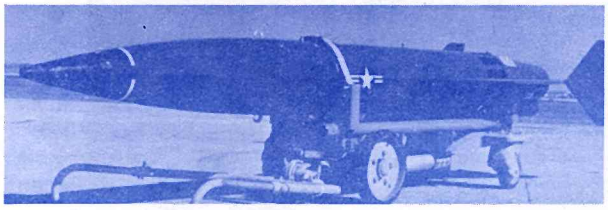
AQM-37A

PUBLISHED AS A SERVICE TO MODEL ROCKET ENTHUSIASTS BY CENTURI ENGINEERING COMPANY PHOENIX, ARIZONA ☐ A COLLECTION OF SCALE DATA

INTRODUCTION

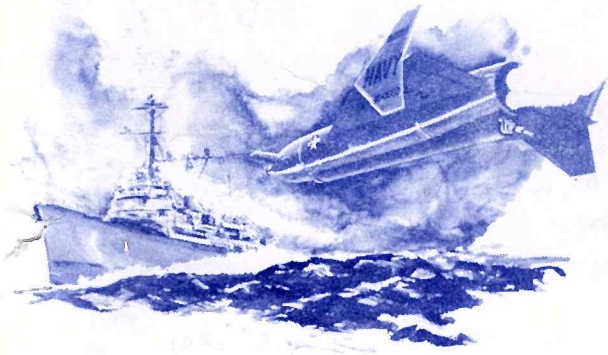


The Jayhawk is a frone type of cruising missile used as a target in aerial combat training. The Jayhawk, shown resting on its handling dolly, gives U.S. Navy pilots practice at supersonic aerial interception. It's low cost and high maneuverability made it ideal for aerial target practice, where fighter pilots could develop lightning fast reflexes.

The AQM-37A Target Missile System has been in continuous use by the U. S. Navy since 1963 with over 2,500 targets having been launched in support of weapon development. The A-4, F-4 and F-8 have been qualified to carry and launch this target. The AQM-37A can be carried in single or multiple loads. The multiple carriage provides wide flexibility and economy of operation.

The Navy AQM-37A Target Missile has great versatility. Its utilization can provide a wide variety of threat simulations for the training of defensive weapon systems crews. It does realistically simulate enemy airborne threats for optical, radar or infrared guided missile systems such as the Sparrow III, Falcon, Sidewinder, Standard and Improved Hawk. Its high performance enables it to provide realistic high rates of closure so that defensive systems are exercised to their limits. Crews that are trained against this target can attain a true "combat ready" status. Radar augmentation enhances the AQM-37A target for most types of missile and tracking systems. The flexibility of the operational envelope is further enhanced by the fact that it is air launched. This allows the mission profile to be orientated in any manner to accommodate the range or specific training and performance requirements.

GENERAL DESCRIPTION

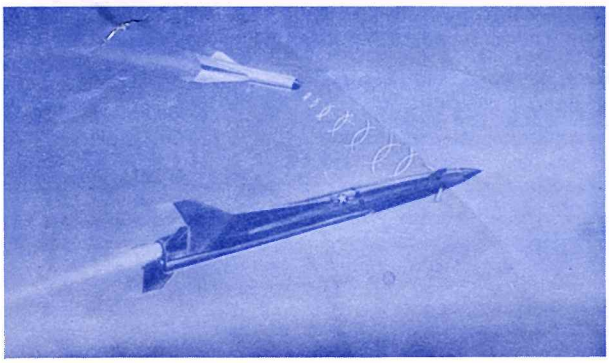


The AQM-37A Target Missile is an expendable rocket powered target missile that is capable of flying missions between 1000 feet and 70,000 feet at speeds ranging from Mach 0.7 to Mach 2.1. It is designed for straight and level flight at various pre-selected altitudes, simulating high performance aircraft and missile threats for evaluation and training of air-to-air and surface-to-air defensive weapons systems. The AQM-37A is air launched from subsonic or supersonic carrier or land based aircraft by the means of an airborne ejection launcher that adapts the target to the aircraft.

The AQM-37A weighs 565 pounds, is 150.8 inches long, 13.0 inches in diameter, and has a highly swept (75°) clipped delta wing with a span of 39.5 inches mounted on a cylindrical streamlined fuselage. Pitch and roll control is maintained by canard surfaces mounted on the nose and full span ailerons located on the trailing edges of the wings. Swept fixed vertical stabilizers are mounted on each wing tip to provide lateral stability. Turns are accomplished by a "roll-to-turn" technique.

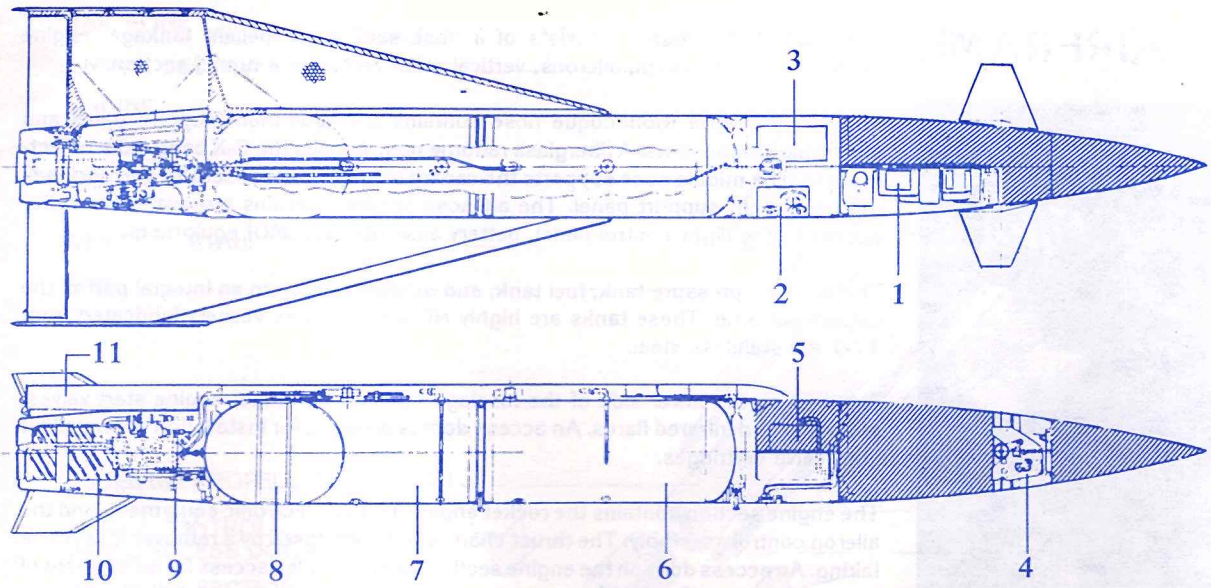
The target is equipped with a self-contained guidance system, radar and infrared augmentation systems and a destruct system for flight termination. It is powered by a dual thrust chamber, liquid bi-propellant rocket engine. The bi-propellants are contained in stainless steel pressure vessels that form an integral part of the fuselage. The fuel and oxidizer tanks are fueled during final manufacture of the target and the fueled target can be stored for two years.

