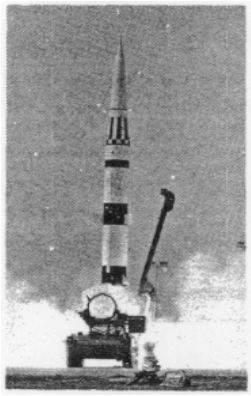
Pershing . . .

New Artillery Sunday Punch



Lt Col William T. Hatter

Guided Missile Department

Solid propellants, automatic checkout, and new concepts in ground handling equipment and procedures have resulted in a new missile system with a firing range twice that of the Redstone missile—Pershing, the long nuclear arm of the field artillery (fig 1). The Pershing system, manufactured by the Martin Company, can be moved by ground or air. The communication system is capable of operation up to 100 miles with more than a 99 per cent path reliability; in addition, it is practically jamproof. In six years, 1958 to 1964, the Pershing missile system has moved from the drawing boards to operational status; Pershing units will be deployed overseas within a few months, gradually replacing Redstone units.

PERSHING TESTING

The test program for the Pershing missile system has been the most extensive and demanding program ever conducted on an Army weapons system. Tests included research and development firings, mobility tests, local weapons system tests, controlled and uncontrolled environmental tests, and the service test recently completed by the US Army Artillery Board.

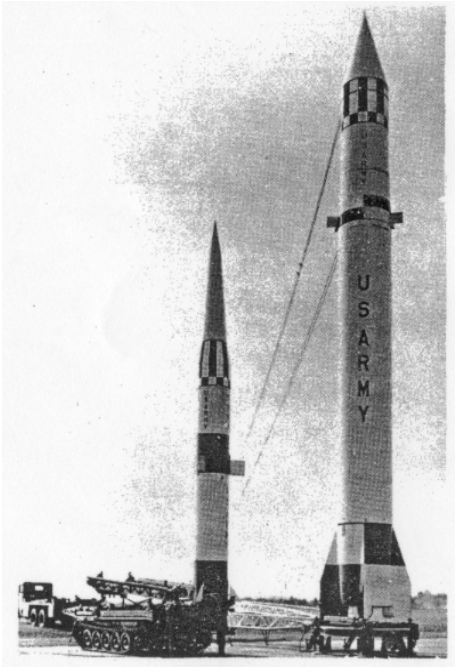


Figure 1. Although smaller than Redstone, the Pershing delivers its warhead to a greater range.

The service test was conducted in three major phases:

- a transition firing phase at Cape Kennedy (formerly Cape Canaveral) which terminated the research and development firing program and allowed the service test unit to make early use of the latest equipment during actual firings.
- a nonfiring phase at Fort Sill to establish reliability of the equipment under field conditions.
- a firing phase at the White Sands Missile Range with firing positions at White Sands; Blanding, Utah; and Fort Wingate, New Mexico.

During the tests, the Pershing system was operated under field conditions at altitudes of 4,000 feet to 8,056 feet, with temperatures ranging from below freezing to above 100° F.

MISSILE CHARACTERISTICS

The Pershing missile measures 34.5 feet (10.38 meters) in length and 40 inches (1.02 meters) in diameter and weighs 10,275 pounds. A solid propellant two-stage motor and inertial guidance provide the thrust and guidance for the Pershing to deliver its nuclear warhead. The missile is constructed in four sections (fig 2)—a warhead section, a guidance and control section, and two motor sections. The two solid propellant rocket motor sections each contain two sets of hydraulically powered control surfaces—air fins mounted externally and jet vanes mounted in the rocket exhaust nozzle.

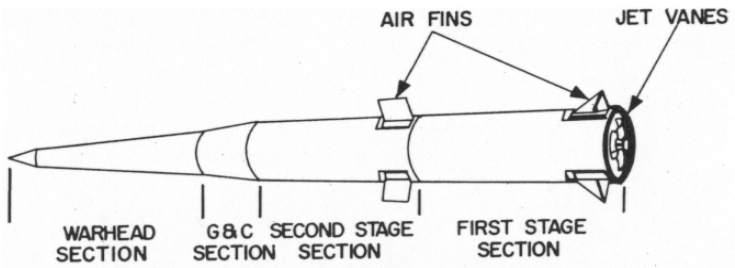


Figure 2. Missile structure.

The third section of the missile, the guidance and control section, contains a completely inertial guidance system which receives no commands from the ground after liftoff; hence, it is immune to all known electronic countermeasures.

