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THE UNIFIED TALOS

This article describes the final version of Talos, known as Unified Talos.

The final version of Talos is shown in Fig. 1. Four interchangeable warhead assemblies were available: nuclear, nuclear training, continuous-rod, and exercise warhead with telemetry. The innerbody provided packaging space for the warhead and also acted as part of the annular diffuser for the ramjet engine. Interferometer antennas were placed on the lip of the diffuser inlet. The outer annular region of the forward compartment contained the electronic hardware for the guidance system, behind which were compartments containing the hydraulic power supply and wing control actuators for missile control, batteries for electronic power, and fuel pump and flow regulators for the propulsion system. An 85 gallon fuel tank holding JP-5 or dimer fuel completely encircled the missile and was part of the airframe. Missile speed was regulated by control of the fuel flow.

The electronic equipment was packaged in modules and designed to facilitate checkout and repair. Modules were physically and functionally interchangeable to permit replacement in the event of equipment failure. Interchangeable wings and fins were provided that could quickly be attached to or removed from the missile and booster assembly.

A summary of overall weights and dimensions is given in Table 1.

The missile had four independently movable wings that provided for roll control and steering maneuvers. They were angularly positioned by hydraulically powered actuators through differential-current servo valves. Attitude and roll stabilization were maintained during boost by wing control, assisted by the booster fins. In the midcourse and homing phases, the control system combined outputs from motion-sensing elements with outputs from the missile guidance receiver to provide error signals to steer the missile.

The missile was launched at elevation angles from 25 to 55° (Fig. 2). It was boosted to nominal flight speeds of over 2000 feet per second by a solid-fuel

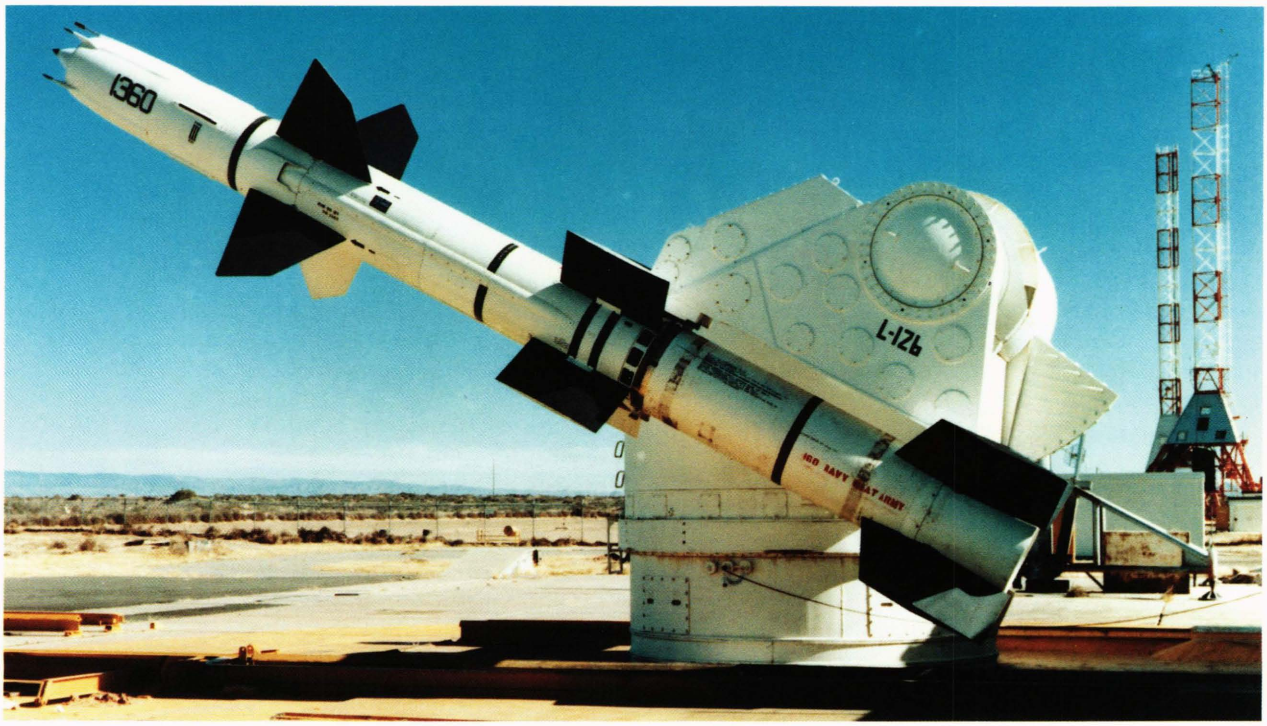

Figure 1 — The Unified Talos is shown in the missile-booster configuration, mounted on the *Desert Ship* launcher at White Sands Missile Range in 1972. This missile could employ either a conventional or a nuclear warhead. Guidance and control modules were physically and functionally interchangeable. The missile was designated RIM-8E. Improved versions of the missile, RIM-8G, RGM-8H, and RIM-8J, were made by substitution of modules.

