

LESSON 1. INTRODUCTION TO THE NIKE HERCULES MISSILE AND LAUNCHING AREA

MMS Subcourse No 151	Nike Missile and Test Equipment
Lesson Objective	To provide you with a general knowledge of the purpose, capabilities, and physical description of major units comprising the Nike Hercules missile and launching equipment.
Credit Hours	One

TEXT

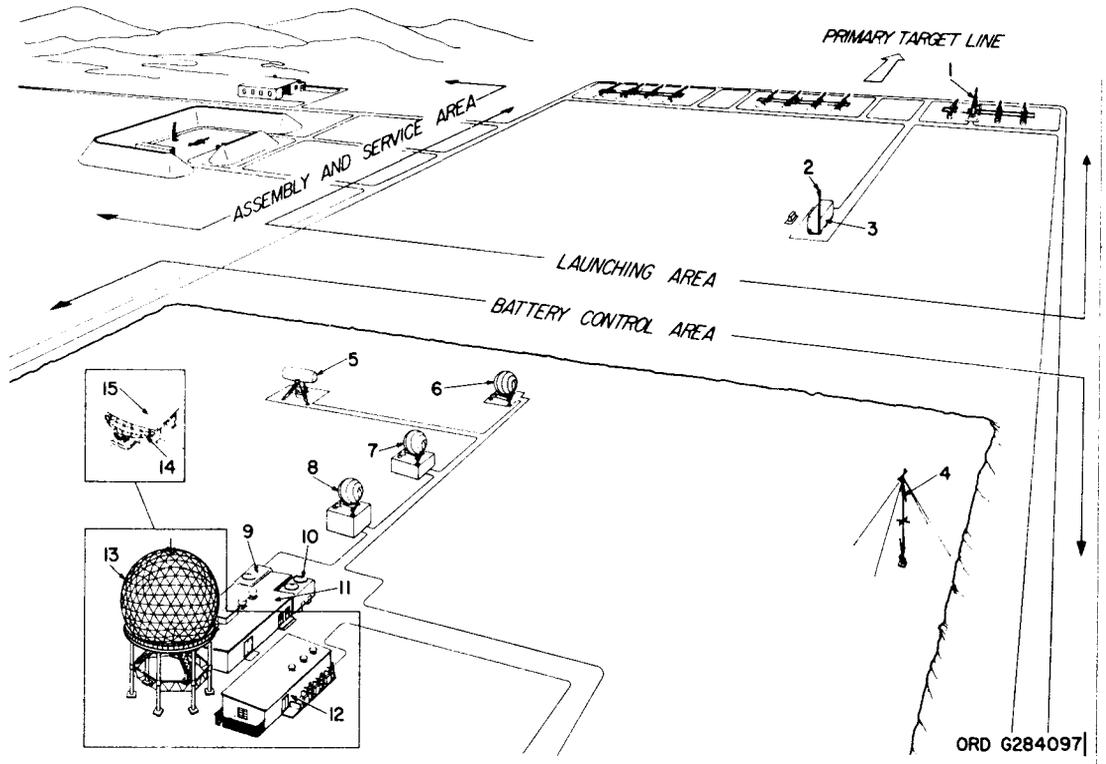
1. **INTRODUCTION.** Equipment incorporated in the improved Nike Hercules or the Anti Ballistics Missile (ATBM) system is located in three operational areas: the battery control area, the launching area, and the assembly and service area. These areas are illustrated in figure 1 and their functions are briefly described in a through c below.

a. **Battery control area.** The battery control area contains the radar course directing central (RCDC) which basically consists of the following: the acquisition radar systems, the target tracking, target ranging, and missile tracking radar systems; the computer system; and other associated equipment. A detailed study of this equipment is provided in subcourse MMS 150. The purpose of the RCDC, as illustrated in figure 2, is to detect, acquire, and track the target; furnish the necessary information to the battery control officer for determining when a missile should be fired; track the missile during flight; and issue steering and burst orders to the missile. The battery control officer determines the type of mission, missile, and warhead to be used; supervises selection of the target to be engaged; and issues orders to ready the missile for firing and to fire the missile.

b. **Launching area.** This lesson will deal primarily with the Nike Hercules guided missile launching set (fig 3), which is emplaced in the launching control area. Succeeding lessons will cover components of the launching set in more detail. The tactical function of the launching set is the prefire preparation of the Nike Hercules missile and warhead combination for launching. The overall physical arrangement of the launching area depends upon the type of installation employed. A mobile installation can be employed by a field army; however, a permanent installation is employed when the launching set is used as a fixed defense installation:

(1) **Permanent installation.** A typical permanent launching set is shown in figure 3. It consists of the trailer mounted launching control station, three launching sections, and frequency converters or generators which supply power to the launching control station and the sections. A permanent launching section is shown in figure 4. The launching set is designed to handle four launching sections; however, the number of sections used will depend on the tactical situation.

(2) **Mobile installation.** A mobile launch-



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|---|---|
| 1. Erected missile on launcher | 9. Trailer mounted director station |
| 2. Flight simulator group and radar target simulator | 10. Trailer mounted tracking station |
| 3. Trailer mounted launching control station | 11. HIPAR building |
| 4. Radar test set group | 12. Power building |
| 5. LOPAR antenna-receiver-transmitter group | 13. HIPAR antenna radome-supported-tripod |
| 6. Missile track antenna-receiver-transmitter group | 14. AAR antenna |
| 7. Trailer ranging antenna-receiver-transmitter group | 15. AAR shelter |
| 8. Target track antenna-receiver-transmitter group | |

Figure 1. Battery layout--typical consolidated site.

