailer to simplify the maintenance. The system is 100-percent mobile, and is air transportable.

e. (CMHA) Fire Capabilities. The Redstone missile is capable of carrying a nuclear warhead section to a maximum range of 324 kilometers. Minimum range is 93 kilometers. The design circular probable error is 300 meters. The battalion is capable of a maximum rate of fire of 4 missiles in a 24-hour period with adequate warning, providing that the firings are done from the same positions and that resupply is adequate. The sustained rate of fire is 1 missile per 48-hour period.

f. (U) Vulnerability. The Redstone missile system is considered invulnerable to any presently known electronic countermeasures.

7. (U) Redstone Operational Flight Sequence

(fig. 2)

a. Phase I, Firing to Propulsion Cutoff. The missile is fired vertically from a portable launcher. The thrust develops gradually, and the missile initially rises slowly. During this time maneuvering control of the missile is accomplished by carbon jet vanes which deflect the stream of hot gases expelled from the rocket engine. As the missile gains speed, the air rudders also become effective. During this phase of flight the guidance system is capable of detecting, measuring, and correcting attitude and lateral path errors. A section of the range guidance computer (cutoff computer) is used to determine the proper position in space for propulsion cutoff.

b. Phase II, Propulsion Cutoff to Separation. Propulsion cutoff is initiated by the guidance system when the missile has attained sufficient displacement from its firing point, and is traveling at a velocity so that its trajectory will coincide with the standard trajectory at reentry. Separation of the body from the thrust unit occurs 10 to 30 seconds after propulsion cutoff.

c. Phase III, Separation to Reentry. Separation occurs at an altitude where the lack of atmospheric density renders the body air vanes ineffective as control surfaces. At this point, jet nozzles working in conjunction with the air vanes are utilized for missile attitude control. From separation to reentry the range and lateral computers accumulate deviations from the standard trajectory which will be applied during terminal guidance.

d. Phase IV, Reentry to Impact. Reentry is that portion of the trajectory where the body of the missile comes back into the earth's atmosphere. Upon reentry a deceleration switch initiates the following guidance and control changes.

- (1) The control computer accepts signals from the lateral and range computer. The guidance gain is small at first, then it gradually increases until the control servo loop is operating at full gain.
- (2) The attitude error signals are attenuated so that primary consideration is given to guidance errors. After all guidance corrections have been made, and if no further disturbances occur, the missile will dive into the target at the point designated by the standard trajectory.

Section III. MISSIONS

8. (U) Field Artillery Missile Battalion, Redstone

The mission of the field artillery missile battalion, Redstone, is to provide nuclear field artillery missile fires in general support of