The fourth section, the warhead, is the reentry vehicle and contains the nuclear warhead and adaption kit.

During flight, the first stage motor section provides the initial thrust (liftoff) for the missile. The second stage motor section propels the Pershing to the desired point in flight, where the guidance and control section terminates thrust (the guidance and control section solves the motor cutoff equation). When this cutoff equation is solved, three thrust-termination ports, located at the forward end of the second motor section, are blown open, thus reducing chamber pressure and neutralizing thrust. At this

point, the warhead section separates from the remainder of the missile and follows a ballistic path to the target.

SUPPORT EQUIPMENT

For normal ground operations, the Pershing ground support equipment (fig 3)—the erector-launcher, the power station, the programmer-test station, and the radio terminal set AN/TRC-80—are mounted and transported on a single type of vehicle, the XM474 missile equipment carrier. The XM474, similar to the M113 armored personnel carrier, is equipped with mounting kits for mounting each piece of support equipment on the carrier. These kits are interchangeable from one carrier to another, thus eliminating the requirement for a particular type of vehicle for each load. Each Pershing firing battery is authorized four XM474's.

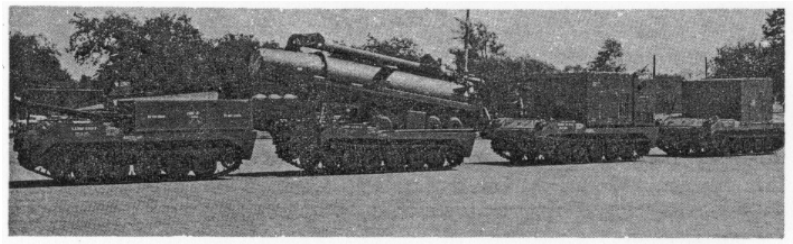


Figure 3. Pershing system components.

The XM474 carrier is full-tracked and unarmored, presents a low silhouette, weighs 11,000 pounds, can travel at a maximum speed of 40 miles per hour, and has a cruising range of 200 miles. The carrier can cross streams to a depth of 42 inches and can traverse 60° slopes.

The erector-launcher (fig 4), mounted on an XM474 carrier, provides a platform for loading, mating, transporting, laying, erecting, leveling, and firing the missile. The missile, less warhead, is normally loaded

Figure 4. Erector-launcher on XM474 carrier.

on the erector-launcher in the assembly area for movement to the firing position. Equipment for the erector-launcher includes a cable mast, which routes the electrical power and the conditioned air and high-pressure air and provides a path for signals to and from the missile guidance and control section. Most of the mechanisms on the erector-launcher are designed for operation by electric motors; however, they may be operated manually in the event of electrical failure.

The power station is a gas-turbine-operated power source, equipped with electrical, high-pressure air, and conditioned-air outputs. These outputs are used at the firing position to operate the missile and its ground support equipment. The high-pressure air is used for the air-bearing gyros on the ST-120 inertial platform. The conditioned air is used to heat or cool the guidance and control section as required.

The programmer-test station (fig 5) is a completely automatic, transistorized, self-verifying system, equipped with a computer. The purpose of the programmer-test station is to detect and isolate malfunctions in the missile, test the flightworthiness of the guidance and control section, determine the desired trajectory for the Pershing, and insert this trajectory program into the guidance and control section of the missile. The programmer-test station and power station, which are transported on the same XM474 carrier, remain in the firing position during firing operations (fig 5).

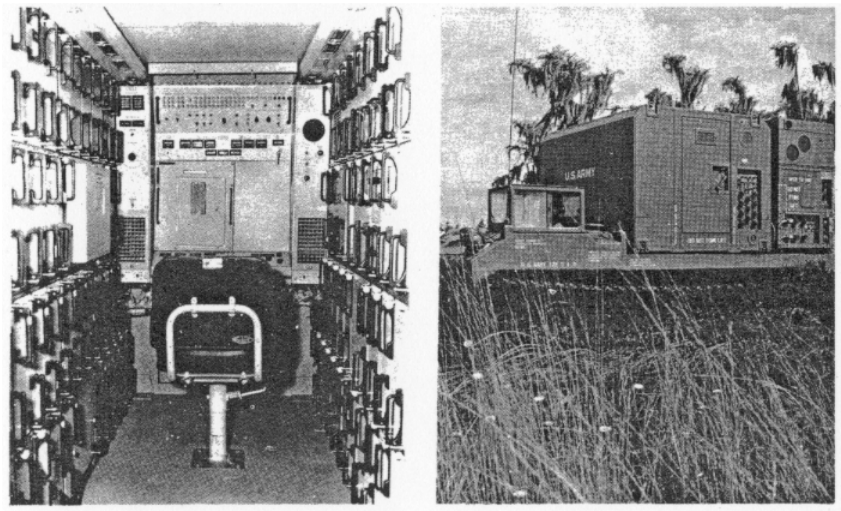


Figure 5. Inside of programmer test station (left). Programmer test station and power station are transported on the same carrier (right).