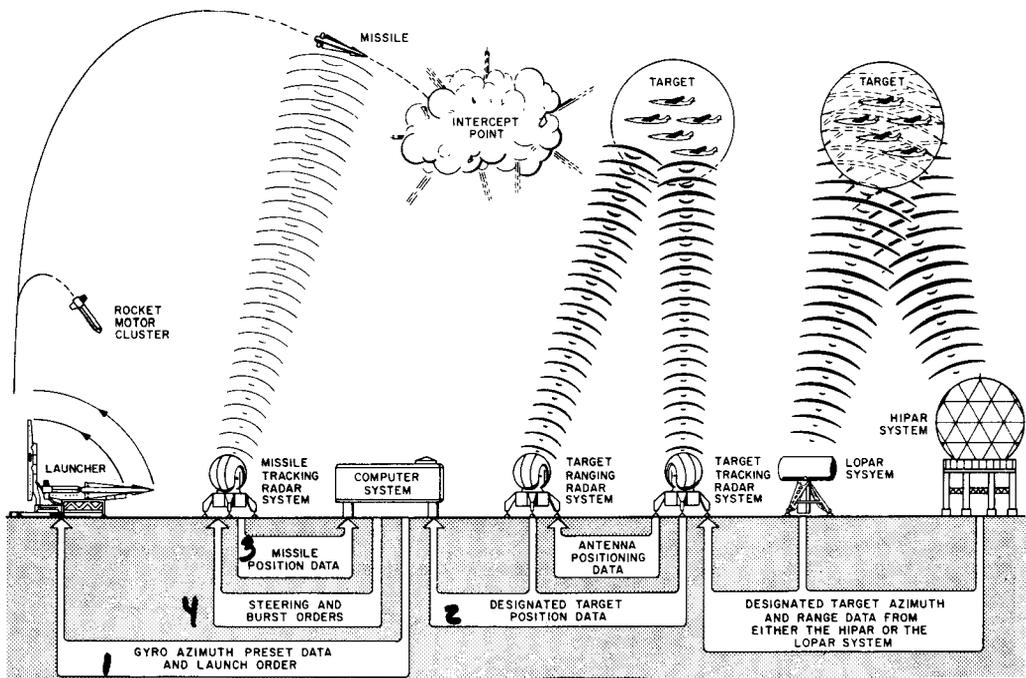


Figure 2. Surface to air mission--functional diagram.

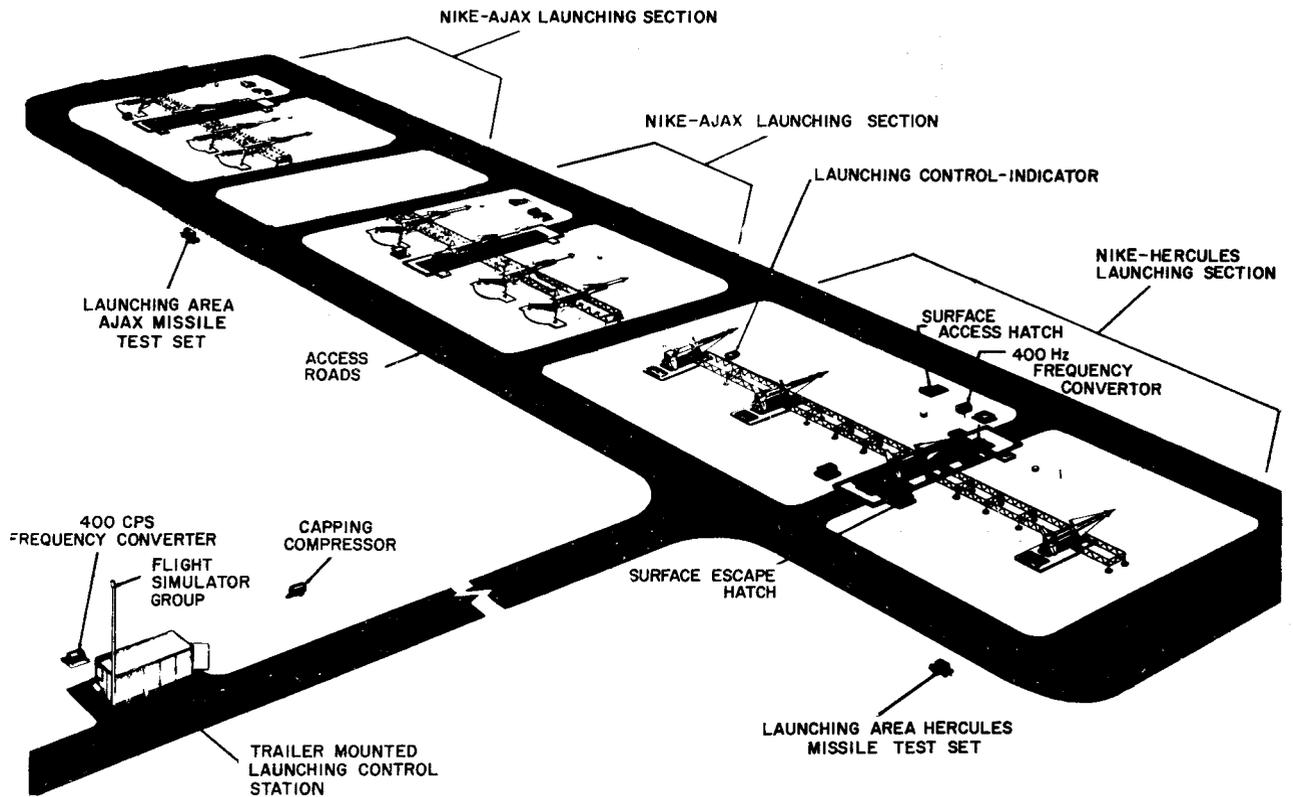


Figure 3. Permanent launching set.