AIR DEFENSE SYSTEMS

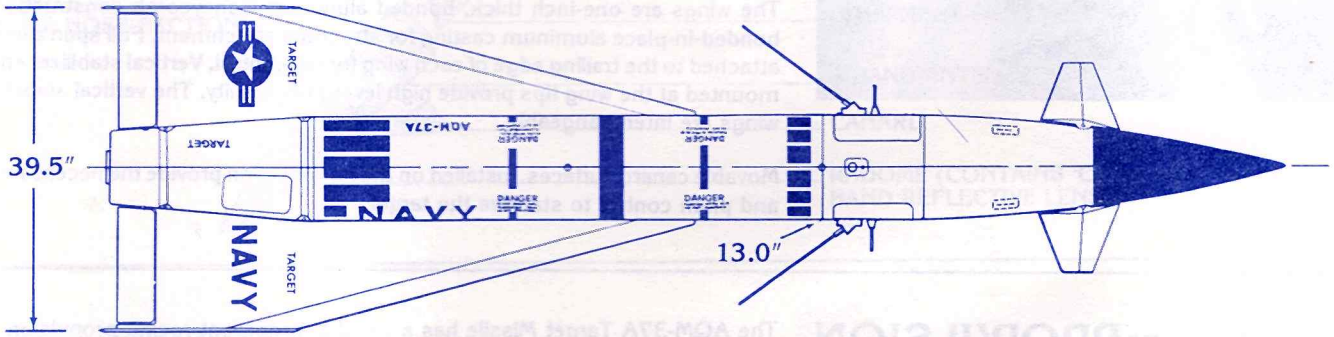


To evaluate the effectiveness of air defense systems with confidence that they will be effective under combat environments it is necessary to simulate the threat as nearly as possible. The more exact the simulation the more accurate the evaluation can be. Operational crews which are an integral part of the weapon systems must be trained under the same exact simulation. At the same time it is necessary that the greatest economy be practiced. The performance and augmentation features of the AQM-37A allows simulation of the widest range of threats. The high altitude and supersonic speed achieved by this rocket powered target are not obtainable by any other target in production.

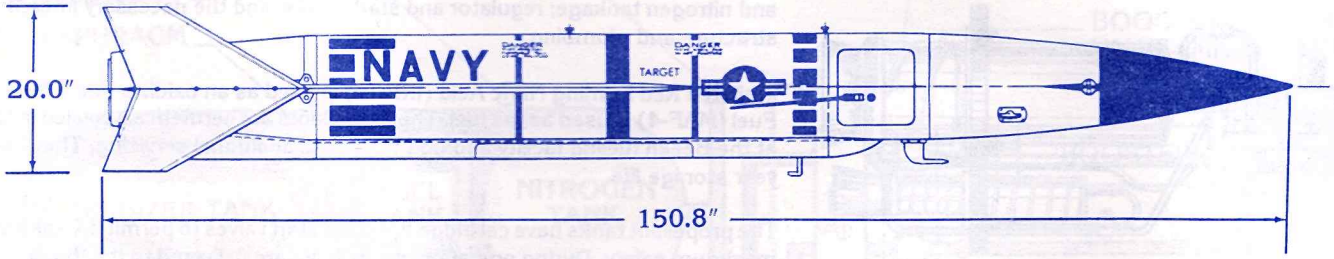
It is a safe, reliable, suitable target system with a performance envelope of speeds and altitudes suitable for all types of air defense systems. It provides targets for surface-to-air, air-to-air, and ship-to-air defensive systems.



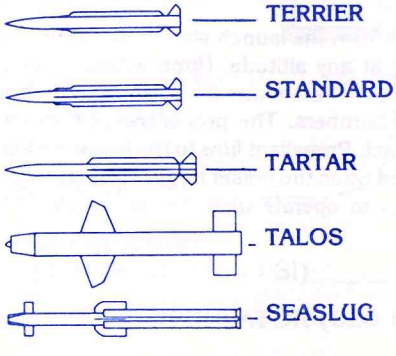
1. Electronic Components
2. Flight Control Panel
3. Batteries
4. Canard Controls
5. Radar Beacon (Optional)
6. Oxidizer Tank (Irfna)
7. Fuel Tank (Maf-4)
8. Pressurant Tank (Nitrogen)
9. Aerodynamic Destructor
10. Rocket Engine
11. Flare Container (Optional)



