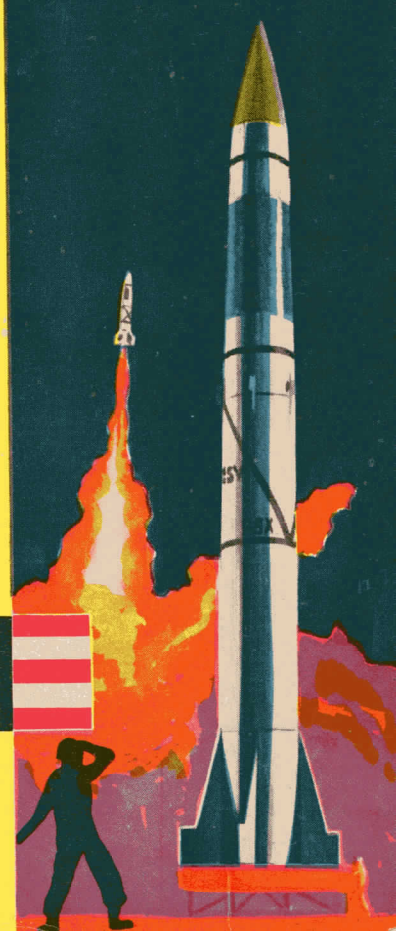
1959

MISSILES AND ROCKETS ENCYCLOPEDIA

BY Revell MANUFACTURERS OF THE WORLD'S LARGEST AND MOST COMPLETE LINE OF MISSILE AND ROCKET MODEL KITS

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LEADING SCIENTIFIC JOURNAL OF THE SPACE AGE





MISSILES AND ROCKETS ENCYCLOPEDIA

We are living in a new and exciting age—the Age of the Rocket In Space. Just since World War II the world has seen things our ancestors could only have imagined. We have seen the mighty Jupiter blast off from the earth and hurl the Explorer satellite into space. We have seen the Sputniks and Vanguards, and the ballistic missiles that have any point on earth as their target. The rocket is a powerful force that is limited only by our imagination. The rocket is a military weapon—the rocket is the key to the secrets of our universe—and, someday, rockets will carry space travelers to other planets.

CHINESE INVENTED ROCKETS IN 1232 A.D.



History of rockets goes back many hundreds of years. In 1232 A.D., the son of Ghengis Khan led an army against the Chinese city of Kai-Fung-Fu. The Chinese frightened away the Mongol invaders with "arrows of flying fire." These were the first rockets used as weapons of war—hollow bamboo rods or arrows filled with gunpowder. News of the "arrows of fire" spread throughout the Middle East and most of Europe, and the actual use of rockets reached Europe in 1258 A.D. In 1379 A.D., in Italy, a supposedly invincible tower defending the Isle of Chiozza was destroyed by an incendiary rocket.

THE CANNON MAKES ROCKETS OBSOLETE

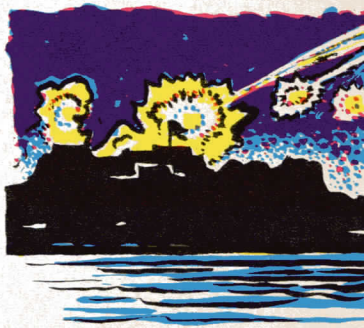
Simple rocket weapons were used in several sieges of European cities during the next 100 years, and military engineers in Germany and Italy continued experiments with rocket powders and projects during the XVIth Century. Early rockets were not very accurate or effective and in this period artillery was greatly improved. By 1600 the rocket had become obsolete as a weapon. For the next two centuries rockets were used mainly for amusement in royal fireworks displays.

ROCKETS GO TO WAR AGAIN



In battles during the 1790's in India, British troops fled before barrages of Hindu rockets. Indians had made a new rocket using an iron tube filled with gunpowder attached to a ten-foot bamboo pole for stability. These rockets had a range of about a mile and a half. Military leaders in Europe set to work on rockets of their own, and once again the rocket was a fearful military weapon. The British made rockets similar to the Indian rocket and used them against the French in 1806. In other battles, half of Copenhagen was destroyed by a barrage of 25,000 rockets. Even Napoleon, conqueror of nearly all of Europe, was stopped by rockets in sieges at Danzig and Leipzig.

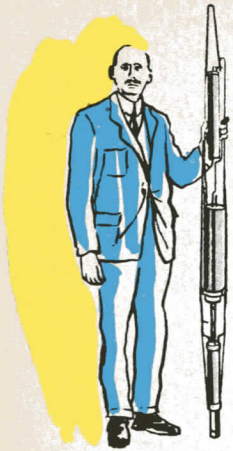
ROCKET WEAPONS SPREAD THROUGH EUROPE



Military men throughout Europe soon accepted the rocket as a powerful weapon. Rocket batteries were made a part of artillery units in many armies. In the American War of 1812, British Army rockets routed the U.S. militia. The British then marched on our capital city and burned it. The attack on Baltimore during the same war inspired the words to our National Anthem. In *"the rockets' red glare,"* Francis Scott Key saw our Star Spangled Banner still flying over Fort McHenry. About thirty years later, in 1846, the first rocket battery in the United States Army was formed. It was used in the landing assault at Vera Cruz in the Mexican War.

ROCKETS LAG BEHIND ARTILLERY AGAIN

In the next sixty years, great improvements in artillery weapons were made. It looked as though the black-powder rocket had reached its limit. In World War I the French fired incendiary rockets against German observation balloons, but practically no one believed in the future of rockets.



DR. ROBERT GODDARD—"FATHER OF MODERN ROCKETRY"

Dr. Robert Goddard began experimenting with rockets during his college days in Massachusetts. Later the Smithsonian Institute gave him a small grant, and he went on with his work in New Mexico. He published a paper in 1920 stating that man could send a rocket to the moon—a crack-pot idea for that day and time. *An important date:* March 16, 1926, Goddard fired the first liquid fuel rocket in history.

GERMANY TAKES A VITAL INTEREST IN ROCKETS

In Germany Herman Oberth watched Goddard's work with great interest. In 1923 Oberth published a book about future space travel. This book inspired a number of scientists to form the German Rocket Society. This group built several liquid fuel rockets in the 1930's, before the Germans began work on military rockets at Peenemunde (on the Baltic Sea).



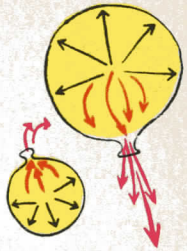
NAZI GERMANY'S "SECRET WEAPON"

Germany began work on the dread V-2 rocket in 1938. The V-2 made its first successful flight in 1942, putting Germany years ahead in rocket technology. Target launchings of V-2's got under way in 1944. Though they did little strategic damage, the V-2's struck terror in the hearts of Londoners, who had no defense against such weapons.

UNITED STATES JOINS THE ROCKET RACE

When World War II ended, our troops stumbled onto stockpiles of German rockets and missiles hidden in caves and underground bunkers. Dozens of V-2's were brought to this country for experiments at White Sands, New Mexico. Our scientists stepped up their work on rocket engines and fuels—making giant strides to catch up in the race of rocket science.

HOW A ROCKET ENGINE WORKS



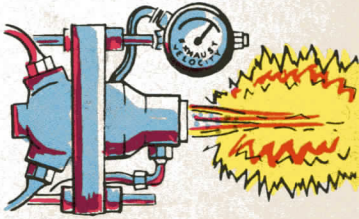
You can demonstrate how a rocket engine works with an ordinary balloon. When you blow air into a balloon, the air inside is compressed. The air pushes against the inside of the balloon with equal force in all directions. Release the mouth of the balloon and the forces of compressed air will be unleashed. Part of the air will rush out the mouth of the balloon, causing a reaction or push against the opposite side of the balloon. That force pushing in the opposite direction sends the balloon "rocketing" across the room.

NEWTON'S THIRD LAW OF MOTION



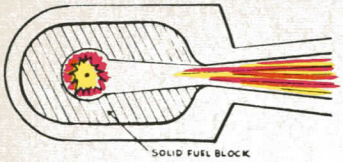
Sir Isaac Newton defined three laws of motion about 300 years ago. In his Third Law of Motion, Newton stated "*For every action there is an equal and opposite reaction.*" This explains what happens inside a rocket to make it work. Burning rocket fuel forms gases which expand with great force. These gases rush through the rocket's exhaust, just as air escapes through the balloon's mouth. The gases roaring out of a rocket are the *action* of Newton's Third Law, and the forward motion of the rocket is the *reaction*.

CONTROLLING THE SPEED AND DIRECTION OF THE ROCKET



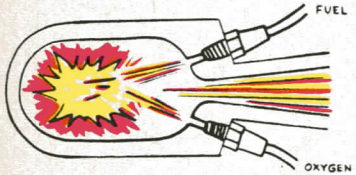
The speed of a rocket can be increased in two ways 1) by increasing the amount of gases passing through the exhaust or 2) by increasing the speed of the exhaust. The course of a rocket's flight can be altered by changing the direction of the rocket blast or by changing the angle of movable tail fins attached to the rocket.

KINDS OF ROCKET ENGINES



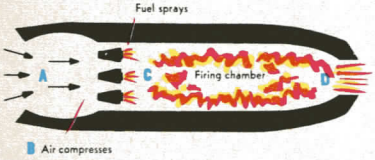
SOLID FUEL ENGINE

A block of solid fuel is molded to fill the rocket to its shell. The fuel burns from the center, and the shape of the hole in the center of the fuel block can be designed to regulate the speed and flight of the rocket.