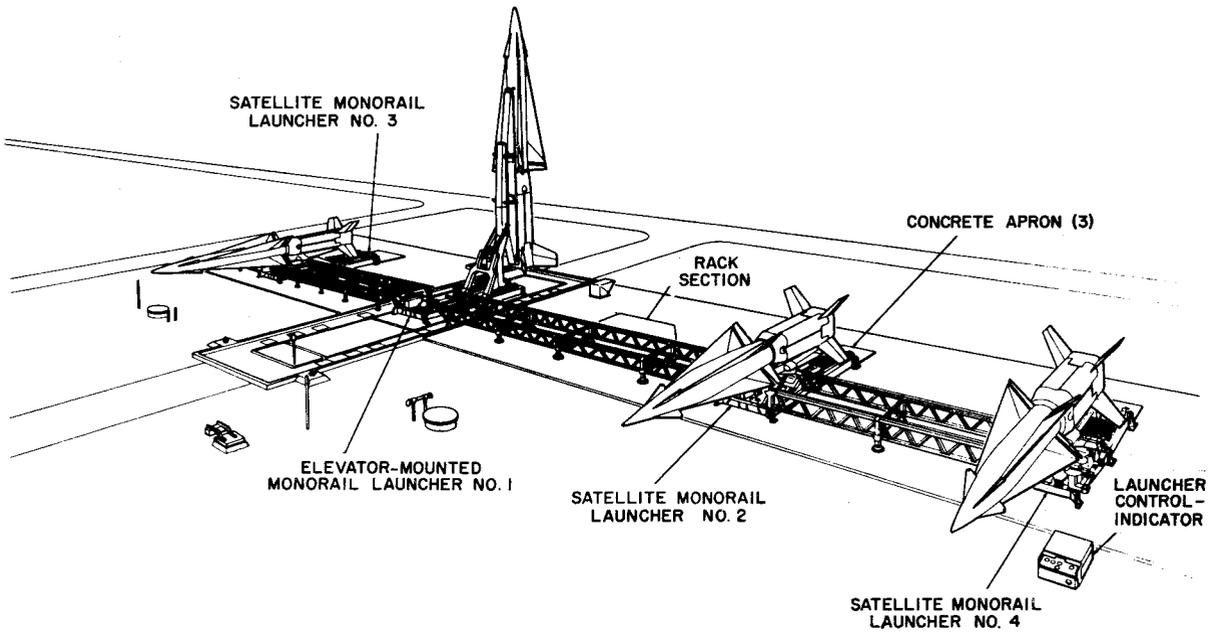


Figure 4. Nike Hercules launching section--permanent installation.

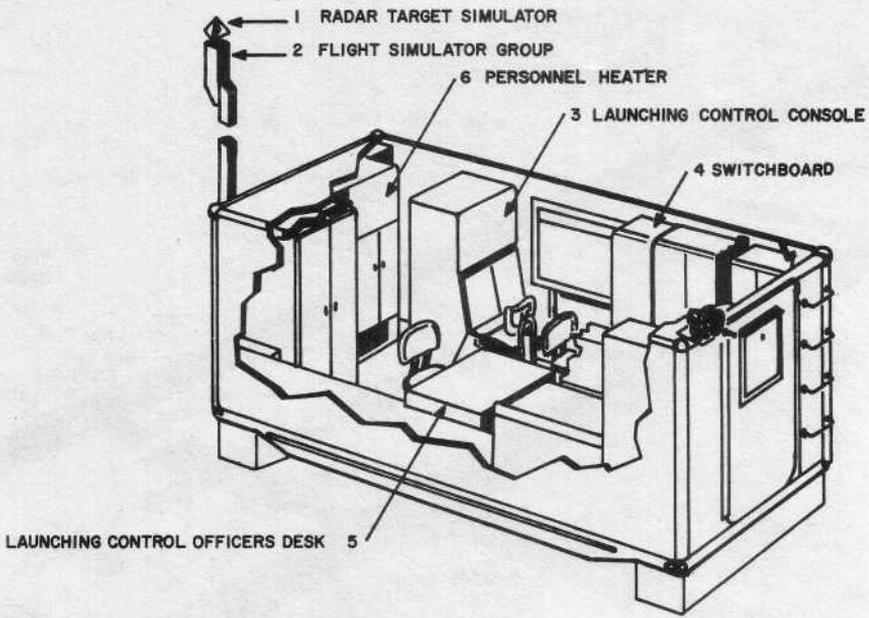


Figure 5. Launcher control trailer--permanent layout.

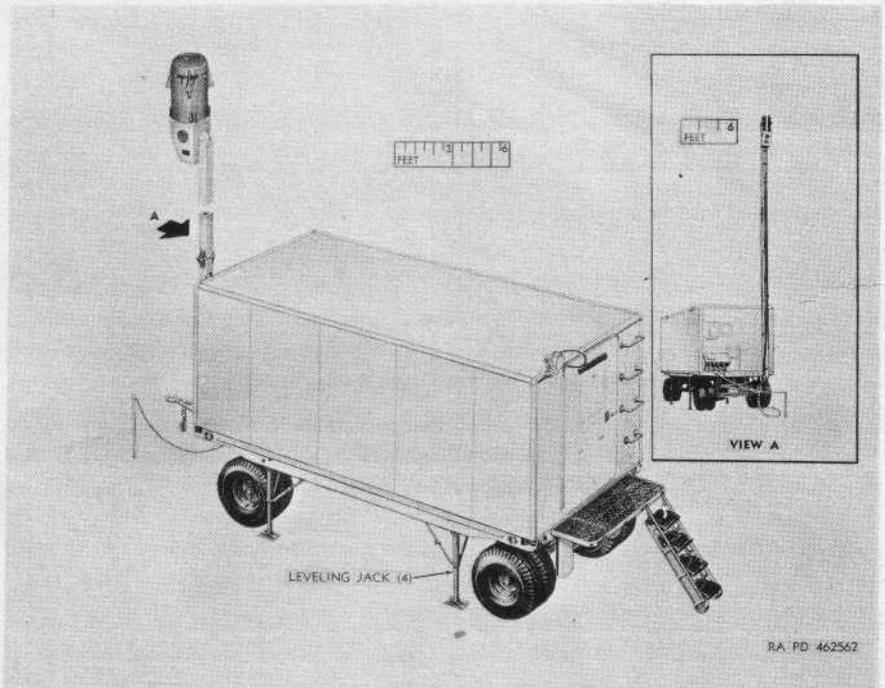


Figure 6. Launcher control trailer--mobile layout.