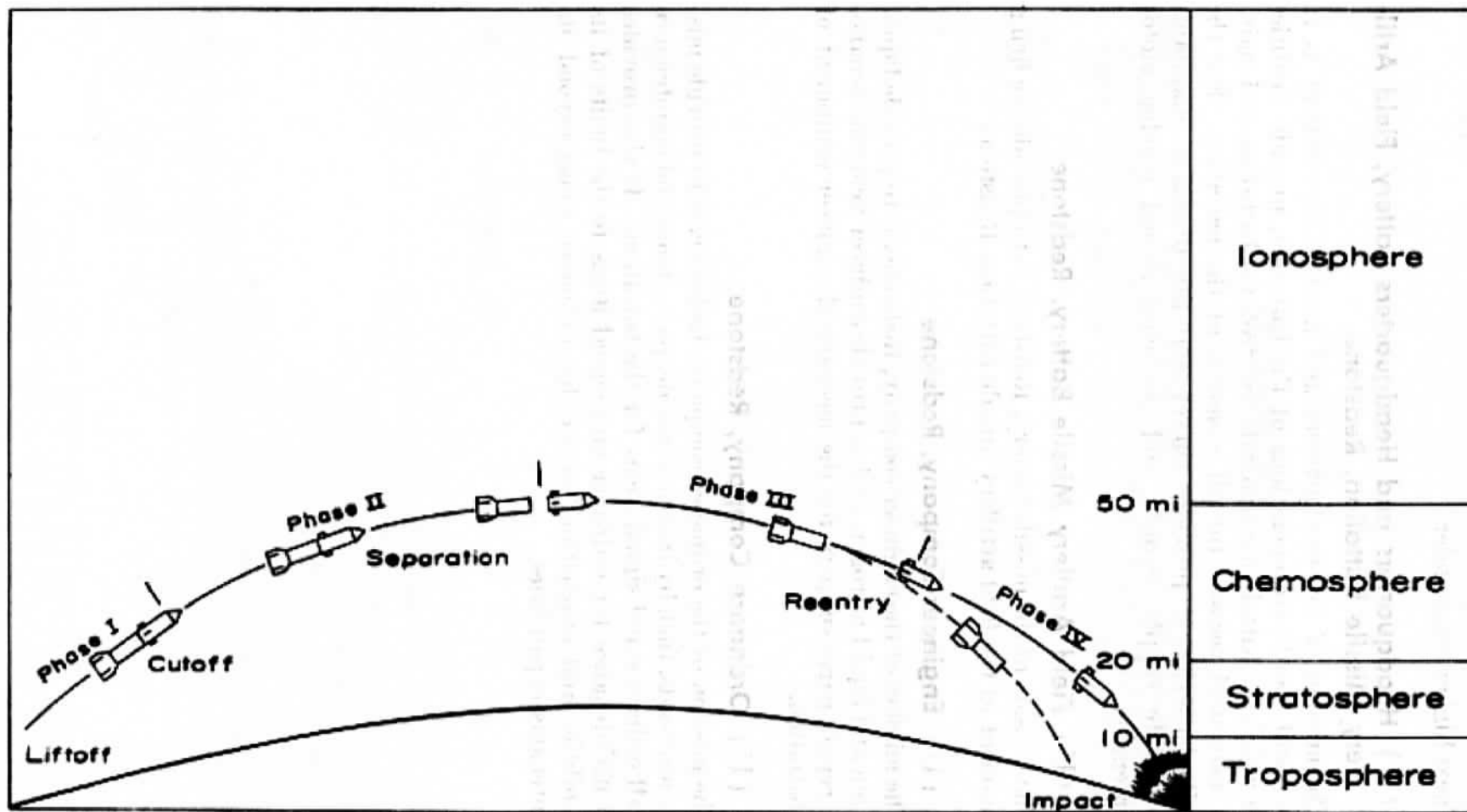


Figure 2. (U) Missile flight phases.

ground forces. Displacement will be either ordered or approved by the next higher commander.

9. (U) Headquarters and Headquarters Battery, Field Artillery Missile Battalion, Redstone

The mission of the headquarters and headquarters battery is to direct and coordinate operations of the battalion, provide facilities with which the battalion commander controls the battalion, and maintain personnel records for all elements of the battalion. For the missile batteries, it provides survey and fire direction, maintains appropriate supply records, and performs second echelon motor maintenance.

10. (U) Field Artillery Missile Battery, Redstone

The mission of the missile battery, Redstone, is to provide the firing component of the field artillery missile battalion, Redstone.

11. (U) Engineer Company, Redstone

The mission of the engineer company, Redstone, is to provide liquid oxygen and liquid nitrogen, and to provide engineer field maintenance and repair parts support for the mechanical engineer equipment of the battalion.

12. (U) Ordnance Company, Redstone

The mission of the ordnance company, Redstone, is to provide missiles, warheads, fuel, hydrogen peroxide, parts, tools, and maintenance for all ordnance and signal items for the battalion. It also provides field maintenance for ordnance and signal items to the limits of its capabilities and evacuation service for ordnance items beyond its maintenance capabilities.

CHAPTER 2

ORGANIZATION

Section I. THE FIELD ARTILLERY MISSILE BATTALION, REDSTONE, AND HEADQUARTERS AND HEADQUARTERS BATTERY, FIELD ARTILLERY MISSILE BATTALION, REDSTONE

13. (U) General

The field artillery missile battalion, Redstone, is organized as a tactical and administrative unit and is self-sustaining. It is composed of a headquarters and headquarters battery; two field artillery missile batteries, Redstone; an engineer company, Redstone; and an ordnance company, Redstone (fig. 3).