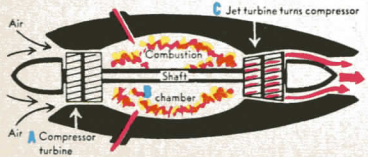
LIQUID FUEL ENGINE

Liquid fuel (such as alcohol) and an oxidizer (liquid oxygen) are combined in the rocket's combustion chamber and ignited. The resulting explosion forces gases out the open end of the engine nozzle creating "thrust."



RAM-JET ENGINE

As the "flying stovepipe" rams through the air, air rushes in through the open front end (A). The air is forced through a "compressor" (B), pressure increases, and fuel is mixed with it. In the combustion chamber (C) a flameholder ignites the mixture, and burning gases burst through the exhaust (D). Ram-jets will not function under 200 miles per hour, or at extreme altitudes where there is no oxygen.



TURBO-JET ENGINE

A compressor (A) in the nose pulls in air and compresses it. Fuel is sprayed into the compressed air in the combustion chamber (B) and ignited. The resulting gases rush past a turbine (C) to the exhaust, turning the turbine, which in turn, runs the compressor. Since turbo-jets work efficiently even from a standing start, they are used in most jet aircraft and some missiles. But, since the turbo-jet breathes air, it cannot be used in extreme altitudes.

GLOSSARY

BALLISTIC MISSILE: A missile whose flight path from the end of rocket thrust to impact has zero lift (free fall). It may or may not be corrected in its flight path. It is subject to air drag and gravity.

BOOSTER ENGINE: An auxiliary engine that gives the rocket its initial thrust before the sustainer engine takes over. It may or may not be dropped off in the rocket's flight.

CELESTIAL GUIDANCE: A method of guiding a missile by the positions of bright stars. Instruments in the missile remain pointed at certain stars during the missile's flight.

GUIDED MISSILE: A missile whose flight path may be changed by a guidance device within its frame.

ICBM: Intercontinental Ballistic Missile; a missile whose range is about 5,000 miles.

IGY: International Geophysical Year: 18 months between July, 1957 and December, 1958, devoted to international exploration of the planet Earth.

INERTIAL GUIDANCE: A method using gyroscopes which control the direction, flight path, and spinning of the rocket.

INFRA-RED GUIDANCE: A method that guides a rocket along heat waves from a target. Instruments in the rocket detect heat radiation and a control system guides the rocket to the target.

IRBM: Intermediate Range Ballistic Missile: a missile whose range is about 1,500 miles.

ORBITING: Flight around the earth at a speed in which the centrifugal (outward) force equals the force of gravity, so that the orbiting object does not fall to earth. The earth orbits around the sun; the moon orbits around the earth; explorer 3 and 4 orbit around the earth, also.

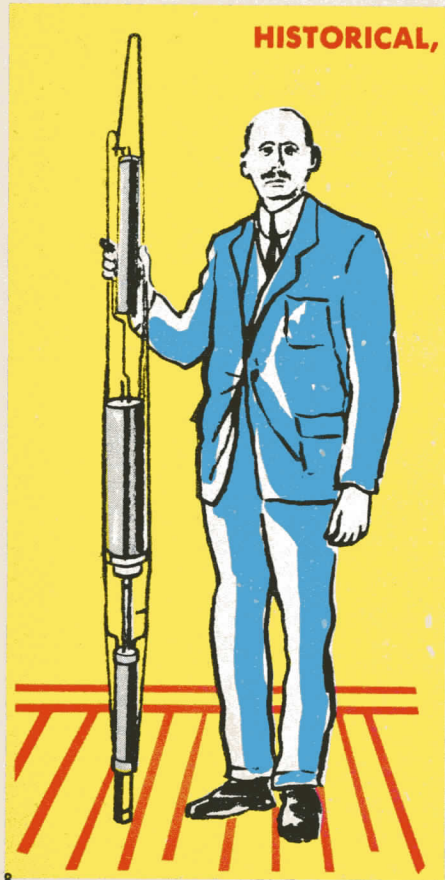
RADAR-HOMING: Radio transmitters in the rocket send out signals that are reflected from the target back to the rocket. Timing of the signals determines location of the target and the control system guides the rocket along the radio waves.

RADIO GUIDANCE: Reflected radio signals transmitted from the ground or an aircraft guide the rocket in its flight path.

SUSTAINER ENGINE: The main engine which propels the rocket or missile after booster engines provide initial speed.

THRUST: The forward force in a rocket that is produced by the discharge of gases from the rocket exhaust.

HISTORICAL, EXPERIMENTAL AND RESEARCH ROCKETS



GODDARD LIQUID PROPELLANT ROCKET

TYPE: Experimental

MISSION: Research vehicle for development of rocket power plants

MANUFACTURER: Prof. Robert H. Goddard

PROPULSION: Liquid-propellant rocket motor

GUIDANCE: Unguided "free" flight

LENGTH: 12 ft. **REMARKS:** This was the first liquid propellant rocket to make a successful flight.

GODDARD GYRO-STABILIZED ROCKET

TYPE: Experimental

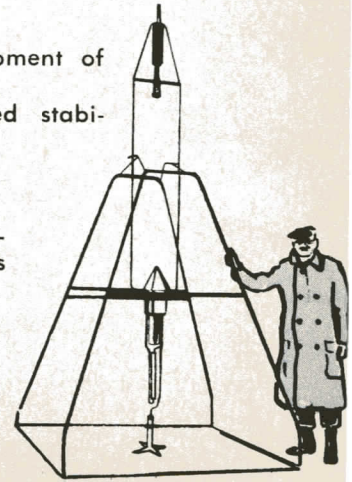
MISSION: Research for the development of stable rocket flight

GUIDANCE: Gyroscopically controlled stabilizers

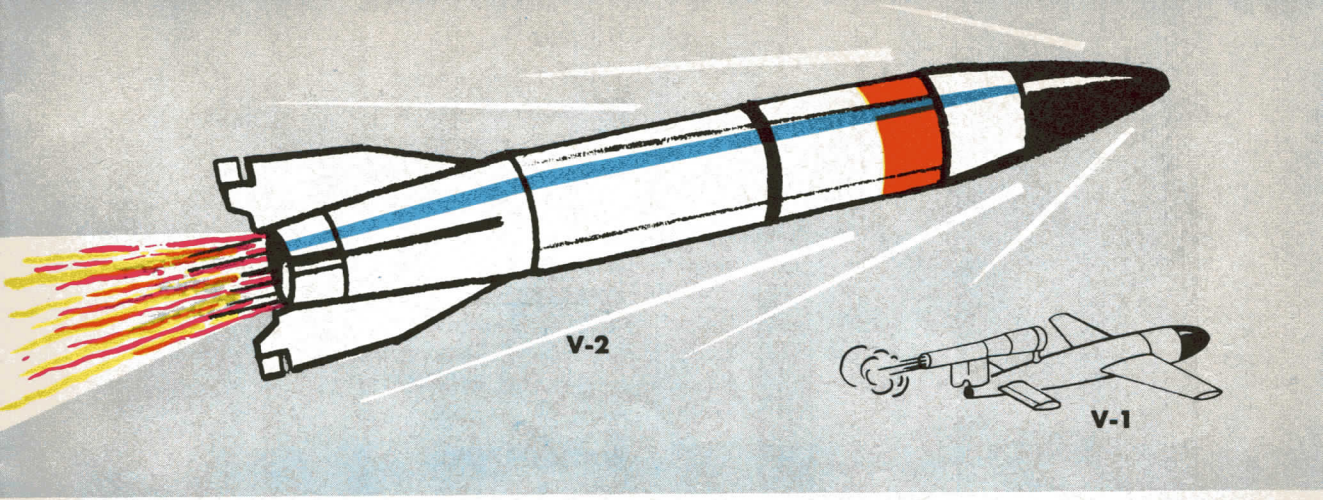
LENGTH: 22 ft.

REMARKS:

This was the pioneer effort in gyroscopically stabilized rocket flights during 1936.



Prof. Robert H. Goddard

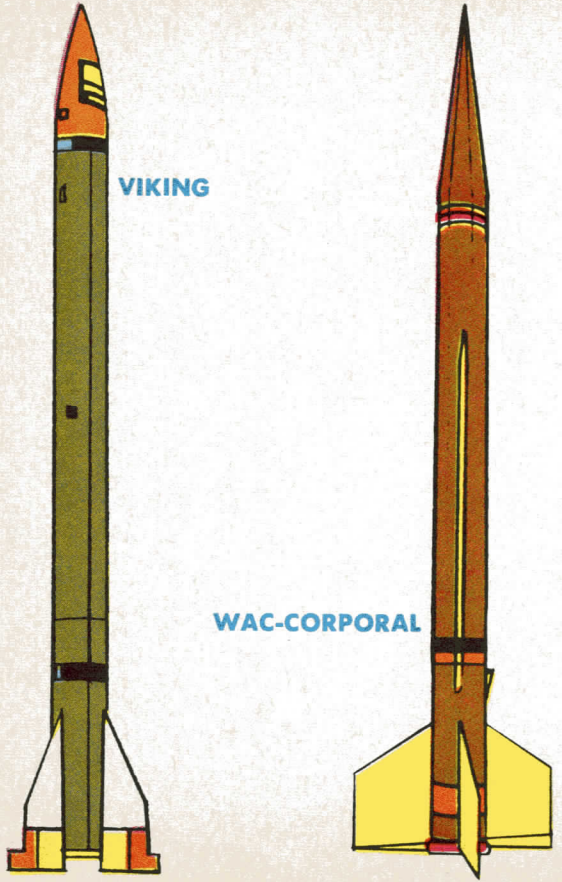


V-2

TYPE: Surface-to-surface
MISSION: Short range ballistic bombardment
MANUFACTURER: German
PROPULSION: Liquid propellant rocket engine
GUIDANCE: Gyro-radio controlled
LENGTH: 46 ft.
DIAMETER: Over fins 11 ft. 8 in., body 5 ft. 5 in.
REMARKS: Developed by Germans during World War II as first effective ballistic type missile.