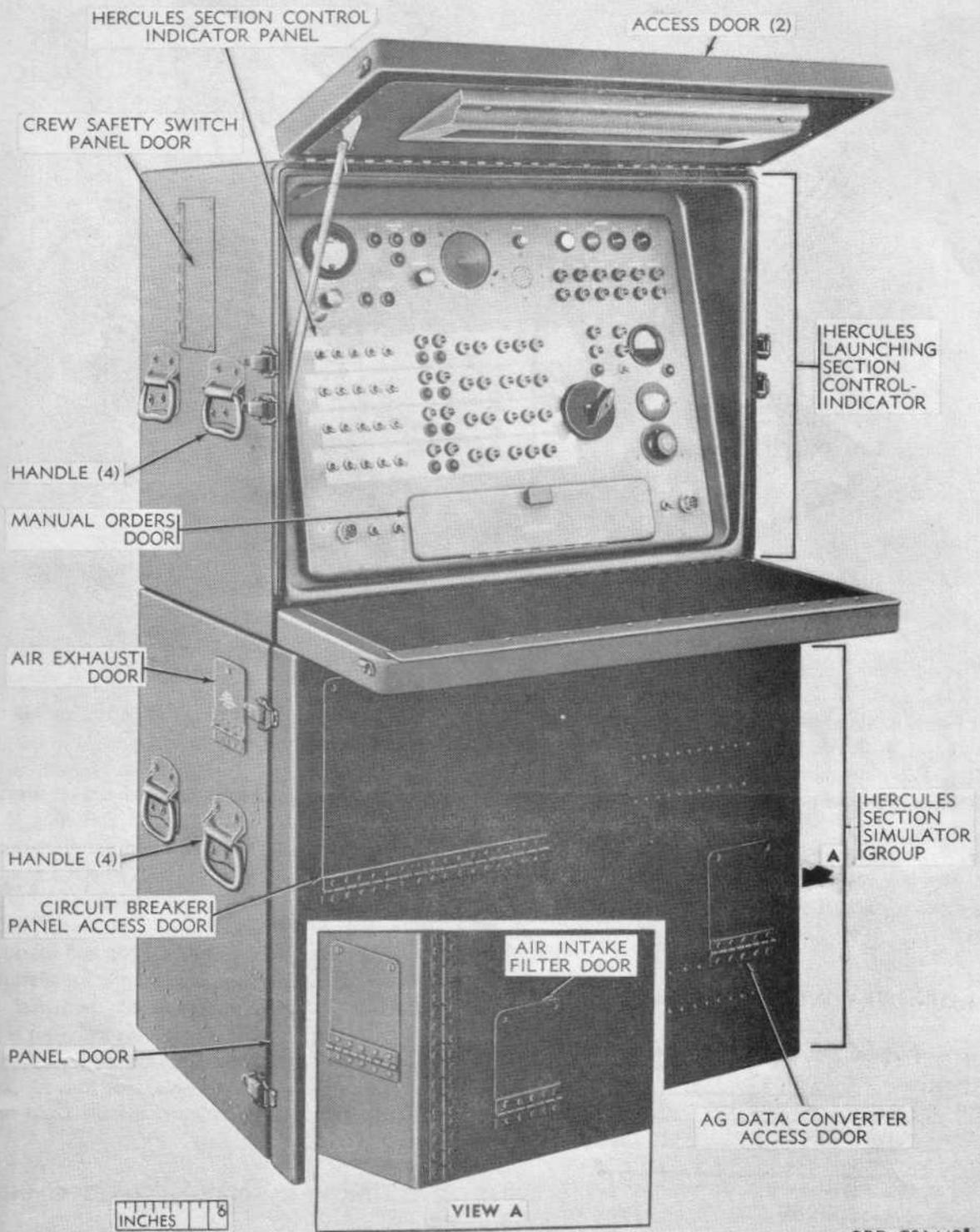


Figure 7. Launching section control indicator and section simulator group.

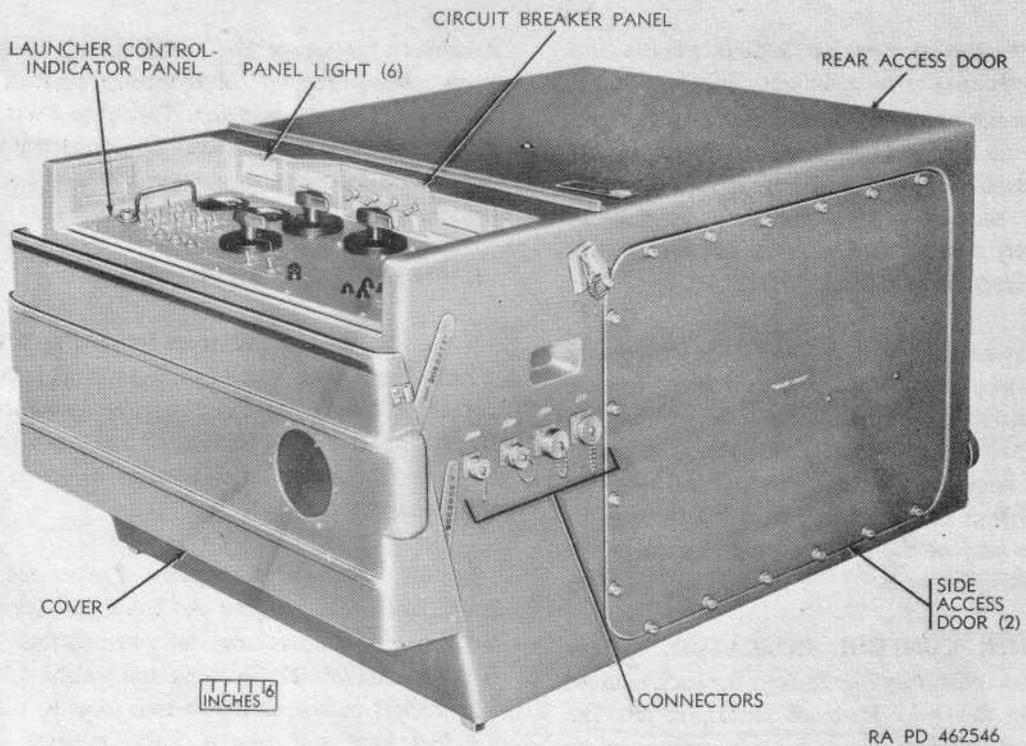


Figure 9. Launching control indicator.