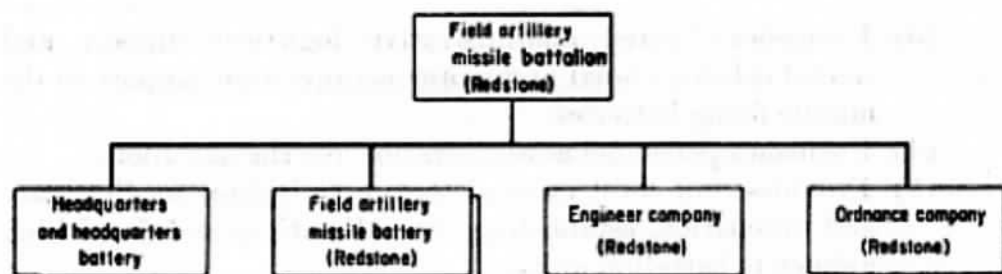


Figure 3. (U) Field artillery missile battalion, Redstone.

14. (U) Functions

a. Battalion Headquarters. The battalion commander and his staff control and supervise all tactical and administrative operations of the battalion. The battalion commander's staff is composed of the executive officer, S1, S2, S3, S4, and a communication officer, a liaison officer, a reconnaissance and survey officer, motor officer, surgeon, chaplain, and sergeant major.

b. Headquarters Battery (fig. 4). The headquarters battery performs the following functions:

- (1) Furnishes enlisted personnel to operate the various staff sections and otherwise supports the battalion headquarters in all its functions.
- (2) Draws and issues all classes of common supplies to the artillery elements of the battalion.

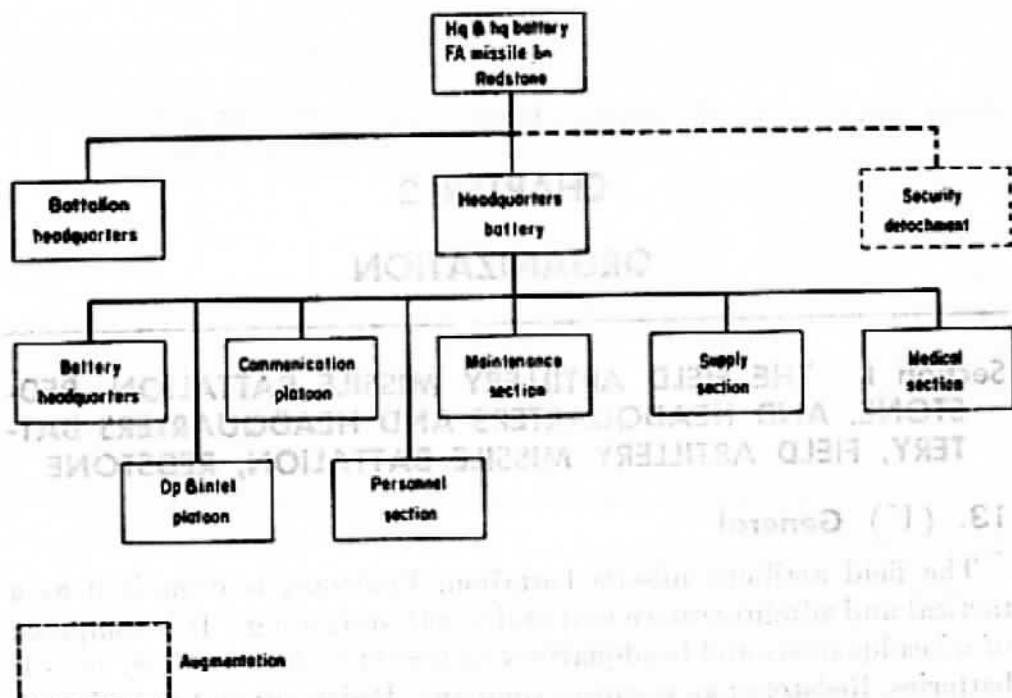


Figure 4. (U) Headquarters and headquarters battery, field artillery missile battalion, Redstone.