V-1

TYPE: Surface-to-surface
MISSION: Short range ballistic bombardment
GUIDANCE: None, except initial aim from launching track
MANUFACTURER: Germany—World War II
PROPULSION: Pulse-jet power plant, gasoline
LENGTH: 25.4 ft.
REMARKS: Developed by Germans during World War II as first successful military unmanned missile having significant range.



VIKING

TYPE: Experimental

MISSION: Research and development of missile systems

MANUFACTURER: The Martin Co.

PROPULSION: Liquid propellant rocket motor

GUIDANCE: Ballistic type

LENGTH: 48 ft. **DIAMETER:** 32 in.

REMARKS: Early research rocket used to replace limited supply of captured German V-2's which were used after World War II for experiments.

WAC-CORPORAL

TYPE: Experimental

MISSION: Research rocket

COGNIZANT SERVICE: Army

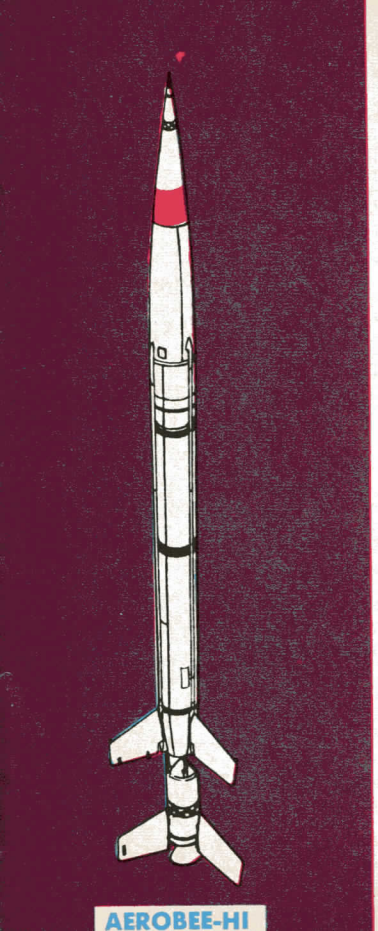
PROPULSION: Liquid propellant rocket engine

GUIDANCE: Ballistic type

LENGTH: 16 ft. **DIAMETER:** 12 in.

REMARKS: An early research vehicle used for experimentation even before U.S. firing of captured German V-2. The WAC-Corporal was replaced by the Aerobee-Hi.

BUMPER: Two stage rocket consisting of WAC Corporal rocket mounted on nose of V-2 type rocket to test staging of missiles.



AEROBEE-HI

FAR SIDE

TYPE: Scientific research

MISSION: Test missile for space navigation

COGNIZANT SERVICE: U. S. Air Force

MANUFACTURER: Aeroneutronics Systems, Inc. and General Mills, Inc.

PROPULSION: Each of the four stages in this missile has a solid propellant rocket motor

GUIDANCE: Ballistic **LENGTH:** 23 ft.

DIAMETER: First stage 2 ft. Second stage 8 in.

REMARKS: Four-stage missile is carried aloft 19 miles by balloon. First stage is then fired by radio signal from the ground. Far Side has reached 3000 miles height.

AEROBEE-HI

TYPE: Scientific research

MISSION: Research rocket for upper-atmosphere research

COGNIZANT SERVICE: Air Force, Army Signal Corps and Navy

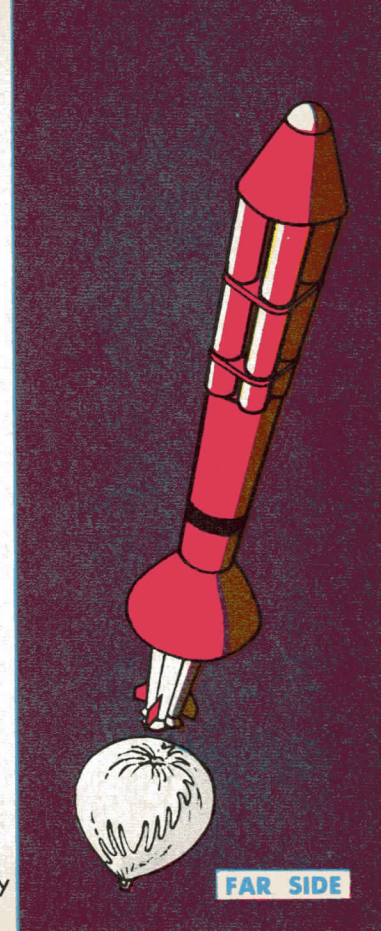
MANUFACTURER: Aerojet General Corp.

PROPULSION: Liquid propellant rocket with solid propellant booster

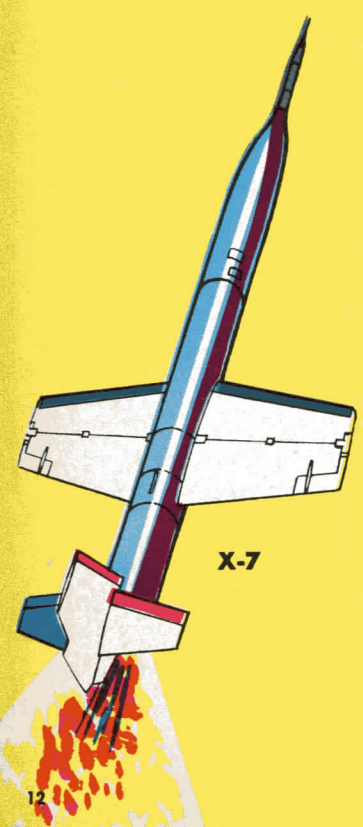
GUIDANCE: Ballistic type

LENGTH: 22 ft. **DIAMETER:** 15 in.

REMARKS: This rocket reached approximately 180 to 190 miles in height.



FAR SIDE



X-7

X-7

TYPE: Scientific research

MISSION: Research vehicle for Ramjet power plants

COGNIZANT SERVICE: Air Force

MANUFACTURER: Lockheed Aircraft Corp.

PROPULSION: Ramjet engine, liquid propellant

GUIDANCE: Radio guided

LENGTH: Secret information

DIAMETER: Secret information

REMARKS: This aircraft-type missile is retrieved by a parachute after flight. Spike nose spears ground to help prevent damage in landing; air dropped.

X-17

TYPE: Scientific research

MISSION: Research vehicle to test re-entry problems

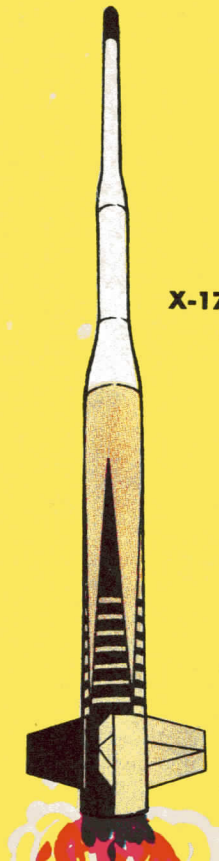
MANUFACTURER: Lockheed Aircraft Corp.

PROPULSION: Solid propellant, sustainer motor

GUIDANCE: Ballistic type **LENGTH:** 48 ft.

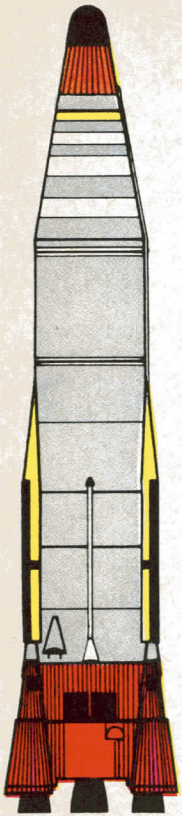
DIAMETER: Secret information

REMARKS: This three-stage vehicle played the major role in solving the re-entry problem for ballistic missile nose cones.



X-17

STRATEGIC AND TACTICAL MISSILES—LONG RANGE



ATLAS



TITAN

See Page 31

SECRET

SNARK

SNARK

TYPE: Surface-to-surface

MISSION: Intercontinental cruise missile

COGNIZANT SERVICE: U. S. Air Force

MANUFACTURER: Northrop Aircraft Corp.

PROPULSION: Solid propellant booster engine and turbo-jet cruise engine

GUIDANCE: Celestial, and inertial

LENGTH: 69 ft. **WINGSPAN:** 42 ft.

REMARKS: Cruising speed mach .94, maximum range 5,000 miles. The Snark can deliver a hydrogen warhead or deploy electronic countermeasures.

ATLAS

MISSION: Intercontinental ballistic missile

COGNIZANT SERVICE: U. S. Air Force

MANUFACTURER: Convair Division of General Dynamics Corp.

