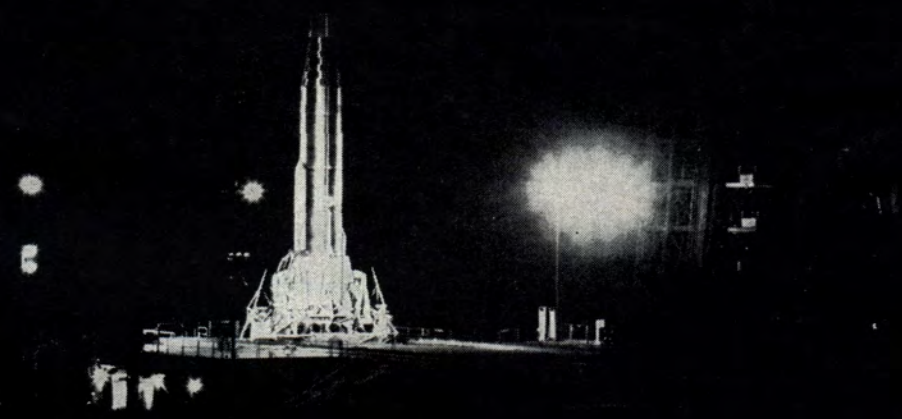
THE CARE AND FEEDING OF A SPACE WEAPON



ATLAS AT VANDENBERG . . .

By James R. Doherty

USAF PHOTOS

Handled with the care normally accorded a fine watch, Atlas, America's first operational ICBM, is the hub around which life revolves for hundreds of technicians at Vandenberg AFB, Calif. In the course of a day . . . a week . . . a month, what happens to the big stainless steel birds upon which America and the free world have pinned such high hopes? Here's a missileman's-eye view of the big bird.

It arrives shrouded in wet mystery, a giant cocoon being disgorged from the belly of a C-133 Cargomaster in an operation that is performed with infinite care. The slightest wrench could cause a disastrous misalignment in the seventy-two-foot-long bird. To prevent such mishaps, the missile is pressurized, or maintained "in stretch," at all times . . . in transit or on the launching pad. Early deliveries of Atlas were made by trucks, towing specially designed trailers. Today's birds arrive at Vandenberg . . . as good birds should . . . by air.