- (3) Furnishes limited administrative logistical support and second echelon signal and motor maintenance support to the missile firing batteries.
- (4) Furnishes personnel administration for the battalion.
- (5) Provides unit level medical service to include medical care and evacuation, establishing an aid station, and furnishing aidmen to battalion units.
- (6) Performs fire direction and survey functions for the missile firing batteries.
- (7) When augmented with the security detachment, provides security personnel for safeguarding of nuclear warheads.

Section II. THE FIELD ARTILLERY MISSILE BATTERY, REDSTONE

15. (U) General

The firing battery provides the firing component of the field artillery missile battalion, Redstone. It is composed of a battery headquarters, communications section, and a firing battery. The firing battery consists of a firing battery headquarters, a missile firing section, and a missile servicing section (fig. 5).

16. (U) Functions

The two firing batteries have a limited administrative capability but are dependent upon headquarters and headquarters battery for admin-

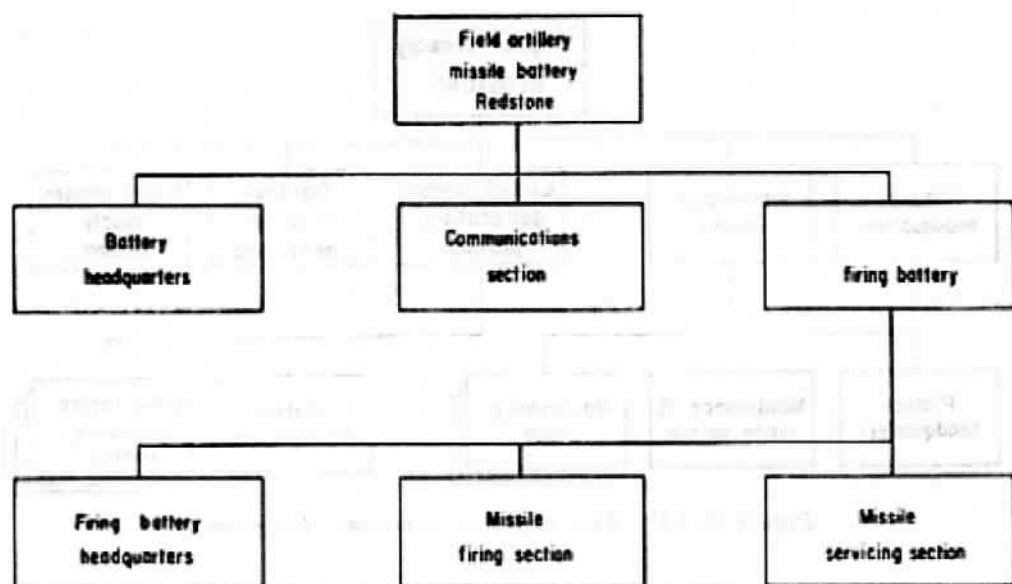


Figure 5. (U) Field artillery missile battery, Redstone.

istrative and logistical support and second echelon maintenance. The firing batteries are responsible for drawing, storing, and transporting their special ammunition load of nuclear rounds, including thrust units, aft units, warhead units, and propellants. They are responsible for the assembly, test, propellant loading, and firing of the missile. They are also responsible for organizational maintenance on all missiles, test equipment, and associated handling equipment. Each firing battery operates one launcher.

Section III. THE ENGINEER COMPANY, REDSTONE

17. (U) General

The engineer company furnishes liquid oxygen (LOX) and liquid nitrogen (LN₂) directly to the firing batteries of the Redstone battalion. It is composed of a company headquarters, a maintenance platoon, and two liquid oxygen/nitrogen generating platoons (fig. 6).

18. (U) Functions

The personnel of the engineer company headquarters maintain close liaison with battalion headquarters, and the company commander acts as a technical adviser to the battalion commander. In addition to furnishing liquid oxygen and liquid nitrogen directly to the firing batteries, the company provides engineer field maintenance and repair parts support for engineer mechanical equipment of the battalion to include engineer equipment organic to the company.