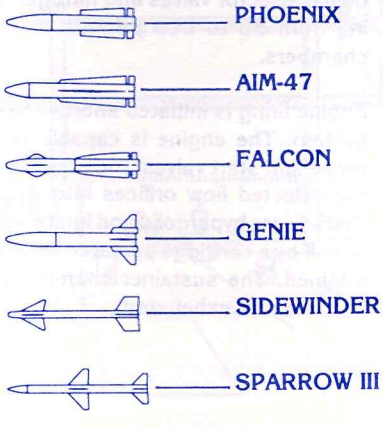
TOP VIEW



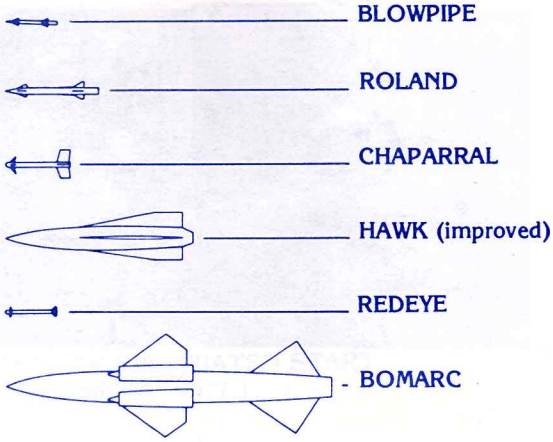
SIDE VIEW



SHIP TO AIR

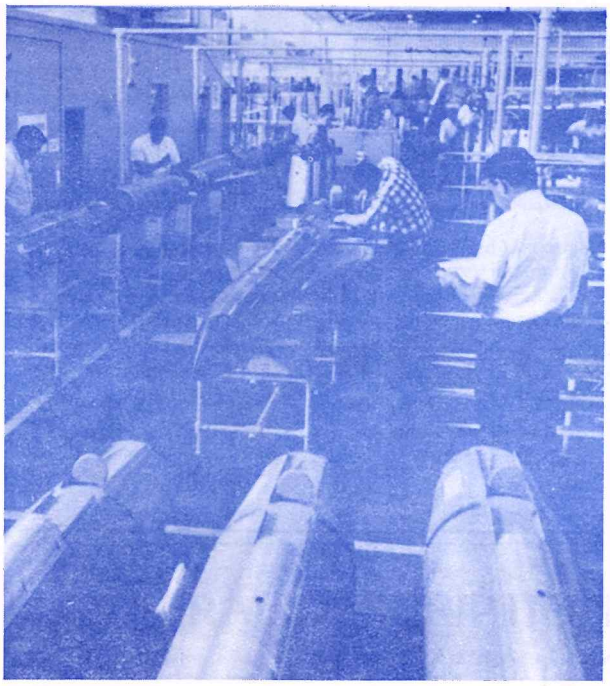


AIR TO AIR



SURFACE TO AIR

AIRFRAME



The AQM-37A airframe consists of a nose section, propellant tankage, engine section, canards, wings, ailerons, vertical stabilizers, and a tunnel section.

The tangent ogive monocoque nose contains the equipment support panel and electronic components. A fiberglass radome nose houses the C-X band radar reflecting lens. The middle nose supports the canard actuator drive assembly and encloses the equipment support panel. The aft nose section contains removable doors for access to the flight control panel, battery assembly and MDI equipment.

The nitrogen pressure tank, fuel tank, and oxidizer tank form an integral part of the targets airframe. These tanks are highly efficient pressure vessels fabricated from 17-7 PH stainless steel.

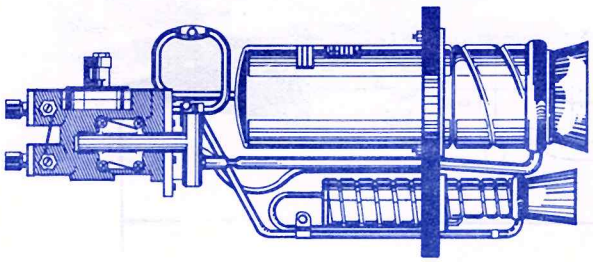
A tunnel on the lower side of the fuselage houses the rocket engine start valves, plumbing and infrared flares. An access door is provided for installation of propellant start valve cartridges.

The engine section contains the rocket engine, related electronic equipment, and the aileron control assembly. The thrust chambers are enclosed by a removable tail cone fairing. An access door on the engine section hatch provides access for adjustment of the propellant orifice selector valves, and installation of the engine start and aero destruct cartridges.

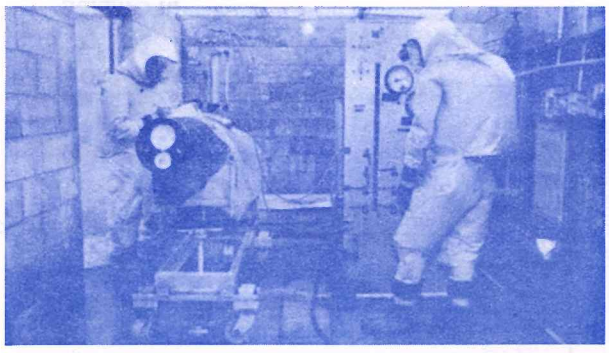
The wings are one-inch thick, bonded aluminum honeycomb construction with a bonded-in-place aluminum casting for structural attachment. Full span ailerons, are attached to the trailing edge of each wing for roll control. Vertical stabilizer end plates mounted at the wing tips provide high level yaw stability. The vertical stabilizers and wings are interchangeable.

Movable canard surfaces, installed on the nose section provide the necessary altitude and pitch control to stabilize the target.