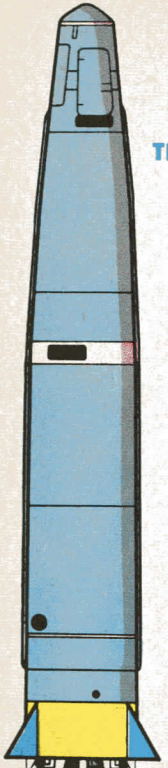
PROPULSION: Two liquid propellant booster engines and one liquid propellant sustainer

GUIDANCE: Ballistic

LENGTH: 80 ft. **DIAMETER:** 108 in.

REMARKS: Atlas is now in flight test phase of development. It reaches a warhead speed of mach 15 and has a design range of 5,500 miles.

STRATEGIC AND TACTICAL MISSILES—INTERMEDIATE RANGE

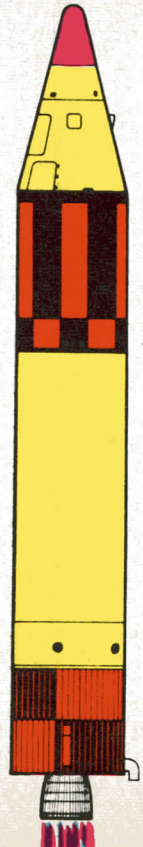


THOR



POLARIS

See Page 31



JUPITER

SECRET

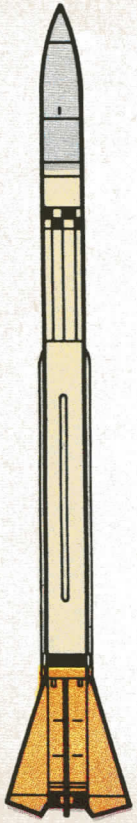
JUPITER

TYPE: Surface-to-surface
MISSION: Intermediate range ballistic missile
COGNIZANT SERVICE: U. S. Army
MANUFACTURER: Chrysler Corp.
PROPULSION: Liquid propellant rocket engine
GUIDANCE: Inertial
LENGTH: 59 ft. **DIAMETER:** 100 in.
REMARKS: The Jupiter missile should be operational in late 1958. It reaches a burn-out speed of mach 10 and has a design maximum range of 1,500 miles.

THOR

TYPE: Surface-to-surface
MISSION: Intermediate range ballistic missile
COGNIZANT SERVICE: U. S. Air Force
MANUFACTURER: Douglas Aircraft
PROPULSION: Liquid propellant rocket engine
GUIDANCE: Radio and inertial
LENGTH: 65 ft. **DIAMETER:** Over 100 in.
REMARKS: It is expected that the Thor will be operational in 1958. It reaches a burn-out speed of mach 10 and has a maximum range of 1,500 miles.

STRATEGIC AND TACTICAL MISSILES—SHORT RANGE



CORPORAL

TYPE: Surface-to-surface

MISSION: Short range tactical missile

COGNIZANT SERVICE: U. S. Army

MANUFACTURER: Firestone Tire & Rubber Co.

PROPULSION: Liquid propellant rocket engine

GUIDANCE: Ballistic **LENGTH:** 41 ft.

DIAMETER: 30 in.

REMARKS: Corporal is now operational and is an outgrowth of the WAC-Corporal. It is roughly comparable to the German V-2. It reaches speeds of mach 3 and has a range of 50 to 100 miles.

SERGEANT

TYPE: Surface-to-surface

MISSION: Tactical ballistic missile

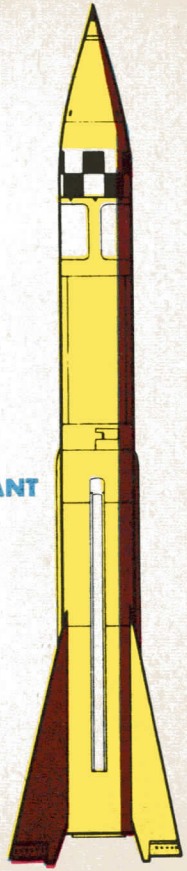
MANUFACTURER: Sperry Gyroscope Corp.

PROPULSION: Solid propellant sustainer engine

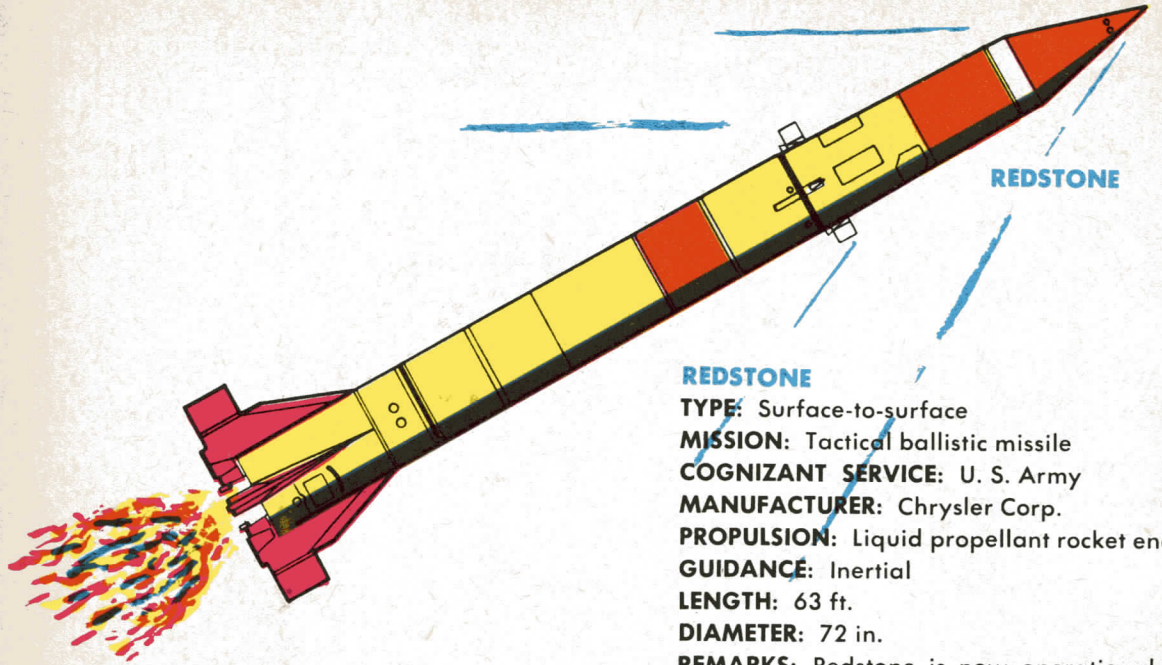
GUIDANCE: Inertial **LENGTH:** 32 ft.

DIAMETER: 36 in.

REMARKS: Sergeant will replace the Corporal. It carries an atomic warhead at a maximum burn-out speed of mach 5 over a range of more than 100 miles.



SERGEANT

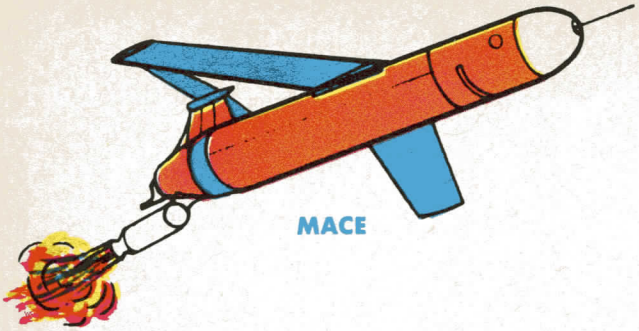


REDSTONE

TYPE: Surface-to-surface
MISSION: Tactical ballistic missile
COGNIZANT SERVICE: U. S. Army
MANUFACTURER: Chrysler Corp.
PROPULSION: Liquid propellant rocket engine
GUIDANCE: Inertial
LENGTH: 63 ft.
DIAMETER: 72 in.
REMARKS: Redstone is now operational. It is basically an improved V-2 German missile. At burn-out it reaches a speed of mach 5 and has a maximum range of over 200 miles. It carries either an atomic or conventional warhead.

PERSHING See Page 31
TYPE: Surface-to-surface
MISSION: Short range ballistic missile
COGNIZANT SERVICE: U. S. Army

SECRET



MACE

MACE

TYPE: Surface-to-surface

MISSION: Winged robot bomber

COGNIZANT SERVICE: U. S. Air Force

MANUFACTURER: The Martin Company

PROPULSION: Solid propellant booster motors and turbo-jet cruise motor

GUIDANCE: Self-contained gyroscopic guidance, inertial

LENGTH: 44 ft.

DIAMETER: 54 in.

WINGSPAN: 22 ft.

REMARKS: This is an advanced version of the Matador; the improvement is primarily in the guidance system. The Mace is still in the developmental stage.

MATADOR

TYPE: Surface-to-surface

MISSION: Winged robot bomber

COGNIZANT SERVICE: U. S. Air Force

MANUFACTURER: The Martin Company

PROPULSION: Solid propellant booster and turbo-jet cruise engine

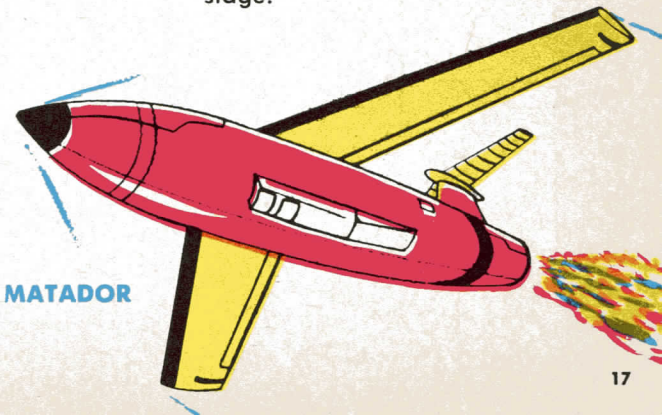
GUIDANCE: Beam rider

LENGTH: 44 ft.