The radio terminal set AN/TRC-80 (fig 6), mounted on the third XM474 carrier, is completely self-contained and receives its power from a 10-kilowatt generator located in a compartment at the rear of the pack. An 8-foot inflatable, parabolic dish antenna is used with the AN/TRC-80

to furnish point-to-point communications over one duplex voice channel and one-half duplex teletype channel at ranges up to 100 miles. The radio set is normally emplaced in the vicinity of the tactical firing position; however, it may be employed to a maximum distance of 2 miles. A three-man crew can prepare the AN/TRC-80 for operation within 10 minutes after moving into position. The radio terminal set uses the tropospheric scatter principle, which is a process whereby UHF radio waves are bounced off the troposphere. This process is very directional and, as such, provides a high degree of immunity to jamming and interception.

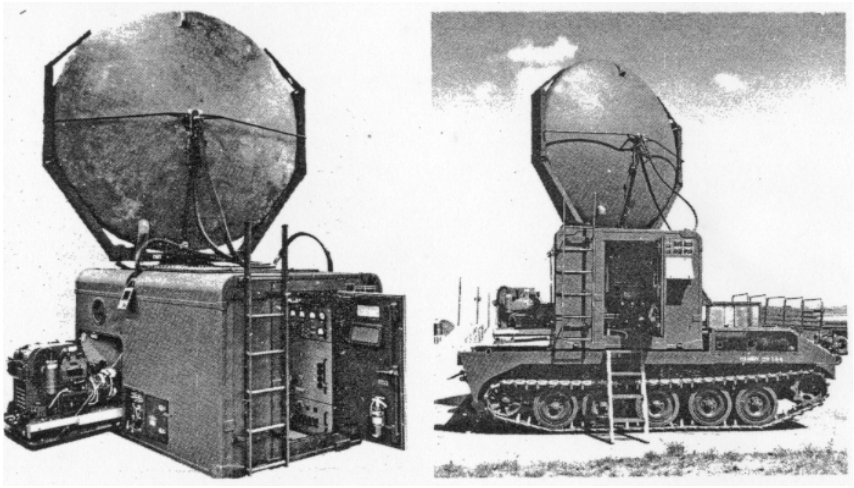


Figure 6. Components of AN/TRC-80 (left). AN/TRC-80 mounted on carrier (right).

The warhead section (fig 7), mounted on a pallet, and two chests containing the azimuth laying equipment are transported on the fourth XM474 carrier. The warhead vehicle also mounts a davit and hoist assembly, which is used to position the warhead section for mating to the missile at the firing positions.

All Pershing equipment is air transportable in CH-47A Chinook helicopters or in fixed-wing aircraft. The Pershing ground support equipment, when transported by the Chinook, is dismounted from the XM474 and mobilized on dolly sets, which are wheel and axle arrangements. The equipment is transported by helicopter to the firing position, off loaded, and fired in the dismounted configuration.

When transported by other aircraft, the Pershing equipment is dismounted from the tracked carriers. The equipment and carriers are then transported by aircraft to the vicinity of the firing position where they are off loaded. The equipment is then remounted on the XM474's for movement to the firing position. Body section lift trucks are used to move the missile equipment when Pershing firing elements are transported by air.

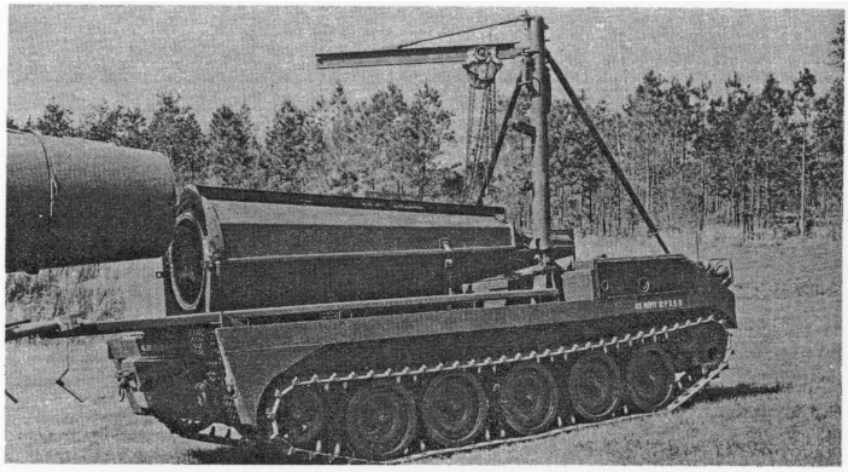


Figure 7. Warhead section mounted on XM474.