PROPULSION



ROCKET ENGINE

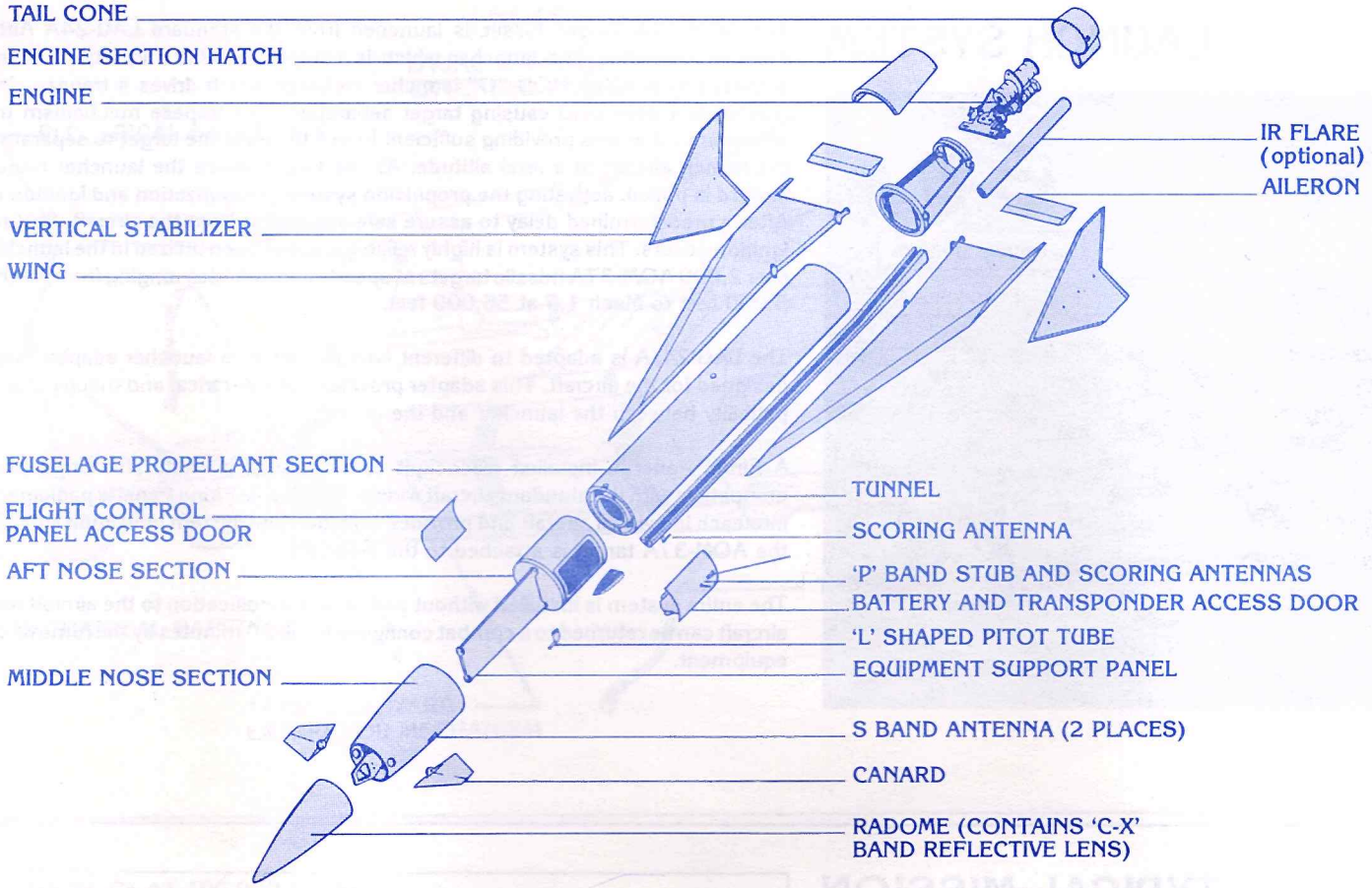


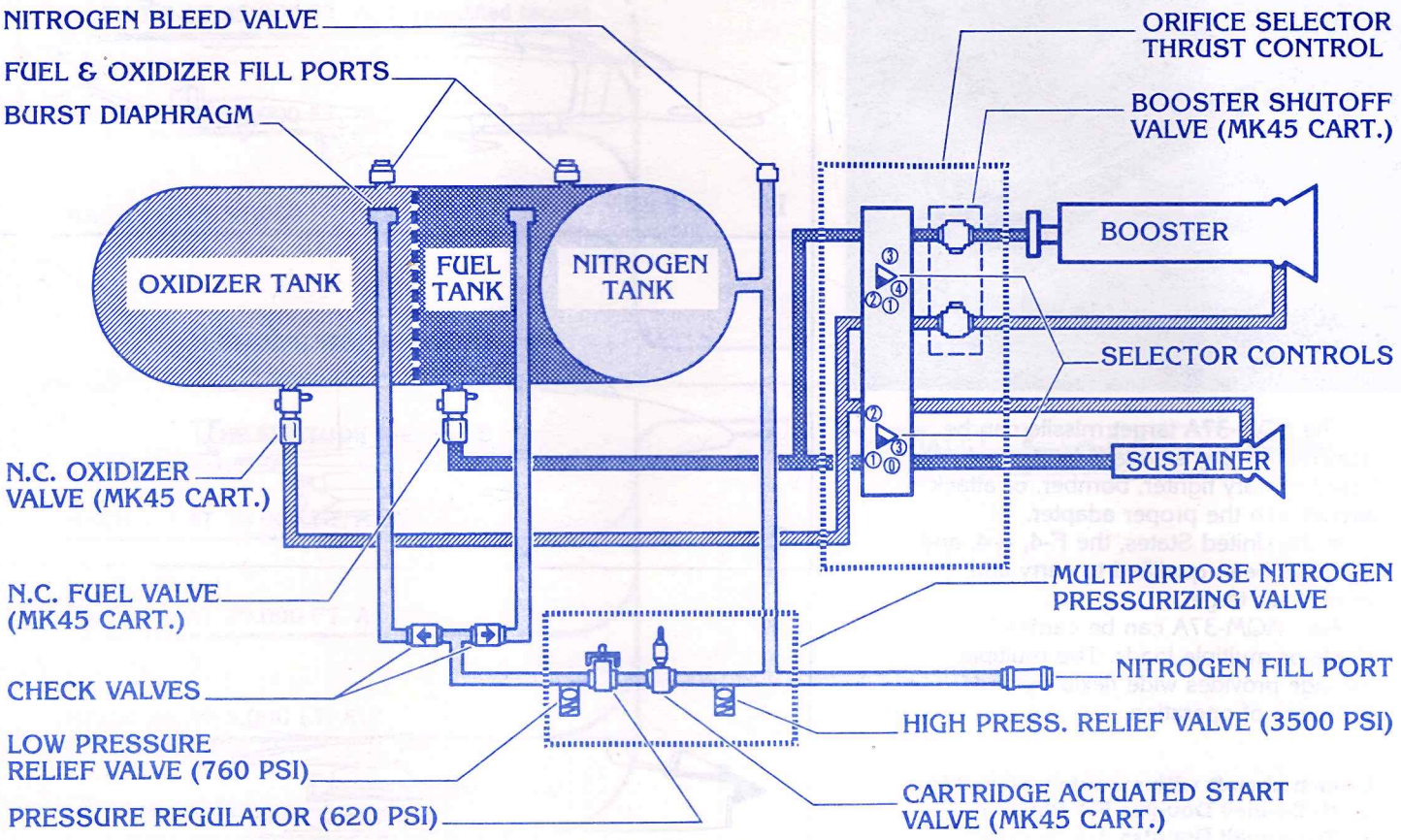
The AQM-37A Target Missile has a liquid bi-propellant rocket propulsion system. The engine is a prepackaged system consisting of one booster and one sustainer thrust chamber, and orifice selector valves for propellant flow control; fuel, oxidizer, and nitrogen tankage; regulator and start valves; and the necessary interconnecting structure and plumbing.