WINGSPAN: 22 ft. 10 in.

BODY DIAMETER: 54 in.

REMARKS: Matador is a pilotless aircraft with a cruising speed of more than 650 miles per hour (mach .86). Its range is well over 600 miles and can carry a conventional or nuclear warhead.



MATADOR

REGULUS I

TYPE: Surface-to-surface

MISSION: Primarily used against aircraft and land targets from Naval vessels

COGNIZANT SERVICE: U. S. Navy

MANUFACTURER: Chance Vought Aircraft Co.

PROPUSION: Solid propellant rocket engines plus turbo-jet engine

GUIDANCE: Command

LENGTH: 33 ft.

DIAMETER: 4.5 ft.

WINGSPAN: 21 ft.

REMARKS: Regulus is operational and designed to be launched from surfaced submarines, surface and shore bases.

REGULUS II

TYPE: Surface-to-surface

MISSION: Used against aircraft and land targets from Naval vessels

COGNIZANT SERVICE: U. S. Navy

MANUFACTURER: Chance Vought Aircraft Co.

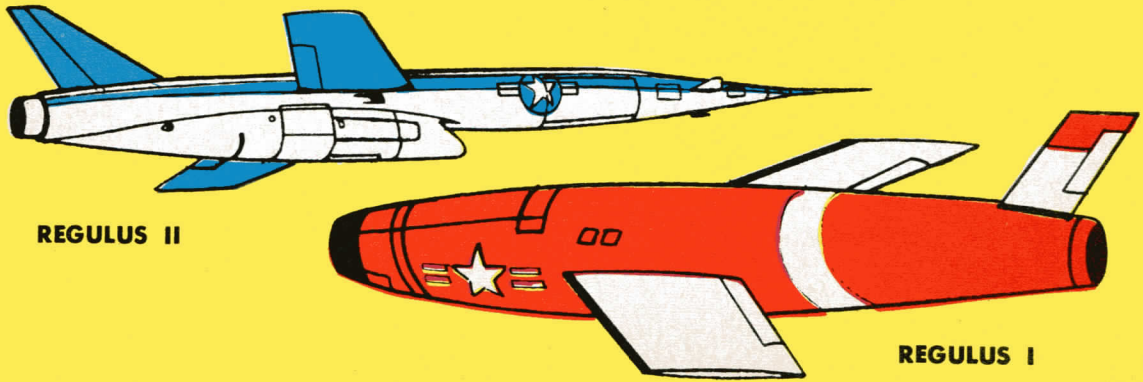
PROPULSION: Solid propellant booster motors and turbo-jet cruise engine

GUIDANCE: Command or inertial

LENGTH: 57 ft.

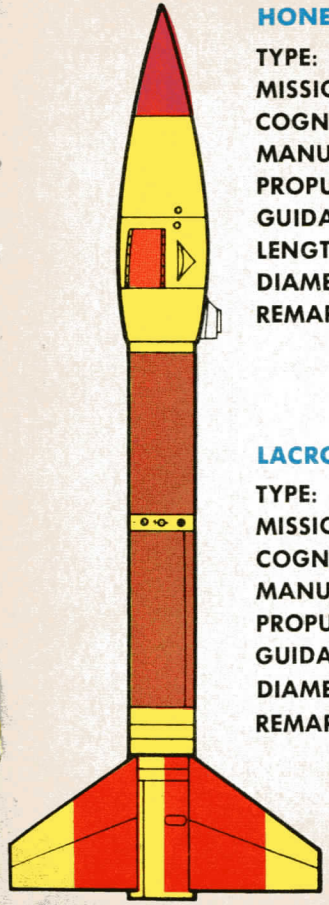
WINGSPAN: 20 ft.

REMARKS: Regulus II will replace Regulus I. It has a cruising speed of mach 1.9 with an ultimate range of 1000 miles. It will be launched from surfaced submarines and other ships.



REGULUS II

REGULUS I

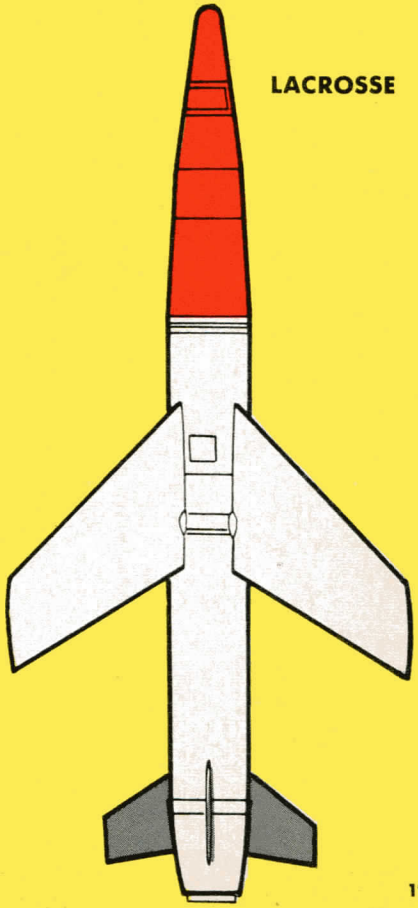


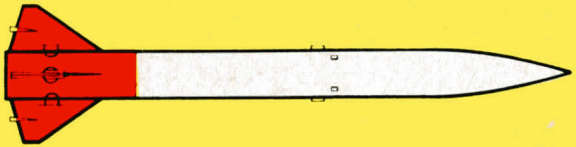
HONEST JOHN

TYPE: Surface-to-surface
MISSION: Short range tactical weapon
COGNIZANT SERVICE: U. S. Army
MANUFACTURER: Douglas Aircraft
PROPULSION: Solid propellant rocket engine
GUIDANCE: Unguided "free" ballistic missile
LENGTH: 27 ft. 3 in.
DIAMETER: 30 in.
REMARKS: The Honest John is operational, carrying an atomic warhead. It reaches speeds of mach 1.5 and has a range of 20 miles.

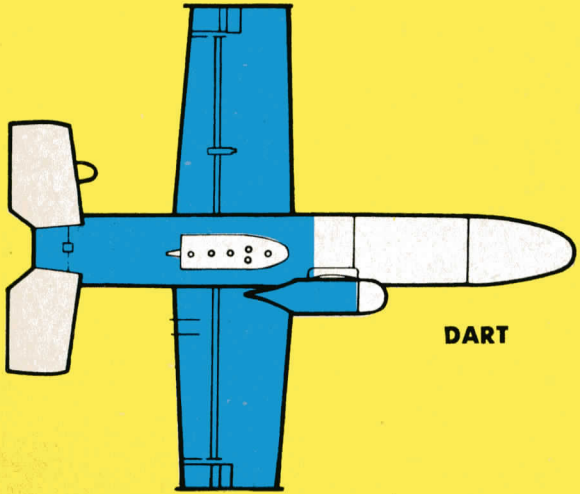
LACROSSE

TYPE: Surface-to-surface
MISSION: Short range tactical missile
COGNIZANT SERVICE: U. S. Army
MANUFACTURER: The Martin Co.
PROPULSION: Solid propellant rocket engine
GUIDANCE: Radio, terminal **LENGTH:** 20 ft.
DIAMETER: 20.5 in. **WINGSPAN:** 108 in.
REMARKS: The LaCrosse missile is in operation and will be used by the Marine Corps as well as the Army for all-weather support for ground troops. Range is 15-20 miles.





LITTLE JOHN



DART

LITTLE JOHN

TYPE: Surface-to-surface

MISSION: Short range tactical weapon

COGNIZANT SERVICE: U. S. Army

MANUFACTURER: Douglas Aircraft

PROPULSION: Solid propellant rocket engine

GUIDANCE: This is a "free" ballistic missile

LENGTH: 12 ft.

DIAMETER: 12.5 in.

FIN SPAN: 33 in.

REMARKS: Little John is in operation. It is similar to Honest John but much smaller. It is an extremely mobile missile and is used as an all-weather support for ground troops.

DART

TYPE: Surface-to-surface

MISSION: Anti-tank and anti-emplacement missile

COGNIZANT SERVICE: U. S. Army

MANUFACTURER: Aerophysics Development Corp.

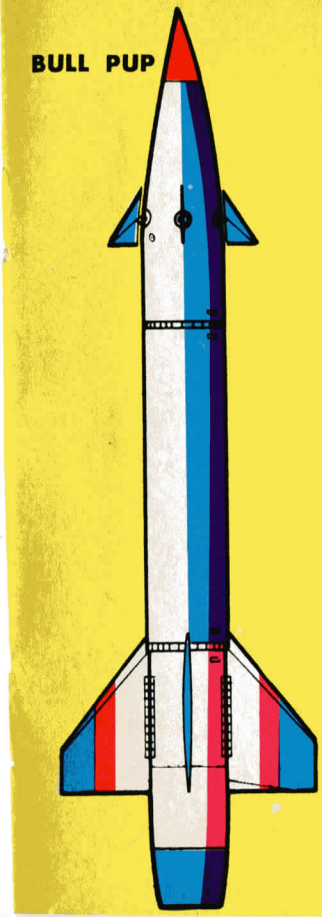
PROPULSION: Solid propellant rocket motor

GUIDANCE: Electrical trailing wire

LENGTH: 5 ft.