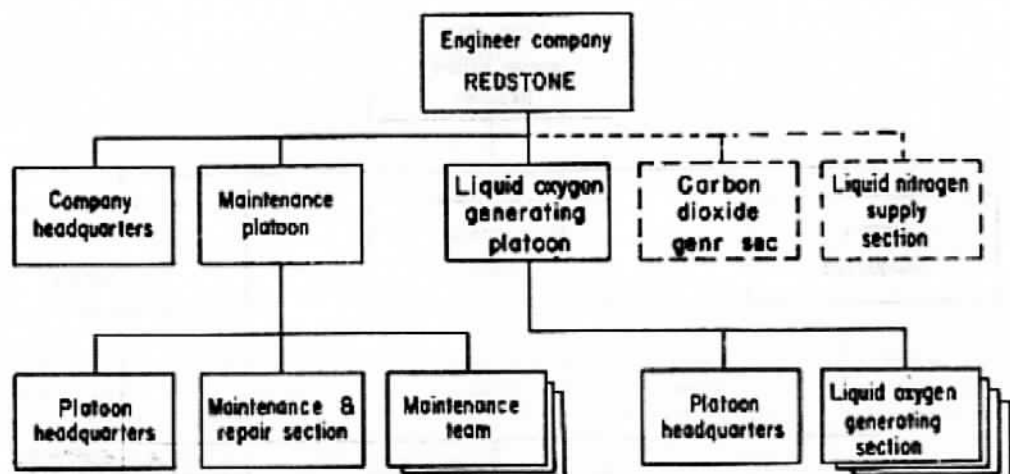


Figure 6. (U) The engineer company, Redstone.

Section IV. THE ORDNANCE COMPANY, REDSTONE

19. (U) General

The ordnance company provides missiles, alcohol and water mixture fuel, and hydrogen peroxide directly to the firing batteries of the Redstone battalion. The company is composed of a company headquarters, an operations section, a missile maintenance platoon, supply platoon, an automotive maintenance platoon and a firing trainer section (fig. 7).

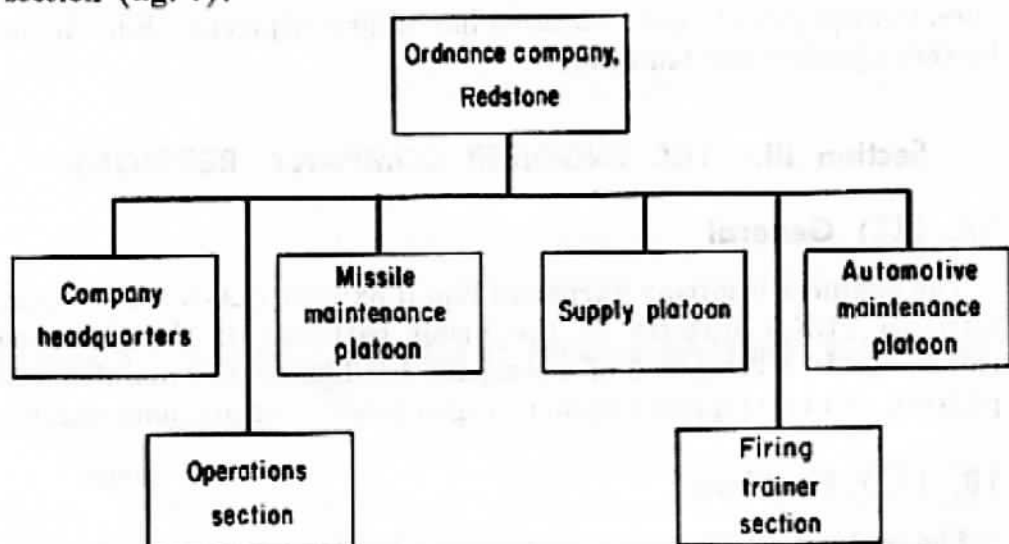


Figure 7. (U) The ordnance company, Redstone.