ORGANIZATION AND MAINTENANCE

The Pershing missile unit is organized as a battalion consisting of a headquarters and headquarters battery, a service battery, and four firing batteries. In addition to normal firing battery procedures, the Pershing firing battery is capable of completely checking a missile and operating and firing almost anywhere within a 100-mile radius of the battalion headquarters.

The firing battery performs first- and second-echelon maintenance on the missile system, but, in most instances, missile malfunctions are corrected by replacement of complete missile sections. Defective missile sections and ground support components are returned to the ordnance platoon for repair.

The headquarters and headquarters battery provides normal command control, communications, and survey information to the missile batteries. The signal maintenance section of the headquarters battery provides third-echelon repair for the AN/TRC-80.

The service battery provides supply, administrative, and maintenance support for the battalion, and in addition, carries a portion of the basic load of missiles. An ordnance platoon and an engineer maintenance section, organic to service battery, provide third-echelon support for all Pershing equipment in the battalion. An augmentation security platoon is responsible for the security requirements imposed by the storage of nuclear warheads.

PERSHING EMPLOYMENT

The Pershing battalion is assigned to the field army. The field army commander will usually retain control of the Pershing battalion, assigning it a general support mission for the field army and occasionally a reinforcing mission for a corps. Also, authority to fire the missile is retained by the field army commander.

In a nuclear war, the Pershing battalion will be primarily concerned with obtaining nuclear superiority of the battlefield by destroying the enemy's nuclear capabilities and the means associated with those capabilities. After attaining nuclear superiority, the Pershing batteries will divert their fires to the attack of other targets.

The Pershing firing battery is small in terms of personnel and equipment, its position area requirements are easily satisfied, and it is easily maneuvered on the battlefield; therefore, the problems of tactical employment are few in number. Although the basic principles of reconnaissance, selection, and occupation of position (RSOP) apply to the Pershing unit, certain pieces of equipment, such as the tracked XM474 carriers, are easily recognized as Pershing peculiar equipment; therefore, a battery should take precaution to avoid detection by enemy intelligence (move during periods of limited visibility).

Although a Pershing battery can be placed in a "goose egg" 300 to 400 meters in diameter, dependent on concealment, any position area that permits the battery to accomplish its mission is acceptable. Generally, Pershing battalions will first be positioned where they can attack targets beyond the capabilities of the Sergeant missile system.

The capabilities of the Army have advanced another significant step forward with the addition of the mobile, fast-reacting, long-range Pershing missile system to the artillery's array of weapons. Pershing—the "commander" of the artillery missiles—will deliver timely and destructive firepower on the battlefield of the future.

NEW SP FLAME THROWER

A new self-propelled flame thrower (fig 1), designated M132, is scheduled to be issued to troops. The flame thrower, mounted on the M113 armored personnel carrier, will provide the troops with a flame thrower which is more mobile, has greater speed, and a greater range than its predecessors. The equipment is designed in kit form which permits it to be transferred from one personnel carrier to another in the field in a relatively short time.

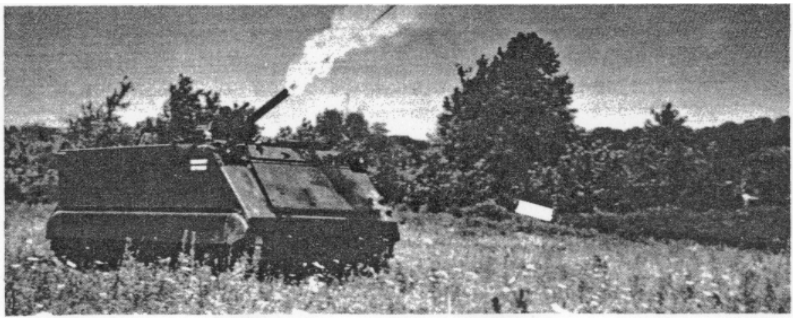


Figure 1. M132 self-propelled flame thrower.