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ATLAS FACT SHEET

The Weapon System. The SM-65 ATLAS is America's first intercontinental ballistic missile. With associated ground equipment it comprises the Air Force weapon system WS 107A-1. Pilot production of the ATLAS is being accomplished at San Diego by Convair (Astronautics) Division, General Dynamics Corporation. The ATLAS is now undergoing advanced flight development tests by the Air Force Missile Test Center at the Atlantic Missile Range.

The goal of Project ATLAS is a dependable missile that is "producible and operable" -- one that can be manufactured with assembly line techniques and operated by regular military personnel.

The Missile. The ATLAS is designed to deliver a thermonuclear warhead 6,325 statute miles (5,500 nautical miles). It is powered by a cluster of liquid propellant rocket engines, burning liquid oxygen and RP-1, a kerosene-like hydrocarbon fuel. The missile is approximately 75 feet long and 10 feet in diameter. Weights and thrust are classified.

The power package consists of two large booster engines and one large sustainer engine, plus a pair of small "vernier" rockets.

All five rockets are ignited prior to launching. After a few minutes of flight, during which the missile is lifted well

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into its trajectory, the booster engines and associated equipment are jettisoned to lighten the load. The sustainer engine continues to accelerate the missile until it has attained a velocity on the order of 16,000 M.P.H., then the sustainer is shut off, and the small vernier rockets are used to "trim" velocity to the exact value required. After vernier shutdown, when the missile is following a purely ballistic (unguided) course, the nose cone is separated from the rocket structure. Both parts travel together until the atmosphere is re-entered. Then the unprotected structure (largely tankage) is destroyed by aerodynamic heating.

Conventional long-range missiles consist of two or more rockets, one mounted on another. The bottom or booster rocket furnishes all power until it burns out. Then it drops away and the next stage is ignited. The ATLAS system -- so-called "one and one-half" staging -- is unique in having two sets of engines but only one rocket tank structure. This permits lighting the upperstage (sustainer) engine on the ground. There is no risk that the missile will abort through failure to achieve ignition many miles in the air.

During powered flight the missile's course and speed are governed by the guidance system. ATLAS will employ radio-inertial guidance (requiring a station on the ground) through the period of early operational use, but convert to all-inertial guidance when this method has been fully perfected.

The ATLAS tank structure is made of thin-gauge stainless steel. The missile contains more than 40,000 parts (not counting those portions of it supplied by associate contractors -- nose cone, guidance and engines).

Flight Testing. Missiles assigned to flight testing are shipped direct from the factory to the Air Force Missile Test Center at the Cape Canaveral Missile Test Annex, Fla., where Convair maintains a field staff of more than 900 persons. Here each missile receives a thorough ground testing, final checkout and test flight.

During a flight, data from more than 300 instrumented points in the missile is telemetered (radioed) back to AFMTC over nearly 50 channels. This information -- recorded on some 10 miles of magnetic tape -- includes temperatures, vibrations, accelerations, liquid flow rates, etc.

Flights To Date. ATLAS flight testing started at Cape Canaveral in June 1957, using missiles fitted with booster engines only, and having dummy nose cones. The range for these flights was limited to approximately 600 miles. In eight such flights, the missile never failed to launch smoothly and retain complete stability during vertical rise.

On the first two flights (June 11 and Sept. 25) the missiles malfunctioned after starting pitchover and were destroyed by the range safety officer. Successful flights followed Dec. 17 and Jan. 10. In flights staged Feb. 7 and Feb. 20, the missiles functioned well until near the end of powered flight, then lost directional stability and broke up. After the causes of these malfunctions were isolated, good flights were achieved April 5 and June 3.

Testing of the complete missile -- having both sustainer engine and separable nose cone -- started in the summer of 1958. A control system failure caused the first three-engine ATLAS to break up in flight July 19. The second was launched successfully on August 2, attaining a speed of more than 15,000 M.P.H., a height of several hundred miles, and a range of more than 2,500 miles.