20. (U) Functions

The ordnance company headquarters maintains close liaison with the battalion headquarters. The company commander acts as an ordnance technical adviser to the battalion commander. In addition

to furnishing all the missile components, the alcohol-water mixture, and the hydrogen peroxide directly to the firing batteries, the ordnance company provides other ordnance and signal support for the battalion. This support includes supply and maintenance of common ordnance and signal items as well as direct support for specialized items of missile equipment. The ordnance company performs preissue inspections of missiles before issue to the firing batteries and performs periodic requalification of missile guidance and control equipment.

BATTALION ORDNANCE COMPANY

ST-1 (1954)

The ordnance company is responsible for the supply and maintenance of all ordnance and signal items required by the firing batteries. It also performs preissue inspections of missiles before issue to the firing batteries and performs periodic requalification of missile guidance and control equipment.

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CHAPTER 3

COMMAND

Section I. BATTALION COMMANDER AND STAFF

21. (U) General

The battalion commander commands the battalion and, with the assistance of his staff, controls and supervises all tactical and administrative activities of the battalion.

22. (U) Responsibilities

a. Battalion Commander. The duties and responsibilities of the commander of a field artillery missile battalion, Redstone, are essentially the same as those of commanders of other field artillery battalions. This battalion differs from a normal artillery organization in that it includes engineer and ordnance technical support units. The battalion commander must be familiar with the capabilities and limitations of all units within the battalion in order to advise the next higher commander on the employment of the battalion and to recommend suitable position areas for the battalion. He must also be prepared to assist the next higher commander in the selection of appropriate targets for the Redstone missile and to recommend suitable position areas.

b. Executive Officer. The battalion executive officer assists the commander in the performance of his duties. He coordinates the activities of the staff and supervises all administrative functions performed with the battalion. Specific duties in operations are directed by the commander with such authority as the commander delegates.

c. S1. The S1 establishes and operates the office of record for the battalion. He supervises the publication and distribution of orders and authenticates administrative orders. His duties and responsibilities are similar to those of the S1 in any other artillery organization. Additional duties may be directed by the battalion commander or executive officer.

d. S2. The battalion S2 is the intelligence officer for the battalion. His duties and responsibilities are similar to those of the intelligence officer in any other artillery organization, except that the battalion has no target acquisition function.

e. S3. The battalion S3 is the operations and training officer and also the gunnery officer for the battalion. His functions include most of those normally performed by a battalion S3 or other type artillery organization. He monitors the transmission of fire missions from higher headquarters. On receipt of a fire mission, the battalion S3 coordinates the activities of the firing batteries, the engineer company, and ordnance company in the accomplishment of the mission. During the actual preparation for firing and after completion of each mission, the group S3 receives reports from the firing battery commanders and prepares operational reports for submission to higher headquarters. The battalion S3 is responsible for the training of the fire direction computers. He supervises the computation of the data for fire missions and coordinates transmission of firing data to the firing batteries.

f. S4. The battalion S4 coordinates and supervises the supply activities of the battalion. The battalion S4 consolidates and forwards supply and maintenance reports as directed by the battalion commander.

g. Assistant S3. The assistant S3 commands the operation and intelligence platoons and performs such duties as may be directed by the S3.

h. Communication Officer. The battalion communication officer supervises the installation and operation of all communications within the battalion. He monitors transmission within the battalion for security violations and supervises communication training and maintenance in all elements of the battalion. He advises the battalion commander in all matters pertaining to communication and maintains contact with signal or communication officers of the next higher headquarters. In coordination with the headquarters battery commander, he advises the battalion commander on location of the command post.

i. Liaison Officer. The battalion liaison officer is the commander's representative in maintaining close contact with higher (or other) headquarters as directed. He keeps the higher artillery headquarters informed of the locations of all elements of the battalion and keeps the battalion informed of the current situation, plans, and impending displacements of the higher artillery headquarters. He must be familiar with detailed capabilities and limitations of all elements of the battalion in order to assist the higher artillery commander in planning appropriate employment of the battalion. Detailed duties and responsibilities of the battalion liaison officer are similar to those of other artillery liaison officers.