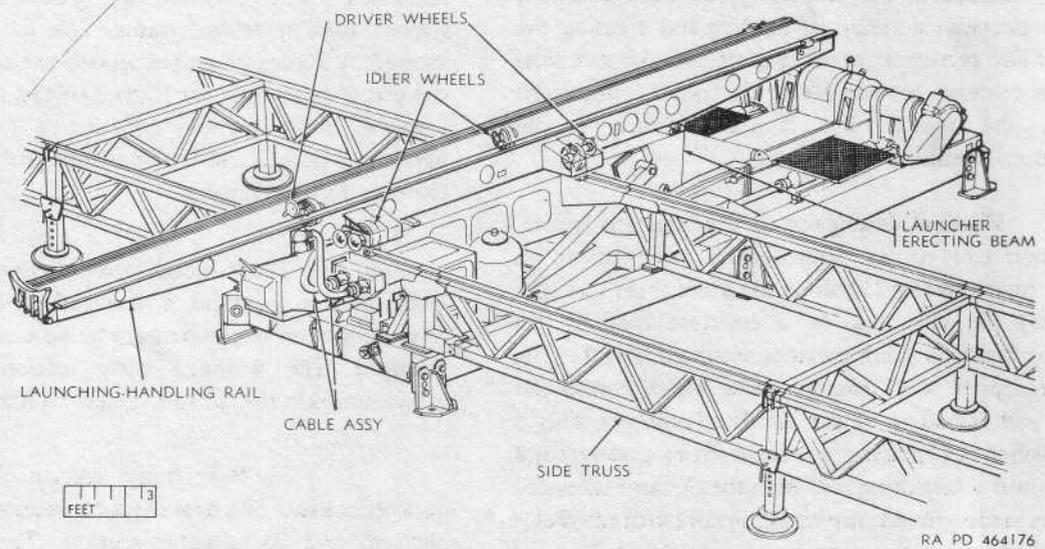


Figure 10. Hercules monorail launcher.

base contains the meters, switches, indicator lights, and gyro azimuth information necessary for missile preparation. If the launcher control trailer becomes disabled, the launching section control indicator becomes the launching control center. Launching is then controlled from the section control indicator as directed from the battery control trailer in the battery control area by field telephone or radio.

b. **Physical description.** The section control indicator and simulator group are located in the control room (fig 8), and they are approximately 5 feet high and weigh about 200 pounds each. The control indicator consists of the necessary switches, meters, and lights for the control of four monorail launchers. The simulator group contains part of the gyro azimuth circuits which will be discussed in lesson 3.

4. **LAUNCHER CONTROL INDICATOR.** Sixteen launcher control indicators (fig 9), four for each section, are included in the Nike Hercules launching set. The launcher control indicator is used for test purposes when performing checks and adjustments or maintenance on the monorail launcher or the missile.

5. HERCULES MONORAIL LAUNCHER.

a. **Purpose and capabilities.** There can be 16 monorail launchers (fig 10), four to each launching section, included in the launching set. Each monorail launcher provides a means of loading and erecting the missile while serving as a firing platform. An umbilical cable (necessary to complete electrical connections between the missile and launcher during missile preparation) breaks away at launch.

b. **Physical description.** In a permanent launching section one of the launchers is mounted on an elevator platform (fig 11) while the other three (satellite launchers) are mounted on a concrete base by six mounting brackets. Each elevator mounted launcher (fig 11) is equipped with adapter racks which permit the loading and reloading of the satellite launchers. This is accomplished by placing a missile from underground storage onto a launching rail. With the elevator mounted launchers underground, the handling rail (with missile) is then rolled onto the launchers and elevated above ground. The handling rail and missile are rolled past the adapter racks onto the loading racks and satellite launchers. Each monorail launcher (fig 12) consists of a launcher base, hydraulic unit (for erecting the missile), erecting beam, strut arm, launcher strut, and main and secondary trunnions. The handling rail and erecting beam outriggers mesh and are locked by a hydraulic

wedgelock to secure the handling rail to the erecting beam. When erected, a hydraulic up-lock locks the erecting beam into position. Two stop bolts at the rear of the handling rail are used to adjust the missile into position and prevent an erected missile from sliding off the rail.

6. NIKE HERCULES MISSILE.

a. **Purpose and capabilities.** The Nike Hercules missile has proven successful against high performance aircraft and has intercepted short range ballistic missiles. It is capable of performing three types of defensive missions: surface to air, surface to air low altitude, and surface to surface.

b. **Physical description.** The missile has a solid propellant rocket engine and has a dart-type configuration with four cruciform, delta-shaped fins. The missile is approximately 27 feet long and weighs 4,900 pounds. The rocket motor cluster, which joins to the missile, is 13 feet long and weighs 5,300 pounds. The missile consists of three aerodynamic sections (fig 13): ogive, constant body, and boattail. These sections are further broken down into the forward body section, warhead body section, and the rear body section.

(1) Forward body section. This section is comprised of the forward nose section and the rear nose section. They are constructed of rolled aluminum alloy, riveted to a structural frame. The four forward fins, located at 90 degree angles around the circumference of the rear nose section, are formed of cast magnesium. The forward body section contains a guidance set, a barometer probe, and four pressure probes mounted on the four forward fins.

(2) Warhead body section. The warhead body section contains a warhead, safety and arming devices, and an explosive harness necessary to burst the warhead. The warhead body section is formed of aluminum skin riveted to a structural frame.

(3) Rear body section. The rear body section consists of a missile motor section, an equipment section, and an actuator section. The missile rocket motor extends through all three sections.

(a) Missile motor section. This section contains the missile motor, blast tube, safety and arming switch, and the necessary insulation blankets to keep the motor at the required temperature during subfreezing weather.