Ground Testing. ATLAS missiles assigned to ground testing are sent to two California facilities, Sycamore Canyon, near San Diego, and the Missile Static Test Site (formerly Edwards Rocket Base), to be expanded in a rigorous and exhaustive program of captive testing by Convair. (A new plane can be repeatedly test-flown, modified and flown again. A missile cannot be. Hence much development testing is done on the ground, with the missile tied down but otherwise simulating test operations as nearly as possible.)

History. The Air Force in 1946 awarded Convair the first research and development contract in a program to develop a missile capable of carrying a warhead 5,000 miles. (At that time the only long-range rocket was the 200-mile German V-2.)

Convair designers under Karel J. Bossart (later Technical Director of Astronautics) conceived and developed the MX-774 Hiroc research rocket. This introduced three innovations which have since become part of the universal art of rocketry.

1. First swiveling of engines for directional control. (The Germans controlled the V-2 with rudderlike graphite vanes placed in the jet stream.)

2. First "integral" tanks -- the skin of the missile serving also as wall of the propellant tanks, thus achieving a tremendous weight saving. (The Germans has used separate internal tanks.)

3. First separable nose cone. (The Germans had re-entered the complete rocket structure.)

Defense Department economy cutbacks in 1947 led to shelving of ICBM development, but unexpended and supplementary MX-774 funds enabled Convair to complete 3 of the 10 Hirocs under construction, conduct the first captive firing in November 1947, and launch the three rockets at White Sands Proving Ground in 1948. From then until early 1951, the company continued limited ICBM studies with its own funds.

The Korean conflict brought increased military appropriations and the Air Force renewed ICBM work on a conservative scale in January 1951, giving Convair a study and development contract. The Ballistic Missile Program was helped by a U. S. Thermonuclear break-through (smaller and more powerful warheads) in 1952-53.

The summer of 1953 Convair proposed an accelerated program. The ICBM project was assigned top Air Force priority in 1954 and was placed on full "crash" footing that fall. (Subsequently a contract to develop a "backup" ICBM, the Titan, was given the Martin Company.)

The ATLAS design proposed by Convair and accepted by the Air Force incorporated some of the revolutionary Hiroc features and included a new ultra-lightweight tank structure. To power the ATLAS, the Rocketdyne Division of North American Aviation developed an advanced liquid propellant rocket system.

ATLAS fabrication began in San Diego in 1955. First engine tests were conducted at Edwards in June 1956 -- the first completed missiles were delivered to Sycamore and Cape Canaveral that fall.

Associates. As systems integrator for Project ATLAS, Convair builds the airframe, the autopilot system and various components -- assembles and checks out the missiles -- conducts both captive and flight tests for the Air Force, activates new ATLAS bases (see next section), and trains Air Force personnel.

Convair's associate contractors, in addition to Rocketdyne, include General Electric Co., and Burroughs Corp., (radio-inertial guidance), to be followed by American Bosch Arma Corp., (all-inertial guidance), General Electric Co., nose cone -- and Sundstrand Turbo Division (formerly American Machine and Foundry), development of an airborne accessory power supply.

Research and development phases of Project ATLAS are directed by the Air Force Ballistic Missile Division, ARDC, commanded by Maj. Gen. Bernard A. Schriever, with headquarters at Inglewood, Calif. At Cape Canaveral Convair launching complexes and assembly/checkout buildings are part of the Air Force Missile Test Center, ARDC, commanded by Maj. Gen. Donald N. Yates, with headquarters at nearby Patrick Air Force Base.

Looking Ahead. The ATLAS is expected to achieve initial operational capability by the end of 1959. The buildup to IOC --

including construction of ATLAS complexes at four bases -- is directed by the Strategic Air Command, commanded by General Thomas S. Power. SAC's 1st Ballistic Missile Division is commanded by Maj. Gen. David Wade, with headquarters at Vandenberg Air Force Base, Lompoc, California.

Construction of the first complex at Vandenberg is underway, and work has been started at Francis E. Warren Air Force Base, Cheyenne, Wyo. The third and fourth ATLAS Bases will be constructed at Offutt AFB, Omaha, Nev., and Fairchild AFB, Spokane, Wash.

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