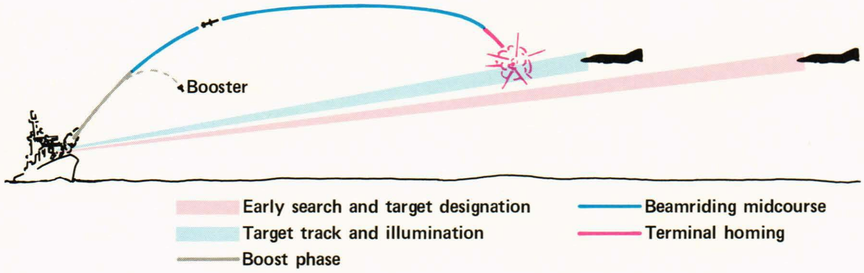

Figure 2 — The operational concept was to launch at elevation angles from 25 to 55°. After the boost phase, the booster rocket was automatically separated from the missile and the ramjet engine was ignited. The missile was then controlled by midcourse beamriding. Near the end of the midcourse phase, the missile was sent a signal that activated the semiactive homing system and armed the warhead.

Table 1 — Unified Talos weights and dimensions.

	Missile	*Booster*
Weight (pounds)	3360	4360
Dimensions (inches)		
Length	254	132
Body diameter	28	30
Wingspan	110	—
Tailspan	82	72

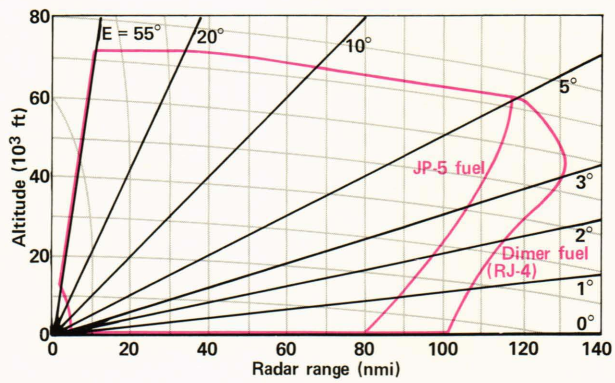

Figure 3 — Kinematic performance envelope for the Unified Talos. The long-range boundaries are determined by fuel exhaustion. The short-range boundary is determined by the time required for boost and 6 seconds of homing. The close-in high-altitude boundary is limited by the maximum climbout angle of 55°.

booster rocket that provided approximately 590,000 pound-seconds impulse for 5 to 6 seconds. After boost, the rocket booster was automatically separated from the missile, the ramjet engine was ignited, and the midcourse flight phase was initiated.

A beamriding system was used during the midcourse phase to steer the missile to a predicted intercept. Near the end of the midcourse flight phase, the missile received a signal that activated the homing system and armed the warhead.

A semiactive continuous-wave interferometer homing system was employed during the terminal phase. Rapid acquisition of the desired target Doppler signal was achieved by a ground-aided acquisition signal derived from the fire control and guidance radars and transmitted via the illuminator beam. The semiactive homing system provided reliable guidance in the presence of sea or land clutter and homed on a jammer at target illumination frequencies in lieu of a target Doppler signal.

An active target-detecting device (proximity fuze) initiated a firing pulse when the missile was within lethal range. Optimum timing of the warhead detonation was calculated using data supplied by the missile homing system.

The intercept envelope was primarily a function of target size, speed, crossing angle, and altitude. The maximum missile-intercept envelope occurred for directly incoming targets (Fig. 3). For small targets at long range, the Talos missile intercept ranges extended beyond the detection capabilities of the ship's radar system.

A fire control channel could engage only one target at a time but could fire a single missile or a two-missile salvo every 46 seconds. That firing rate was considered adequate for long-range targets if short-range targets were covered by other missiles with a higher engagement-rate capability.

Talos had an impressive antiship capability. Its kinetic energy alone extensively damaged any ship it struck, even though there was no warhead. The missile was launched in an antiair mode at a high angle and was programmed to approach the target at a high dive angle. Maximum range capability for that antiship mode depended on the ability of the fire control radar to track and illuminate the surface target.

A surface mode was available for engaging large surface or shore targets. It was designed for firing beamriding missiles on a trajectory that was optimized for a nuclear warhead with command fuzing. The maximum engagement range for a surface target was limited by the guidance radar horizon and the desired altitude of the air burst. Shore targets at distances up to 40 nautical miles were engageable. Flight accuracy when operating against shore targets depended on target position data, set and drift of the ship, ship heading and speed, and ship location. Data on both ship and target position had to be entered into the fire control system by special data transmitters. Several methods were developed for entering those data into the weapon system.

Table 2 — Talos missiles built and flown.

Missile Configuration	*Missile Firings WSMR*	*Fleet*	*Missiles Built*
First Tactical Talos	137	40	229
First Tactical Talos W	60	12	111
Extended Range Talos	57	164	234
Extended Range Talos W	32	56	101
Unified Talos	176	615	1729
Total	462	887	2404

The Talos antiradiation mode made it possible to destroy shore target by homing on radar radiation. Target radiation characteristics, such as frequency and pulse rate, had to be known within certain tolerances to permit target discrimination. Two separate configurations of the homing receiver were required to cover the desired frequency bands. The missile flew a high-altitude trajectory with a maximum range of 120 nautical miles.

A summary of the number of Talos missiles built and flown (not including missiles flown as supersonic targets) is shown in Table 2. The period covers 1955 through 1978, the last record of a Talos flight. The success rate for the missile was greater than 80%. The success rate of the entire system was about 40%.