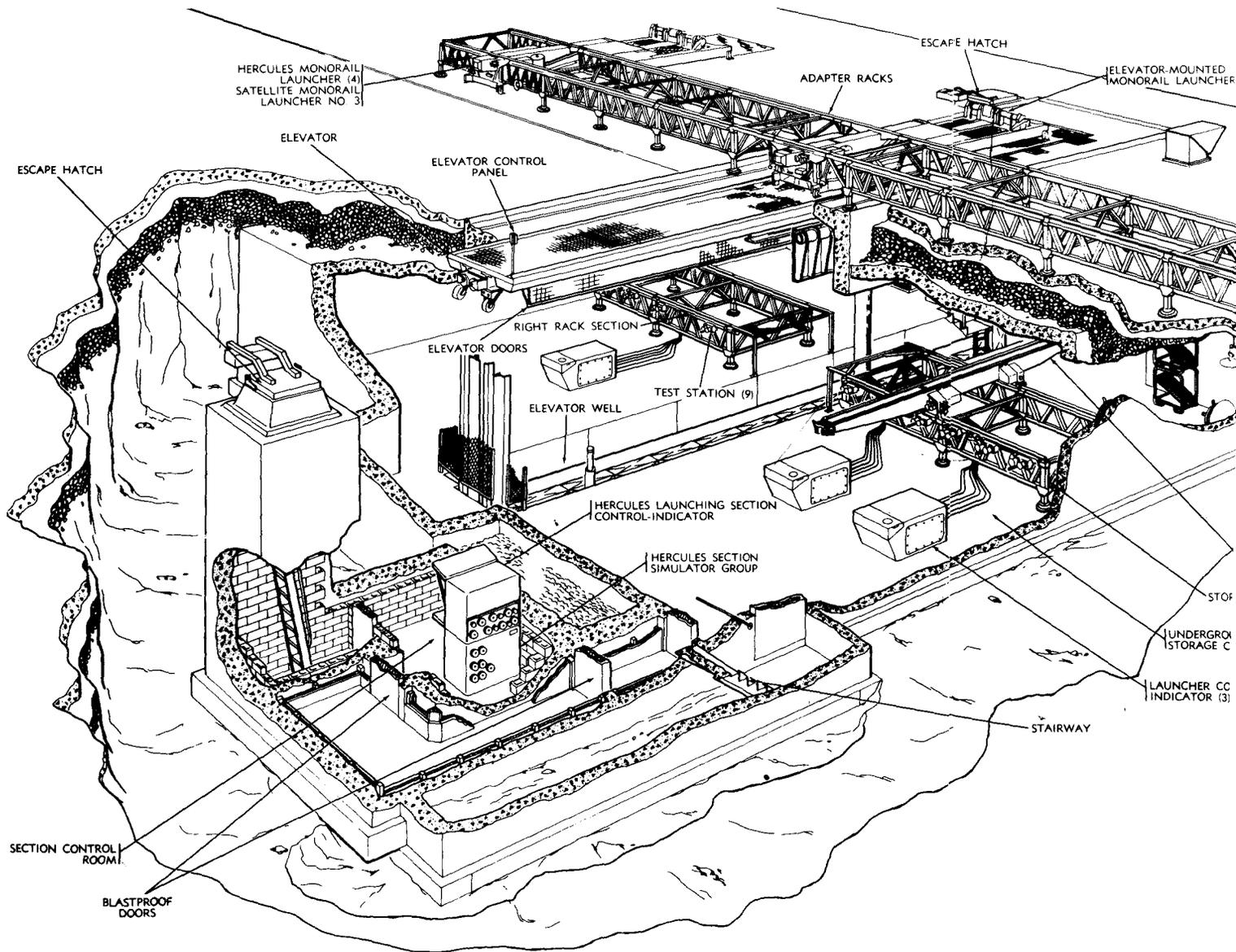
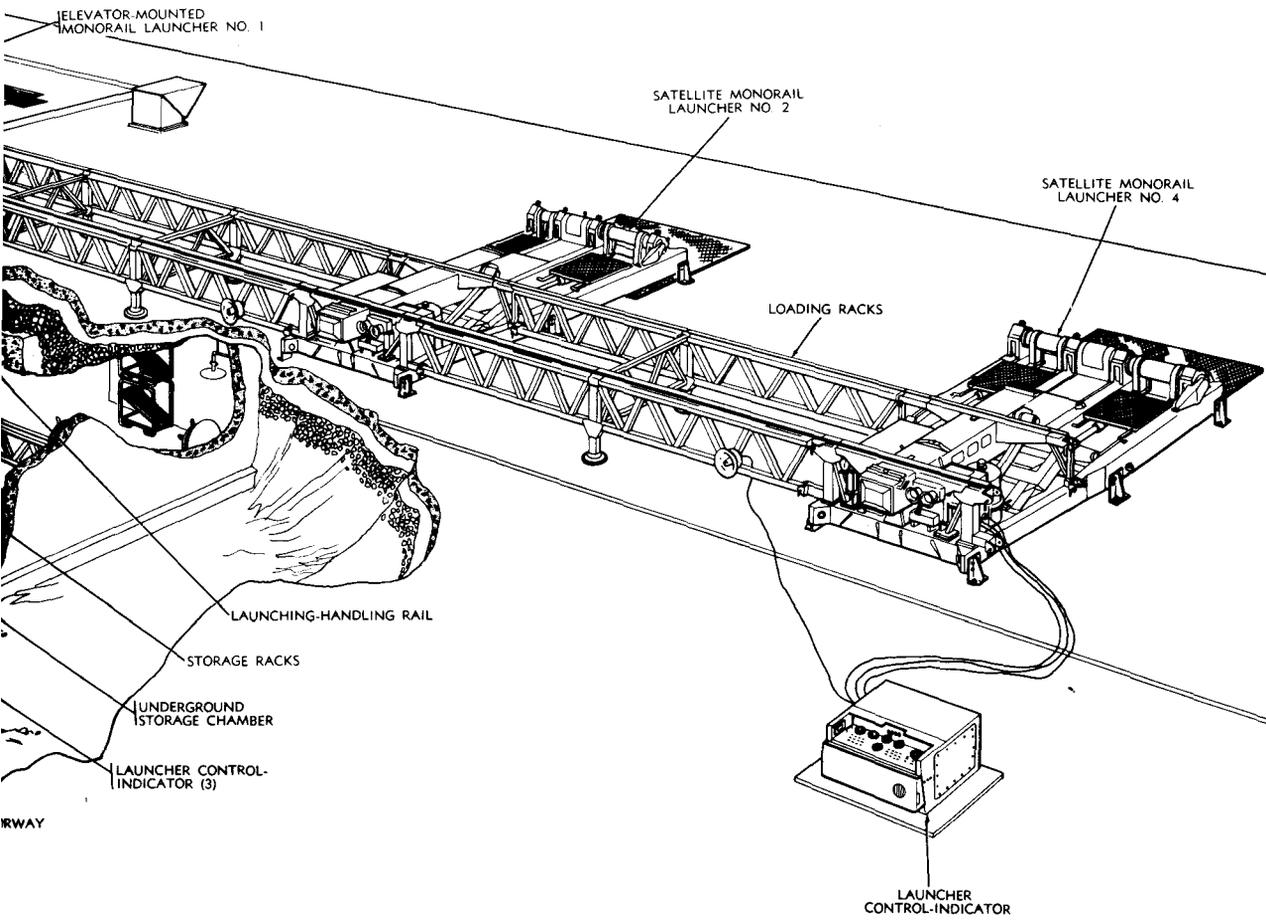


Figure 11. Launcher layout (permanent launching section)



(permanent launching section).