Inhibited Red Fuming Nitric Acid (IRFNA) is used as an oxidizer and a Mixed Amine Fuel (MAF-4) is used as the fuel. The propellants are hermetically sealed in the tanks at the Beech fueling facility and do not require additional servicing. They have a two year storage life.

The propellant tanks have cartridge operated start valves to permit dry line storage for maximum safety. During operation, propellants are delivered to the thrust chambers under pressure supplied by the nitrogen gas pressurization system. The nitrogen is normally added to the target prior to its installation on the launch aircraft. Boost and sustain thrusts are then selected for the target mission to be flown by presetting the orifice selector valves and nitrogen pressure regulator. Thirty-two thrust levels ranging from 86 to 860 pounds are available from the booster and sustainer thrust chambers.

Engine firing is initiated shortly after release from the launch aircraft by a time delay system. The engine is capable of starting at any altitude. Upon actuation of the propellant start valves, the propellants feed out of the tanks under pressure through the selected flow orifices into the thrust chambers. The propellants, IRFNA and MAF-4, are hypergolic and ignite upon contact. Propellant flow to the boost rocket is cut off by a cartridge operated valve energized when the preset target Mach number is attained. The sustainer chamber continues to operate until the remainder of the propellant is exhausted.


TAIL CONE
ENGINE SECTION HATCH
ENGINE
VERTICAL STABILIZER
WING
FUSELAGE PROPELLANT SECTION
FLIGHT CONTROL PANEL ACCESS DOOR
AFT NOSE SECTION
MIDDLE NOSE SECTION
IR FLARE (optional)
AILERON
TUNNEL
SCORING ANTENNA
'P' BAND STUB AND SCORING ANTENNAS
BATTERY AND TRANSPONDER ACCESS DOOR
'L' SHAPED PITOT TUBE
EQUIPMENT SUPPORT PANEL
S BAND ANTENNA (2 PLACES)
CANARD
RADOME (CONTAINS 'C-X' BAND REFLECTIVE LENS)


NITROGEN BLEED VALVE
FUEL & OXIDIZER FILL PORTS
BURST DIAPHRAGM
ORIFICE SELECTOR THRUST CONTROL
BOOSTER SHUTOFF VALVE (MK45 CART.)
OXIDIZER TANK
FUEL TANK
NITROGEN TANK
BOOSTER
SELECTOR CONTROLS
SUSTAINER
N.C. OXIDIZER VALVE (MK45 CART.)
N.C. FUEL VALVE (MK45 CART.)
MULTIPURPOSE NITROGEN PRESSURIZING VALVE
NITROGEN FILL PORT
CHECK VALVES
HIGH PRESS. RELIEF VALVE (3500 PSI)
LOW PRESSURE RELIEF VALVE (760 PSI)
CARTRIDGE ACTUATED START VALVE (MK45 CART.)
PRESSURE REGULATOR (620 PSI)

LAUNCH SYSTEM



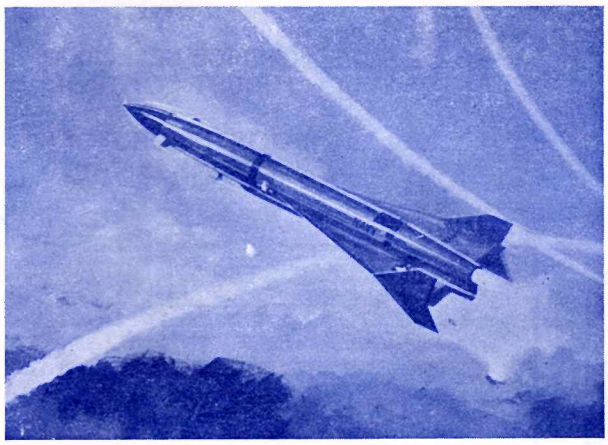
The AQM-37A Target Missile is launched from the standard LAU-24A Airborne Ejection Launcher. The launcher which is compatible with a variety of aircraft is activated by a MK-9 MOD "O" launcher cartridge which drives a trapeze ejection mechanism downward causing target separation. The trapeze mechanism travels downward 12 inches providing sufficient forces to cause the target to separate from the launch aircraft in a level altitude. As the target leaves the launcher trapeze, a lanyard is pulled, activating the propulsion system pressurization and ignition cycle. After a predetermined delay to assure safe separation from the aircraft, final motor ignition occurs. This system is highly reliable and has been utilized in the launching of over 2,000 AQM-37A missile targets at speeds and altitudes ranging from Mach .6 at 5,000 feet to Mach 1.5 at 55,000 feet.