j. Motor Officer. The battalion motor officer is an assistant to the S4. He supervises the motor transport operations and maintenance within the battalion.

k. Reconnaissance and Survey Officer. The battalion reconnaissance and survey officer plans and supervises the survey required within the battalion. In performance of his primary duties, he is closely associated with the battalion commander, S3, field artillery target acquisition battalion, and engineer topographic battalion of the field army.

l. Surgeon. The surgeon advises the battalion commander and staff on matters pertaining to medical services of the battalion. He is responsible for the procurement, storage, and distribution of medical equipment and supplies. He exercises technical supervision over medical activities throughout the battalion. Detailed duties and responsibilities are contained in FM 101-5.

m. Chaplain. The duties and responsibilities of the chaplain are as directed by the Chief of Chaplains, U.S. Army. Specific duties within the battalion may be directed by the battalion commander.

Section II. BATTERY COMMANDERS, COMPANY COMMANDERS, AND PLATOON LEADERS

23. (U) General

The duties of small-unit commanders as outlined in existing publications are generally applicable in the field artillery missile battalion, Redstone.

24. (U) Responsibilities

a. Headquarters Battery Commander. The battery commander of the headquarters battery is also the headquarters commandant of the battalion. He supervises the training and tactical operations of the headquarters battery. Although all personnel in the battery are under his command, most of them work under direct operational control of the various battalion staff officers. For this reason, he must coordinate closely with them on all matters pertaining to awards, discipline, and morale affecting his men. The assistant communication officer assists the battery commander in his duties.

b. Missile Battery Commander. Each missile battery commander supervises the training and tactical operations of his battery. He is responsible for the maintenance of his prescribed nuclear load (PNL) and all associated fire control, tests, and ground handling equipment. The missile battery commander also supervises the battery in preparing for and executing fire missions. The battery executive officer and a warrant officer (material officer) assist the battery commander in his duties.

c. Engineer Company Commander. The engineer company commander has all the responsibilities of a separate company commander. He commands the engineer company and also serves as engineer staff

officer to the battalion commander. As staff engineer, he furnishes engineering advice and assists in the preparation of battalion plans, policies, and orders. He maintains close liaison with other units, such as the supporting engineer field maintenance company. As unit commander, he is responsible for planning and supervising the employment of his company in support of battalion operations. He has a maintenance platoon leader, and two liquid oxygen generating platoon leaders to assist him in his duties. Primary responsibilities include—

- (1) Establishing liaison with the missile battery commanders for coordinating the operations of his company in support of the firing batteries.
- (2) Establishing liaison with the units of the battalion concerning maintenance of engineer mechanical equipment and supply of repair parts.
- (3) Reconnoitering and selecting positions for occupation by elements of his company.
- (4) Formulating plans for the production, storage, and delivery of liquid oxygen (LOX and liquid nitrogen LN₂).
- (5) Establishing and supervising the local security of the engineer company.
- (6) Planning and supervising unit supply, maintenance, administration, and training.
- (7) Providing field maintenance of engineer mechanical equipment to the extent of the company's capabilities.

d. Ordnance Company Commander. The ordnance company commander has all the responsibilities of a separate company commander. He also acts as a special staff officer or technical adviser to the battalion commander for ordnance matters. The ordnance company commander maintains close liaison with the two firing batteries to insure immediate supply of alcohol, hydrogen peroxide (H₂O₂), missiles, warheads, and associated spare parts when required. He must organize and dispose his company to provide ordnance support for the firing unit. He also has the responsibility of maintaining that portion of the battalion special ammunition load not carried by the firing batteries. To assist him in his duties, he has an operations officer, a supply platoon leader, an automotive maintenance platoon leader, and a special weapons electronic officer.

e. Platoon Leaders. The various platoon leaders throughout the battalion organization have all the command functions normally found at platoon level. In addition, most have important technical or supply functions for which they are directly responsible. It is imperative that officers assigned as platoon leaders be technically qualified in their respective fields.