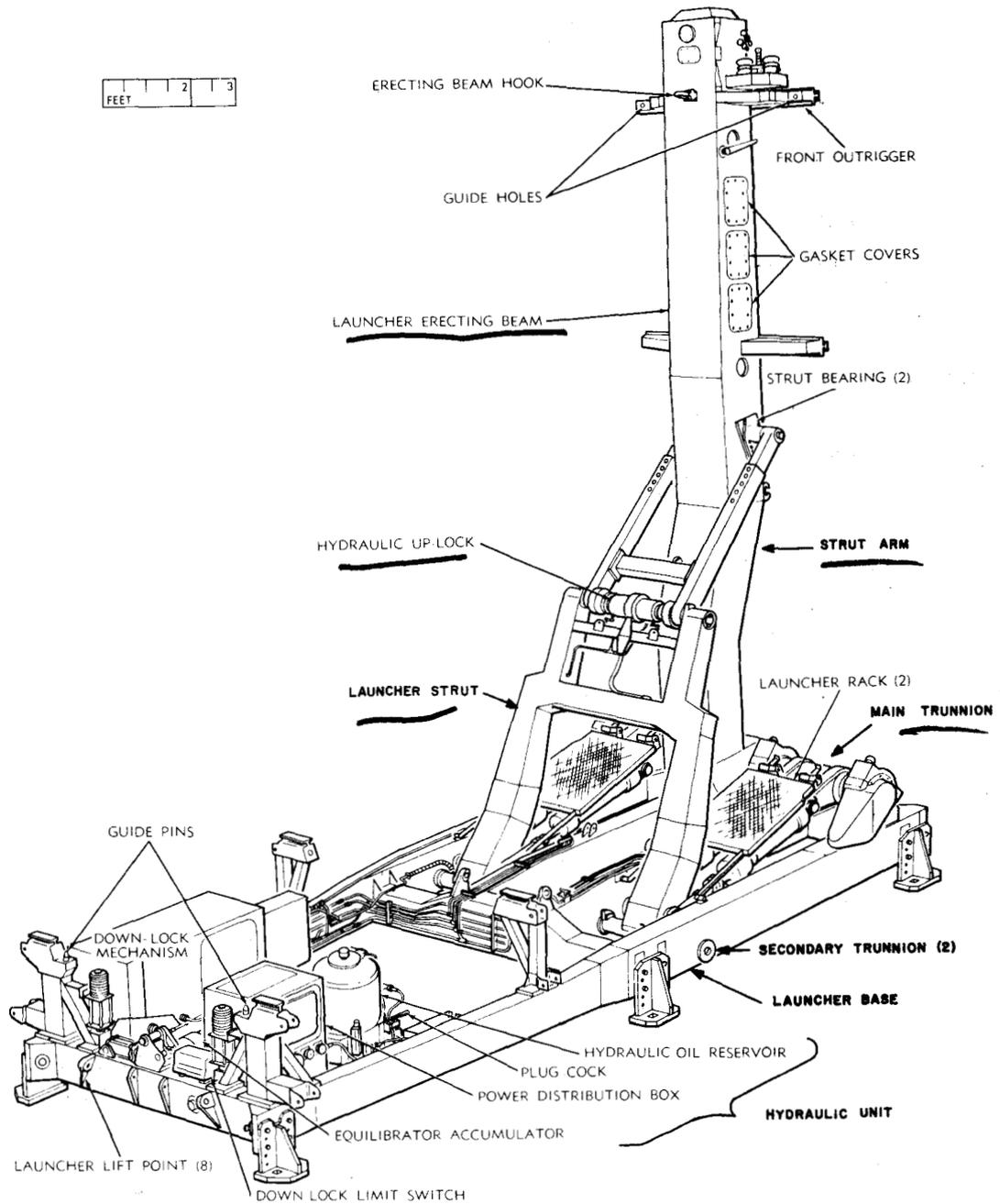


Figure 12. Monorail launcher.

(b) Equipment section. The equipment section contains a hydraulic pumping unit, a missile battery box, and a power distribution box.

(c) Actuator section. The actuator section contains three actuator assemblies, a thermal battery assembly, and a propulsion arming lanyard which activates the thermal batteries upon booster

separation. The three actuators hydraulically actuate a series of mechanical linkages to drive the elevons. The door assemblies provide access to the actuator section.

(d) Main fins. The four main fins are located at 90 degree angles around the circumference of the missile body and are aligned with the four forward fins. The fins are formed of aluminum skin attached to three structural members. The four elevons are made of