The LAU-24/A is adapted to different type aircraft by a launcher adapter specially designed for the aircraft. This adapter provides both electrical and mechanical compatibility between the launcher and the aircraft.

A Firing Panel is installed in cockpit of the launch aircraft. This firing panel is compatible with the standard aircraft wiring. The Missile Firing Panel is packaged to fit into each individual aircraft and provides selection and system indication lights when the AQM-37A target is attached to the launcher.

The entire system is installed without permanent modification to the aircraft and the aircraft can be returned to a combat configuration in 30 minutes by the removal of this equipment.

TYPICAL MISSION



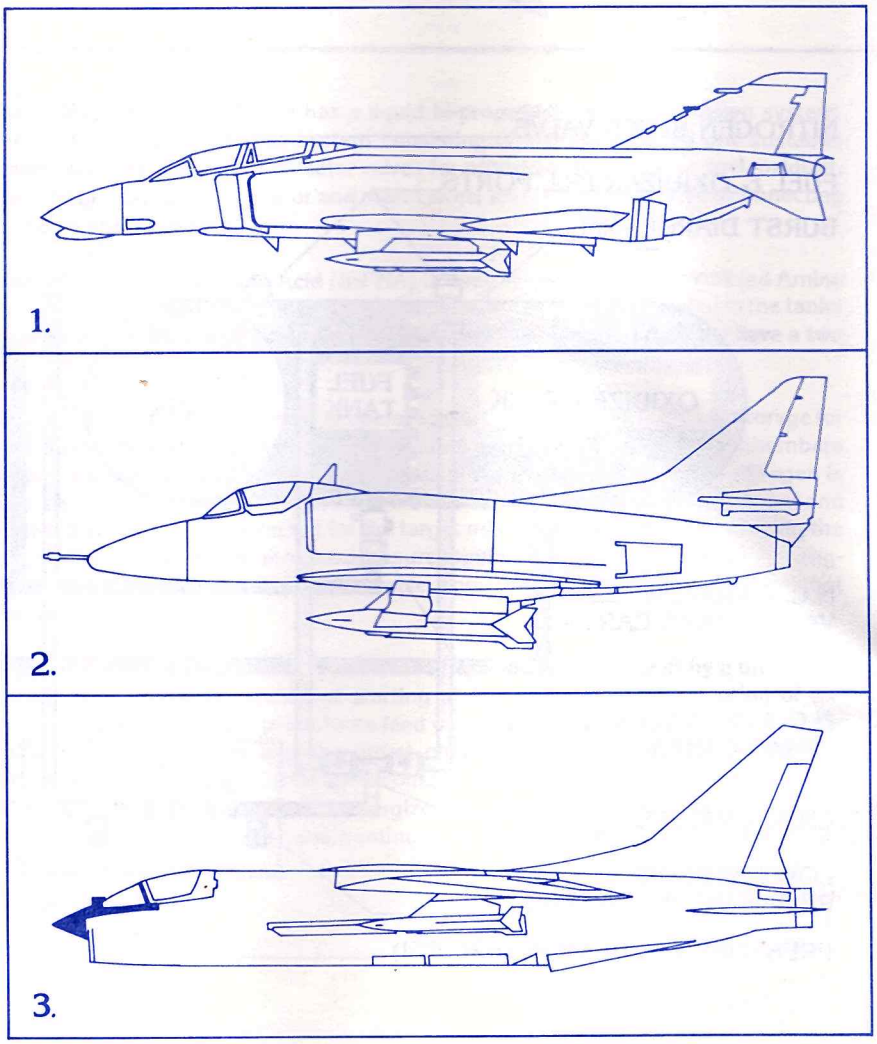
The AQM-37A target missile can be launched by any standard land or carrier based military fighter, bomber, or attack aircraft with the proper adapter.

In the United States, the F-4, A-4, and F-8 have been qualified to carry and launch this target.

Also, AQM-37A can be carried in single or multiple loads. The multiple carriage provides wide flexibility and economy of operation.