WINGSPAN: 50 in.

REMARKS: Dart has 5,000 yard range. It can be fired from jeeps, weapon carriers, or positions, when fixed.



TACTICAL MISSILES—AIR-TO-SURFACE

BULL PUP

TYPE: Air-to-surface

MISSION: Tactical weapon launched from aircraft against relatively small targets

COGNIZANT SERVICE: U. S. Navy and Marines

MANUFACTURER: The Martin Co.

PROPULSION: Solid propellant rocket

GUIDANCE: Radar beam rider **LENGTH:** 11 ft.

DIAMETER: 12 in. **WINGSPAN:** 37 in.

REMARKS: Inexpensive, highly accurate and simple in design. It has 15,000 foot range and speed of mach 1.8.

RASCAL

CORVUS See Page 31

SECRET

TYPE: Air-to-surface

MISSION: Robot bomber with nuclear warhead

COGNIZANT SERVICE: Air Force

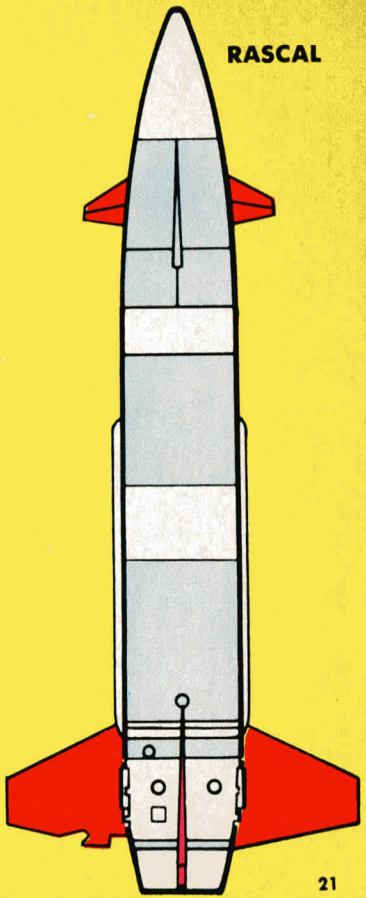
MANUFACTURER: Bell Aircraft Corp.

PROPULSION: 3 barrel liquid propellant rocket engine

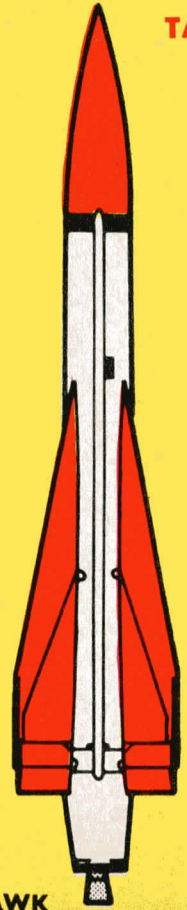
GUIDANCE: Radar command

LENGTH: 35 ft. **DIAMETER:** 4 ft.

REMARKS: Scheduled to be operational with Strategic Air Command in 1958. The Rascal is launched from B-47 Stratojet Bomber at high altitude and high speed.



TACTICAL DEFENSE MISSILES—SURFACE-TO-AIR



HAWK

BOMARC

TYPE: Surface-to-air

MISSION: Pilotless interceptor of enemy aircraft

COGNIZANT SERVICE: U. S. Air Force

MANUFACTURER: Boeing Airplane Co.

PROPULSION: One rocket booster engine and two ram-jet sustainer motors.

GUIDANCE: Beam rider **DIAMETER:** 36 in.

LENGTH: 47 ft. **WINGSPAN:** 18 ft.

REMARKS: The Bomarc is now operational. It has made kills against high flying drone aircraft at a range of 100 miles away from launching site and attacking from above 60,000 feet.

HAWK

TYPE: Surface-to-air

MISSION: Anti-aircraft weapon

COGNIZANT SERVICE: U. S. Army

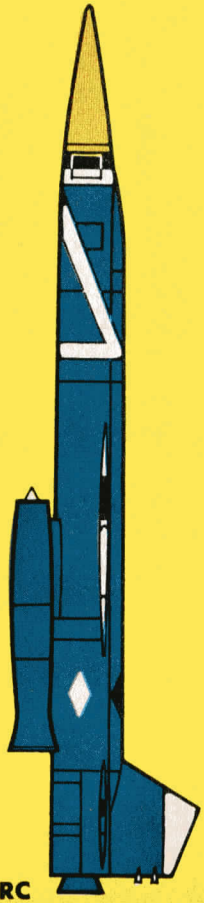
MANUFACTURER: Raytheon Mfg. Co.

PROPULSION: Solid propellant rocket engine

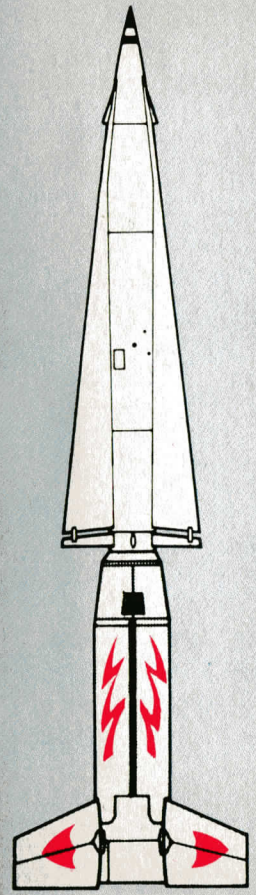
GUIDANCE: Beam rider **SPAN:** 47 in.

LENGTH: 16 ft., 4 in. **BODY DIAMETER:** 16 in.

REMARKS: This missile reaches speeds of mach 2.8 and has a range of more than 15 miles.



BOMARC



NIKE HERCULES

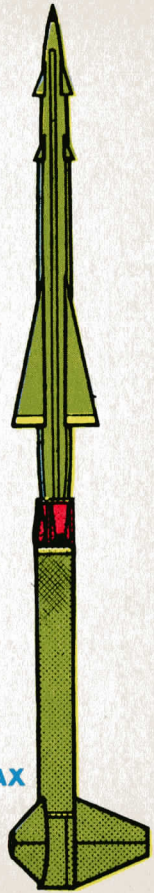
TYPE: Surface-to-air
MISSION: Anti-aircraft weapon
COGNIZANT SERVICE: U. S. Army
MANUFACTURER: Western Electric Co.
PROPULSION: Solid propellant rocket engine plus quadruple solid propellant booster engines
LENGTH: 41 ft., 6 in. **DIAMETER:** 25 in.
REMARKS: Replacing, and is 15 times as effective as, Nike Ajax. Reaches speeds of mach 3.3 with a maximum slant range of 75 miles.

NIKE-ZEUS See Page 31

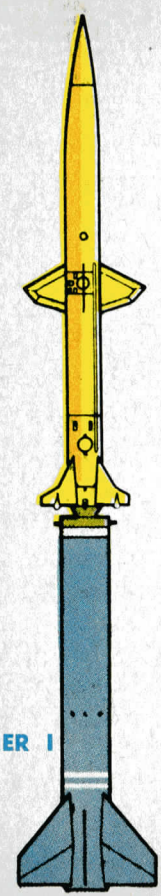
SECRET

NIKE-AJAX

TYPE: Surface-to-air
MISSION: Anti-aircraft missile
COGNIZANT SERVICE: U. S. Army
MANUFACTURER: Bell Telephone Laboratories
PROPULSION: Solid propellant booster engine and liquid propellant sustainer engine
GUIDANCE: Ground controlled beam rider
LENGTH: 20 ft.
DIAMETER: 1 ft.
REMARKS: Nike-Ajax is now stationed as an air defense weapon in many cities in the country.



NIKE-AJAX



TERRIER I

TERRIER I

TYPE: Surface-to-air

MISSION: Anti-aircraft weapon

COGNIZANT SERVICE: U. S. Navy

MANUFACTURER: Convair

PROPULSION: Solid propellant booster and sustainer engines

LENGTH: 26 ft., 5 in. **DIAMETER:** 1 ft. (approx.)

GUIDANCE: Radar homing and shipboard beam rider

REMARKS: Used on carriers and destroyer frigate type vessels. Maximum speed mach 2.5 at range of 20 miles.

TALOS

TYPE: Surface-to-air

MISSION: Anti-aircraft, anti-ship and anti-shore-installation weapon

COGNIZANT SERVICE: U. S. Navy

MANUFACTURER: Bendix Aviation Corp.

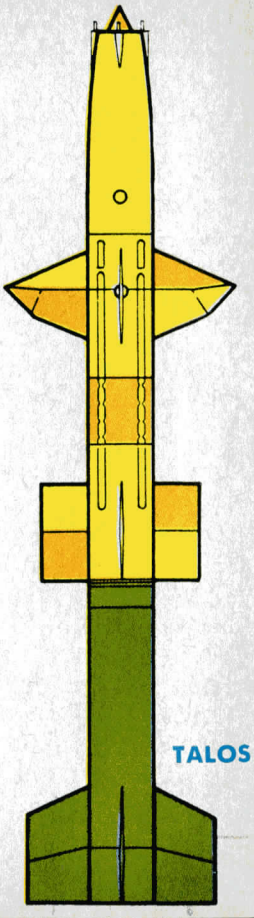
PROPULSION: Solid propellant booster and ram-jet sustainer engine

GUIDANCE: Beam rider and homing radar

LENGTH: 31 ft. 3 in., missile and boost. Basic missile, 20 ft. 3 in.