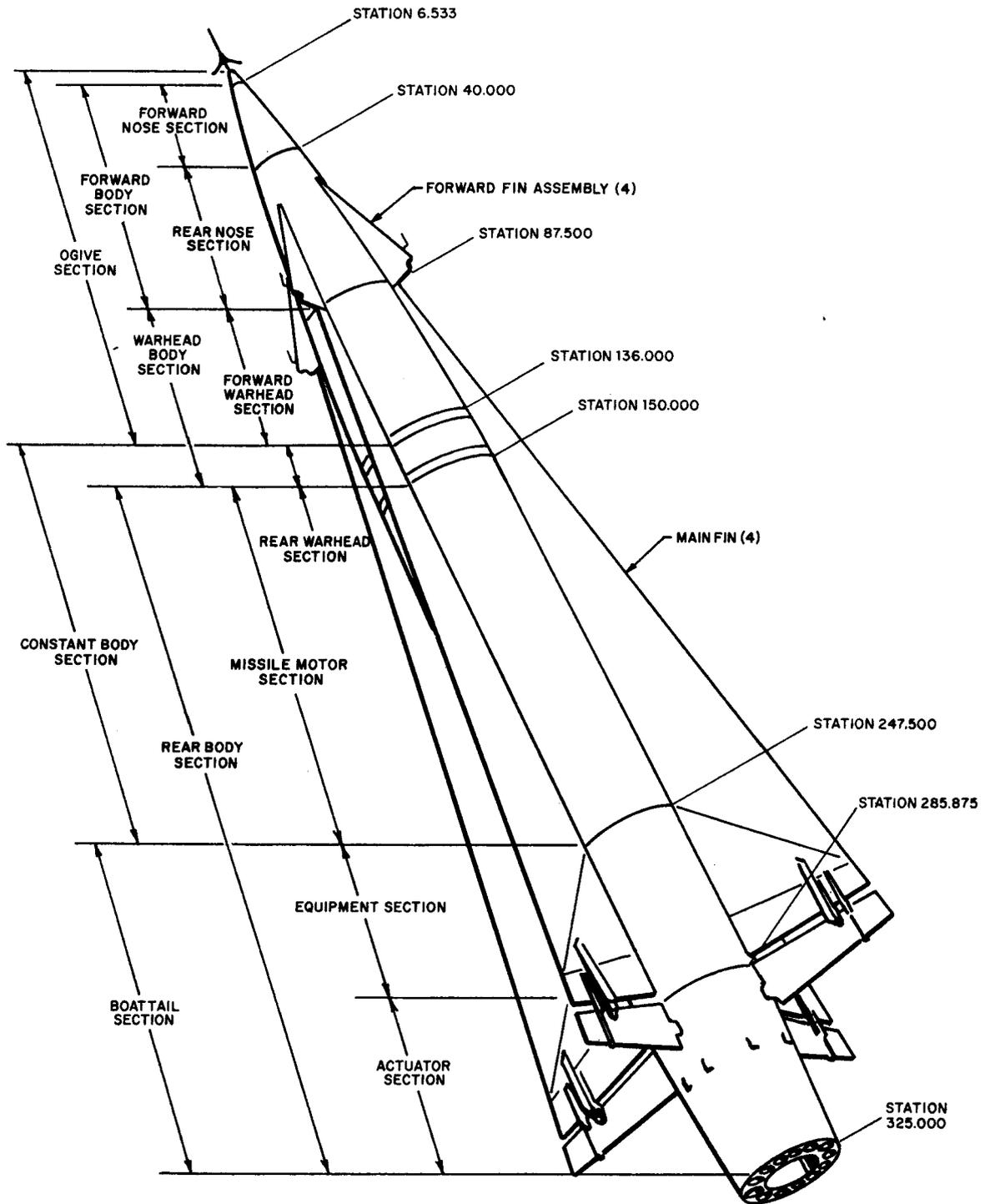


Figure 13. Hercules missile.

forged aluminum and are physically attached to the main fins to control the missile during flight.

7. ASSEMBLY AND SERVICE AREA.

a. **Permanent installation.** The permanent type assembly area contains the assembly building, the receiving area (adjacent to the assembly building), and the test area within the assembly building. Upon completion of assembly, test, and service procedures the missile body is moved to the revetted service area. In the revetted service area, the missile rocket motor and the warhead are installed and checked out. The assembled missile body is then transported to the launching area where the missile body is joined with the rocket motor cluster and placed on a launching and handling rail.

b. **Mobile installation.** The mobile type assembly area is composed of three distinct sections; the checkout area with an air-inflated shelter, the warhead area with an air-inflated shelter, and the explosive-storage area.

8. EQUIPMENT STATUS.

a. **General.** The varying degrees of equipment status determine the action of the personnel in the launching control area. Four equipment status indicator lights are used to determine the degree of equipment preparation for firing. These indicator lights are white, yellow, blue, and red and are normally controlled from the battery control area. During an emergency they are controlled either from the launching control trailer or the launching section control indicator.

b. **White.** The white equipment status is the standby condition for the Nike Hercules battery; under normal conditions, the equipment in the launching control area is not operating. During the "white status," however, such activities as maintenance, testing, and training are conducted in a normal fashion.

c. **Blue.** The blue equipment status is established when the destination of enemy aircraft appears to be in the direction of the battery defense area. This is the "prepare for action" status. Operating personnel "man" their battle stations, and equipment in the launching control area is energized. Personnel perform their prefire checks in preparation for launching a missile.

d. **Red.** The Nike Hercules battery is placed in red equipment status when an attack against the battery defense area becomes imminent. Final preparations for an engagement are completed and the missile is launched at the designated aircraft.

NOTE: Although the yellow equipment status circuit is still incorporated in the launching set, it is no longer used in the tactical situation.

9. **SUMMARY.** This lesson presented a brief description of the three functional areas of a Nike Hercules missile site which includes the battery control, launching, and assembly and service areas. The main subject of this lesson was major equipment items in the launching area. The launcher control trailer (LCT) serves as a data link between the battery control area and launching area. Information required to coordinate missile preparation and direct the launching is interchanged between the LCT and the launching section control indicator. In case of an emergency the launching could be controlled from the section control indicator by field telephone or radio communication with the Battery Control Officer in the battery control trailer. A launching control indicator is provided at each launcher for performing maintenance on the launcher or missile while the missile is mounted on the launchers. The missile is placed onto a handling rail and the rail with missile is locked to the launcher and raised to a vertical position for firing.

MMS SUBCOURSE NUMBER 151, NIKE MISSILE AND TEST EQUIPMENT

EXERCISES FOR LESSON 1

1. What is one purpose of the flight simulator?
 - A. Check commands generated by the missile tracking radar
 - B. Check fire command prior to launch
 - C. A reference point for the target tracking radar
 - D. A line of sight reference point for battery control area
2. What is the tactical function of the launching set?
 - A. Control of the missile during flight
 - B. Storage of the missile and warhead combination
 - C. Prefire preparation and launching of Nike Hercules missile
 - D. Determine which target to engage
3. From which does the section control indicator receive its tactical information?
 - A. Launcher control trailer only
 - B. Battery control trailer only
 - C. Missile tracking radar
 - D. Launcher control trailer or battery control trailer
4. In which section of the missile is the guidance set located?
 - A. Forward body
 - B. Boattail
 - C. Constant body
 - D. Equipment
5. How many monorail launchers are used per launching section?
 - A. A minimum of two
 - B. Four
 - C. Sixteen
 - D. As many as the commander desires
6. What supplies the necessary power to drive the elevons during flight?
 - A. Three hydraulic actuators
 - B. Thermal battery
 - C. Power distribution box
 - D. Guidance set
7. What are the aerodynamic sections of the missile?
 - A. Ogive, constant body, warhead
 - B. Constant body, warhead, rear
 - C. Ogive, boattail, rear
 - D. Boattail, ogive, constant body
8. What service is performed on the missile in the revetted area?
 - A. Electrical checkout
 - B. Missile motor and warhead installation
 - C. Arming device installation
 - D. Final preparation of rocket motor and missile
9. Where are the four equipment status lights normally controlled from?
 - A. Launcher control trailer
 - B. Battery control area
 - C. Launching section control indicator
 - D. Assembly and service area.
10. During what equipment status is the missile launched?
 - A. Red
 - B. Green
 - C. White
 - D. Blue