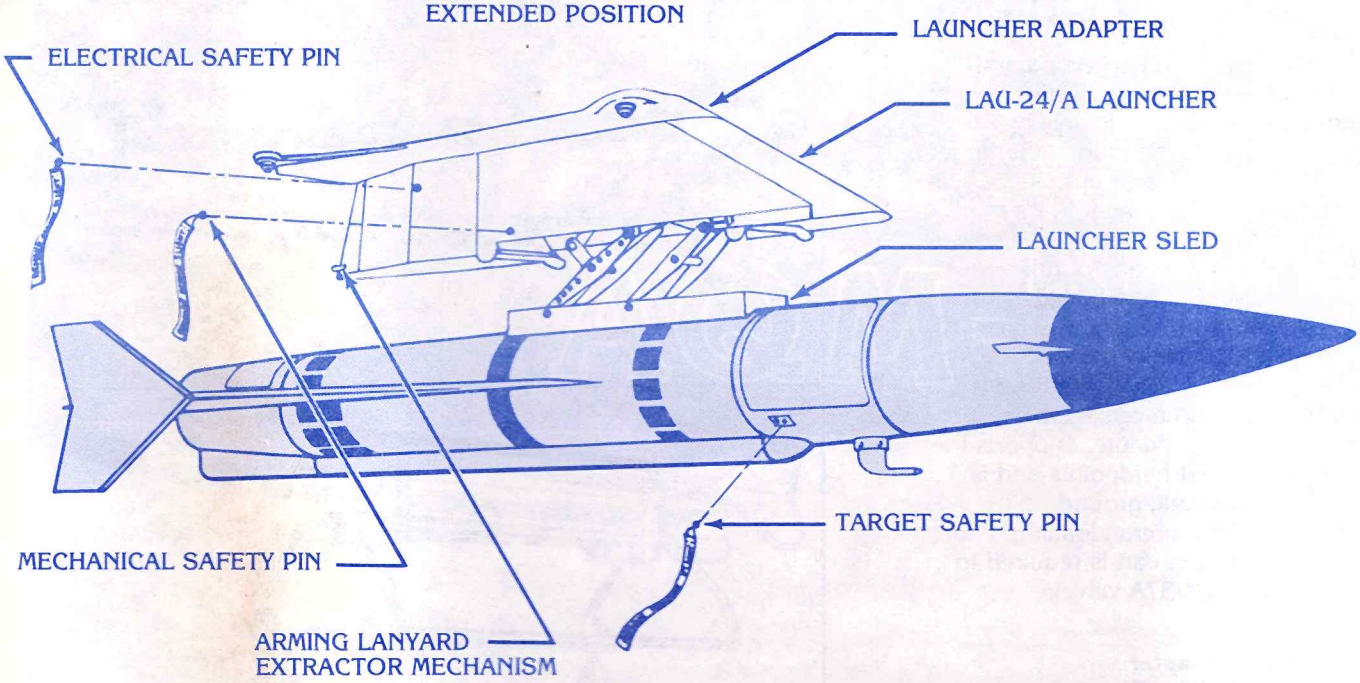
Launch aircraft with mounted AQM-37A:

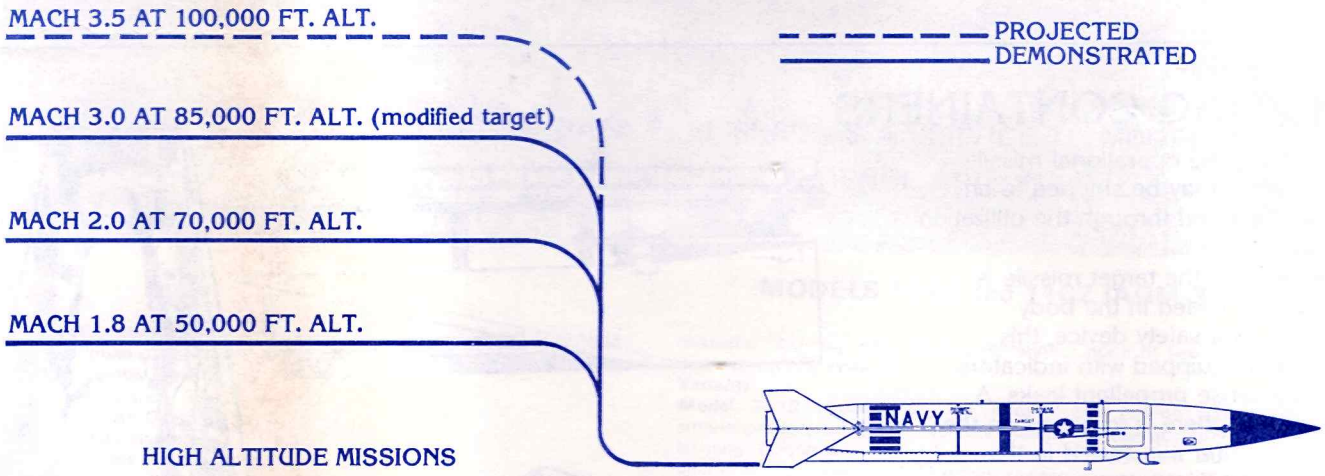
1. **McDonnell Douglas F-4 Phantom**
2. **McDonnell Douglas A-4 Skyhawk**
3. **Chance Vought F8U Crusader**