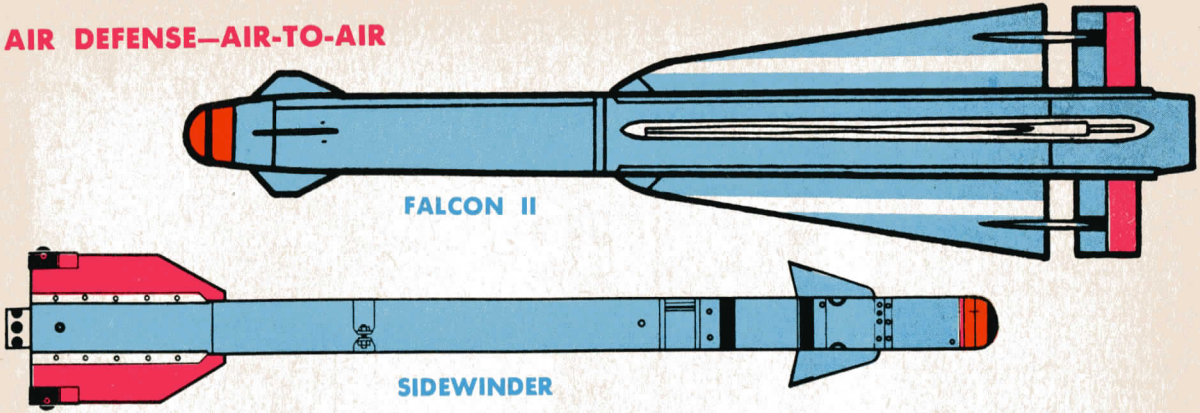
WINGSPAN: 95 in.

REMARKS: In production and operational. Reaches speed of mach 4 and has range of 40 miles.



TALOS

AIR DEFENSE—AIR-TO-AIR

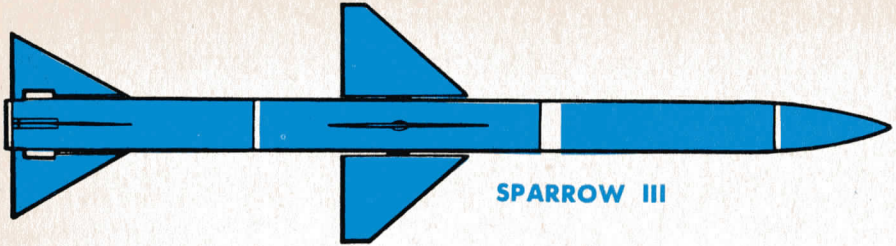


FALCON II

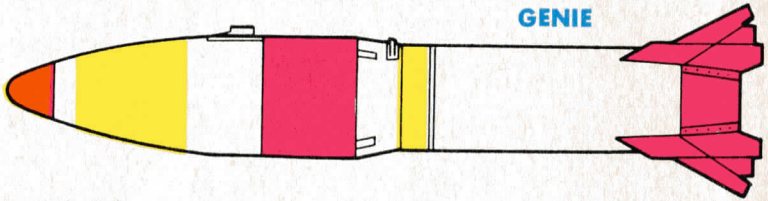
TYPE: Air-to-air
MISSION: Aircraft interceptor armament
COGNIZANT SERVICE: U. S. Air Force
MANUFACTURER: Hughes Aircraft Co.
PROPULSION: Solid fuel rocket engine
GUIDANCE: Infra-red homing system
LENGTH: 6 ft. **DIAMETER:** 6 in.
WINGSPAN: 2 ft.
REMARKS: One of the first air-to-air weapons to go into service anywhere in the world. Speed reaches mach 2 and has an operational range of about 5 miles.

SIDEWINDER

TYPE: Air-to-air
MISSION: Aircraft interceptor armament
COGNIZANT SERVICE: U. S. Air Force
MANUFACTURER: Philco Corp.
PROPULSION: Solid propellant rocket engine
GUIDANCE: Infra-red homing device
LENGTH: 9 ft. **DIAMETER:** 4.5 in.
REMARKS: The speed of the Sidewinder reaches mach 2.5 and has a range of 18,000 feet. It is operational with the U.S. Air Force and Navy. Sidewinder II and Sidewinder III are in prototype stages.



SPARROW III



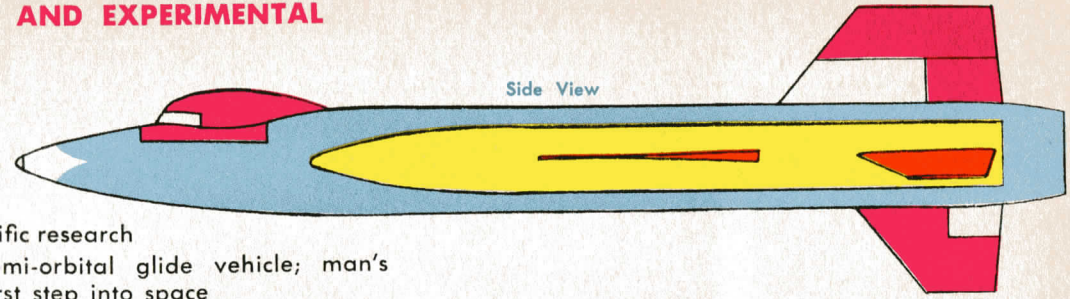
GENIE

SPARROW III

TYPE: Air-to-air
MISSION: Aircraft interceptor armament
COGNIZANT SERVICE: U. S. Navy
MANUFACTURER: Raytheon Mfg. Co.
PROPULSION: Solid propellant rocket engine
GUIDANCE: Radar homing device
LENGTH: 12 ft.
WINGSPAN: 38.5 in.
REMARKS: Will eventually replace Sparrow I in Fleet service. Has burn-out speed of mach 2.8. Sparrow III is an all-weather missile which can be fired above or through clouds with accuracy.

GENIE

TYPE: Air-to-air
MISSION: Aircraft interceptor armament with nuclear warhead
COGNIZANT SERVICE: U. S. Air Force
MANUFACTURER: Douglas Aircraft Corp.
PROPULSION: Solid propellant rocket engine
GUIDANCE: Beam rider
LENGTH: (Approx.) 9 ft. **DIAMETER:** 17 in.
REMARKS: Missile in late development stages. The Genie can be launched by fighter aircraft from any direction relative to target.



X-15

TYPE: Scientific research

MISSION: Semi-orbital glide vehicle; man's first step into space

COGNIZANT SERVICE: Air Force

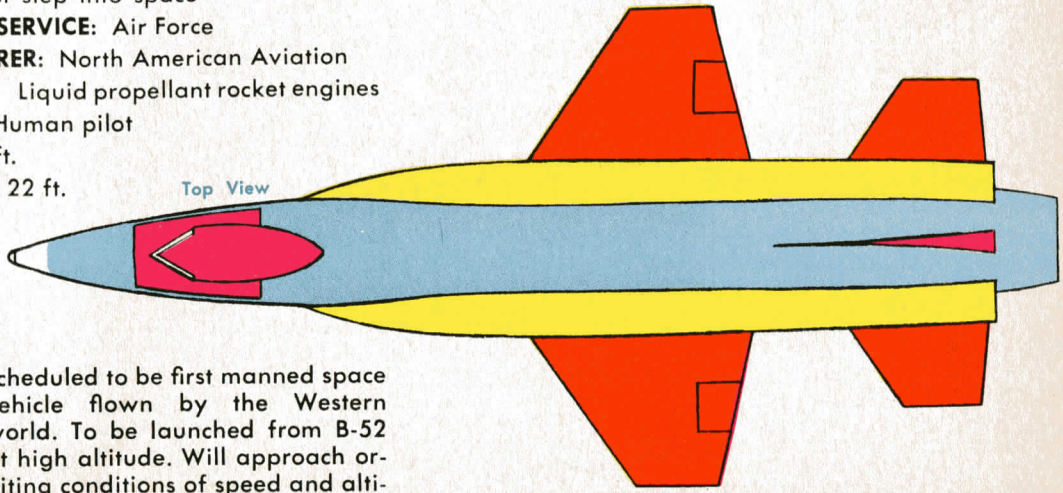
MANUFACTURER: North American Aviation

PROPULSION: Liquid propellant rocket engines

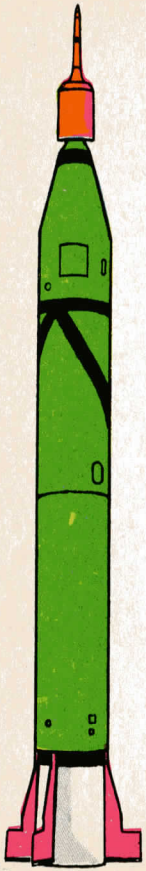
GUIDANCE: Human pilot

LENGTH: 50 ft.

WING SPAN: 22 ft.



REMARKS: Scheduled to be first manned space vehicle flown by the Western world. To be launched from B-52 at high altitude. Will approach orbiting conditions of speed and altitude and then glide down to landing.

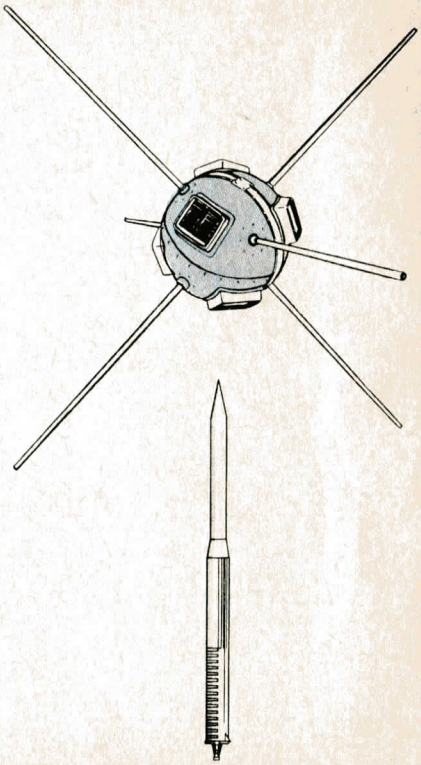


JUPITER "C"

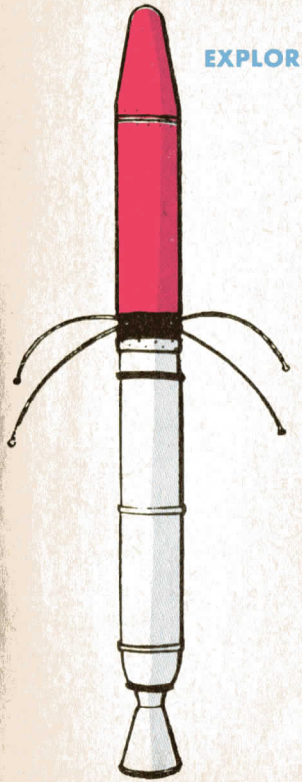
TYPE: Surface-to-air
MISSION: Booster for Explorer satellite
COGNIZANT SERVICE: U. S. Army
MANUFACTURER: Chrysler Corp.
PROPULSION: Liquid fuel rocket engine
GUIDANCE: Inertial
LENGTH: 823 in.
DIAMETER: 70 in.
REMARKS: Jupiter "C" was used to make the first successful satellite (Explorer I) launching by the United States.

VANGUARD

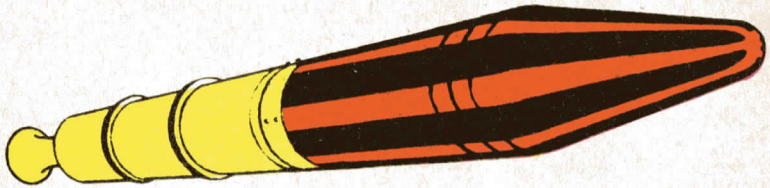
TYPE: Scientific research
MISSION: Launching earth satellites
COGNIZANT SERVICE: U. S. Navy
MANUFACTURER: The Martin Co.
PROPULSION: First and second stage, liquid propellant. Third stage, solid propellant
GUIDANCE: Gyro and pre-programmed controls
LENGTH: 72 ft. **DIAMETER:** (maximum) 45 in.
REMARKS: This is the rocket used to launch, on March 17, 1958, the second satellite orbited by the U. S. and the fourth by man.



VANGUARD



EXPLORER I



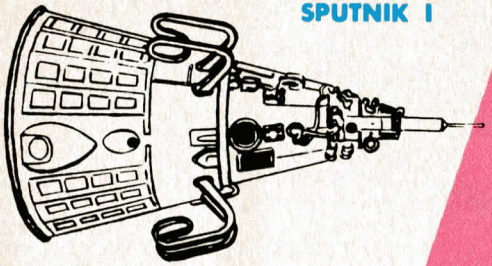
EXPLORER III

EXPLORER I

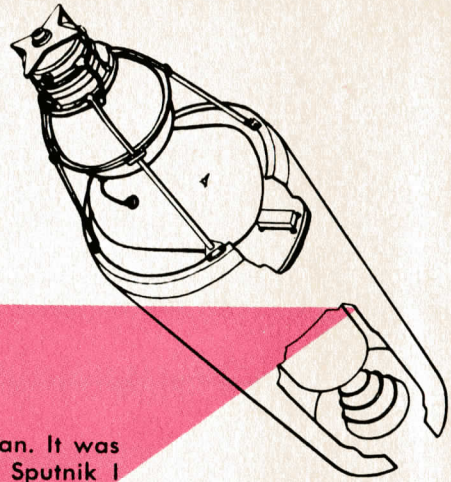
REMARKS: First artificial earth satellite orbited by the United States and the third in history, it was launched January 31, 1958 by the U. S. Army Jupiter "C" missile.

EXPLORER III

REMARKS: Explorer III was third U. S. satellite and the fifth in history. It was launched March 26, 1958, by the U. S. Army Jupiter "C" missile and carried research instrumentation.



SPUTNIK I



SPUTNIK II

SPUTNIK I

REMARKS: The first man-made earth satellite orbited by man. It was launched by the U.S.S.R. on October 4, 1957. Sputnik I carried instrumentation.

SPUTNIK II

REMARKS: Sputnik II is the second successful artificial earth satellite. Launched by the U.S.S.R. one month after Sputnik I, it carried a live dog into orbit.

SPUTNIK III

REMARKS: The third satellite launched May 15, 1958 by the U.S.S.R. and the sixth by man. Was largest of satellites ever launched, and weighed approximately 3,000 lbs.

NIKE-ZEUS

TYPE: Surface-to-air
MISSION: Defense against enemy ICBM (anti-missile missile)
COGNIZANT SERVICE: U. S. Army
MANUFACTURER: Bell Telephone Laboratories and Douglas Aircraft
PROPULSION: Rocket propelled
GUIDANCE: Secret information
LENGTH: Secret information
REMARKS: At present this is a research and development program. Nike-Zeus will have as its object detection and interception of an incoming enemy ICBM. This is an extremely difficult job. Design altitude is 200 miles as presently indicated.

CORVUS

TYPE: Air-to-surface
MISSION: Tactical weapon against surface ships and heavily defended areas
COGNIZANT SERVICE: U. S. Navy
MANUFACTURER: Temco Aircraft Corp.
PROPULSION: Solid propellant sustainer motor
GUIDANCE: Beam rider
LENGTH: Secret information
DIAMETER: Secret information
REMARKS: Long range winged vehicle for use on carrier based aircraft.

PERSHING

TYPE: Surface-to-surface
MISSION: Moderate range ballistic missile
COGNIZANT SERVICE: U. S. Army
PROPULSION: Solid propellant rocket engine
GUIDANCE: Ballistic
LENGTH: Secret information
DIAMETER: Secret information
REMARKS: Pershing is elected to succeed the Redstone liquid propellant missile. It will be smaller, lighter and more mobile than the Redstone.

TITAN

TYPE: Surface-to-surface
MISSION: Intercontinental ballistic missile
COGNIZANT SERVICE: Air Force
MANUFACTURER: The Martin Co.
PROPULSION: Liquid propellant rocket engine, both stages
GUIDANCE: Inertial
LENGTH: 105 ft. **DIAMETER:** 120 in.
REMARKS: Titan is a two-stage missile with hydrogen warhead capabilities. Range more than 5,500 miles, warhead speed reaches mach 15.

POLARIS

TYPE: Surface-to-surface
MISSION: Intermediate range ballistic missile
COGNIZANT SERVICE: U. S. Navy
MANUFACTURER: Lockheed Aircraft Corp.
PROPULSION: Solid propellant rocket engine
GUIDANCE: Ship inertial navigation system (SINS)
LENGTH: 40 ft. to 50 ft. **DIAMETER:** 100 in.
REMARKS: Polaris is designed to be launched from a submarine below the surface of the water. It has a design range of 1,500 miles. It is now under development.

SECRET

The following reading is recommended for those interested in knowing more fully the subjects covered by this encyclopedia.

Bergaust, Erik. ***Rockets and Missiles.*** New York: G. P. Putnam's Sons, 1957.
Cox, Donald & Stoiko, Michael. ***Spacepower.*** Philadelphia: The John C. Winston Co., 1958.
Ley, Willy. ***Rockets, Missiles, and Space Travel.*** New York: The Viking Press, 1957.
Ley, Willy. ***Satellites, Rockets, and Outer Space.*** New York: The New American Library, 1958.
Current and previous issues of ***Missiles and Rockets, Magazine of World Astronautics,*** published by American Aviation Publications, Inc., Washington, D.C.

BE A MISSILE AND ROCKET EXPERT!

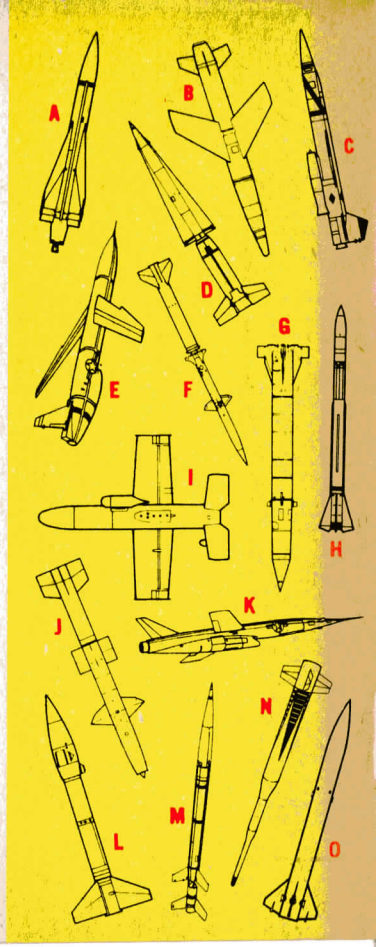
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- [ ] HAWK
- [ ] HONEST JOHN
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