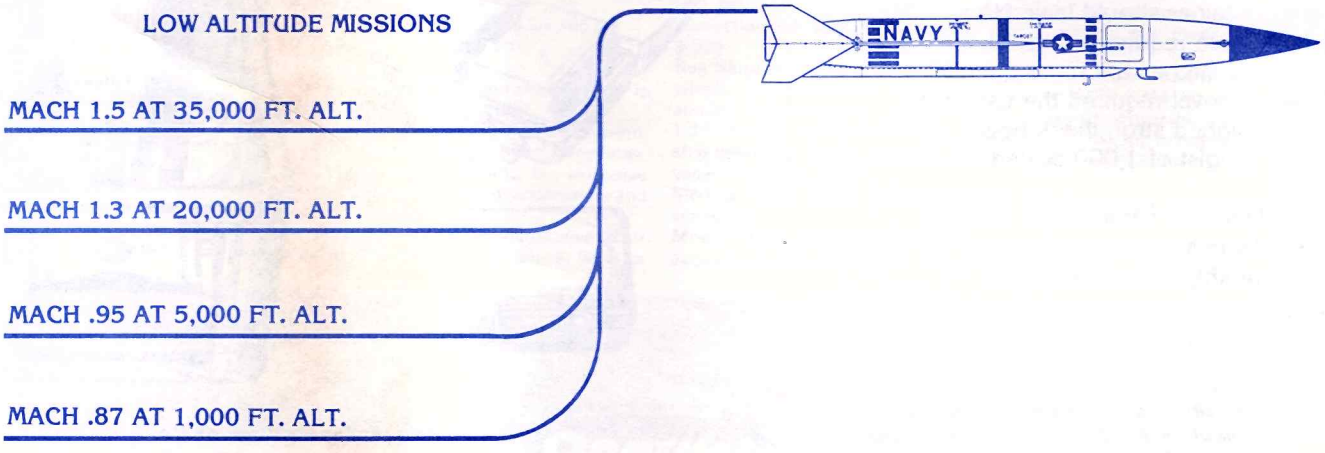


NOTE

LAUNCHER SHOWN IN EXTENDED POSITION





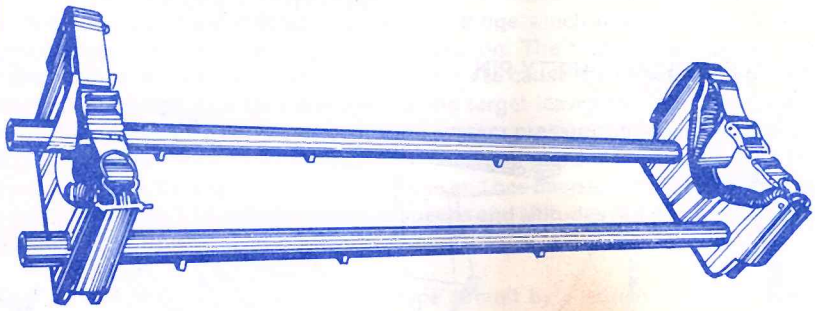


GROUND HANDLING EQUIPMENT

The AQM-37A and is handled and loaded on the aircraft with a minimum of equipment and personnel. Only two or three men are required to load the target aboard the aircraft. Maximum use can be made of existing equipment in the interest of economy. The target missile can be transported on any of numerous standard missile and bomb skids and trailers available at most military installations. Adaption of the AQM-37A shape to standard skids and trailers is accomplished by a universal cradle adapter. This cradle adapter supports the target at designated hardpoints and is used during checkout, ground transportation, and aircraft loading. Prior to launch, a nitrogen cart is required to pressurize the AQM-37A vehicle.

1. **Universal Adapter**
2. **AQM-37A Shop Stand**

1.



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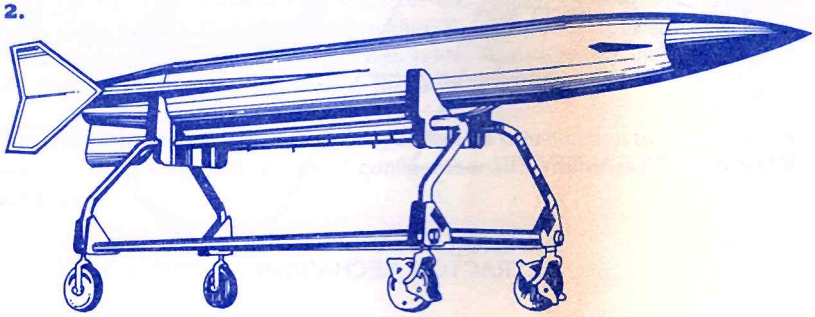


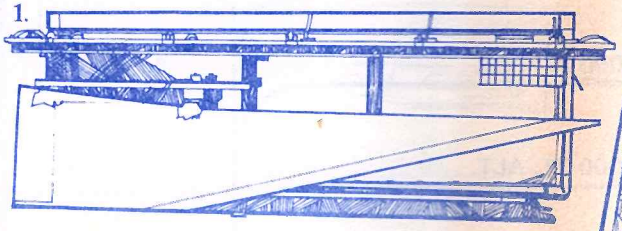
SHIPPING CONTAINERS

The complete operational missile target system may be shipped to any point in the world through the utilization of four containers.

The body of the target missile is shipped fully fueled in the body container. As a safety device, this container is equipped with indicators which will sense propellant leaks. A known atmosphere is imposed on the target body after it is sealed in the container and desicants are packaged with the target to absorb moisture if the shipping container should leak. No special tools are required since all fasteners and latches are hand operated. The body removal required the use of a specially designed strongback hoist beam and a hoist of 1,000-pound capacity.

Wings, fins, and canards are shipped in a specially designed container. Batteries are shipped in a separate container.

1.



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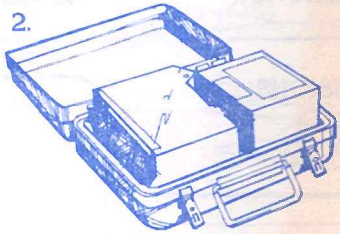

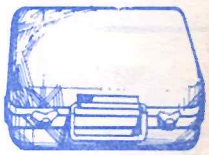

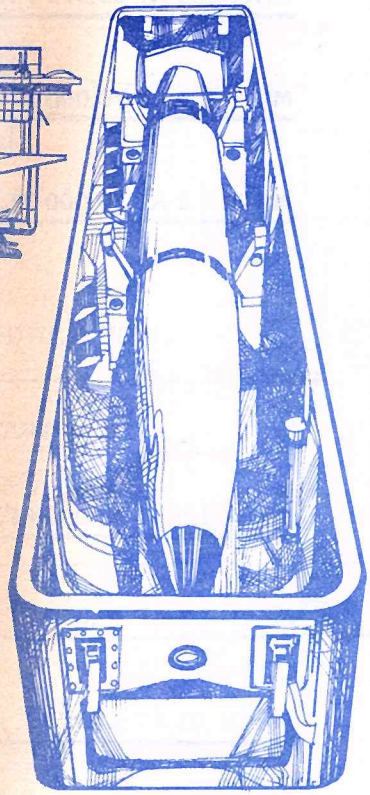

Above: Open View of Body Container From Left Side of Page: 1. Body Container with Top in Place 2. Battery Container

Graphics & information for this booklet was extracted from publications of the AQM-37A manufacturers, and Jane's Pocketbook of Remotley Piloted Vehicles.