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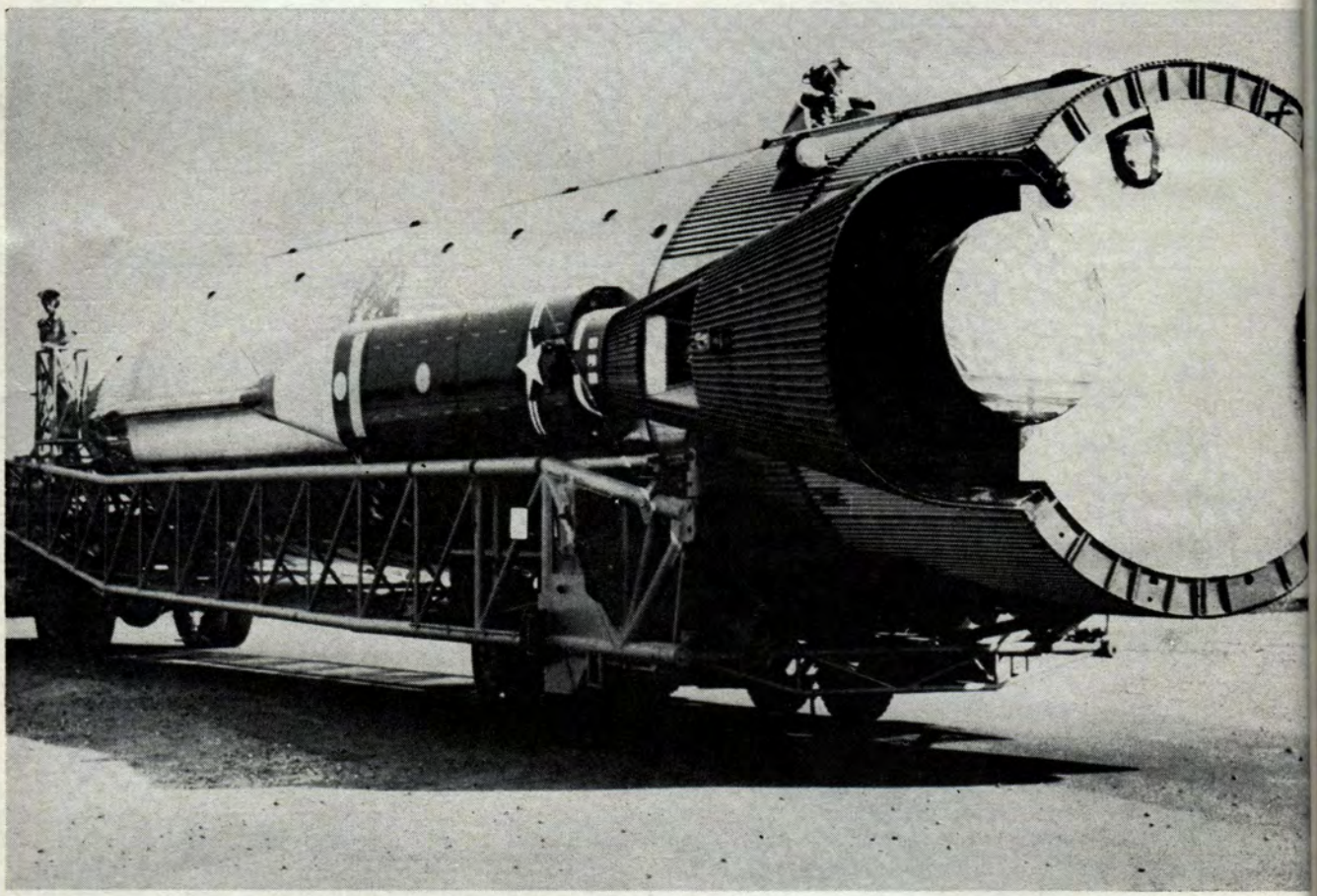
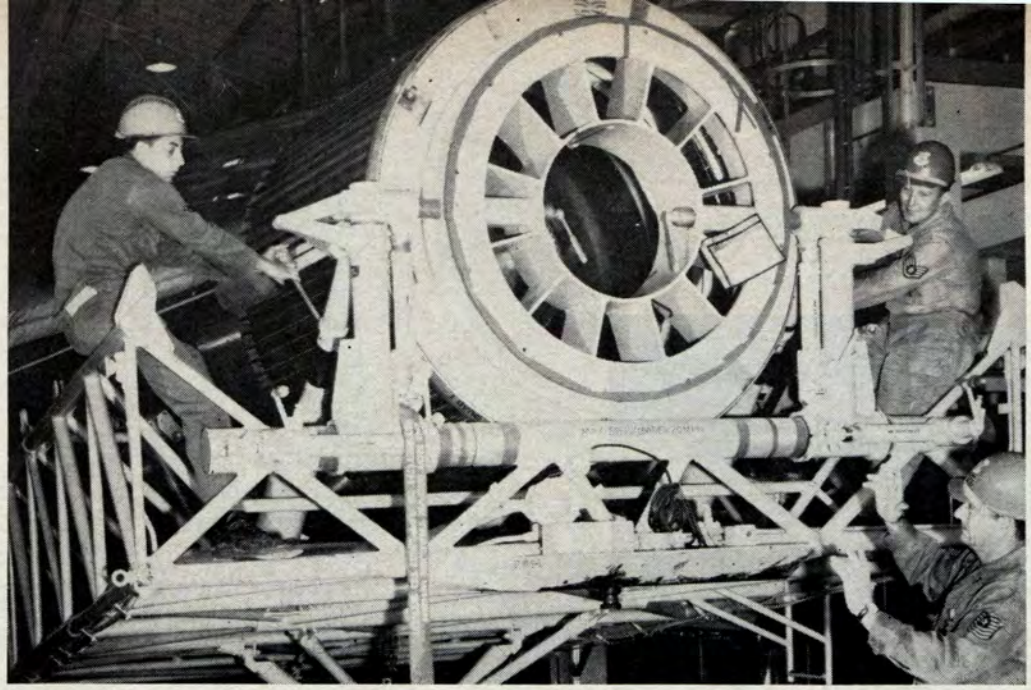
On its way to Vandenberg's missile assembly building, Atlas is unmasked so that technicians can better observe its gleaming, inert length for signs of damage or malfunction. As he creeps along base roads, the driver is in constant telephone communication with the technician in charge, who stands at the missile's nose, and with two other "drivers" ensconced in tiny cabs immediately behind the trailer's rear wheels. Visible here on top of the missile is one of Atlas' two small vernier engines, used to trim the birds' velocity when it has reached a speed of approximately 15,000 miles per hour. After verniers have been shut down, the reentry vehicle is separated and arcs downward in its deadly ballistic curve.





To guard against the possibility of collapse, the Atlas is put in stretch immediately upon its arrival at the assembly building. In addition, an interior pressure of six to nine pounds per square inch is maintained in both the cavernous liquid-oxygen and RP-1 fuel tanks. Here under the direction of a noncommissioned crew chief, technicians turn struts that exert force on either side of the nose ring, stretching the bird a life-saving fraction of an inch under a force of 10,000 pounds. Rhythm in the operation is mandatory. An ounce too much pull—at the wrong time, on the wrong side—may result in serious damage from warping. The crew chief counts a steady, even cadence. Slowly, a quarter turn . . . another . . . then another. At last, with the missile's skin at drumhead tautness, the job is done. Now the real work can begin.

Air Force enlisted men, possessing among them forty-seven different skills, are utilized to prepare a single Atlas ICBM for hookup to its launching pad. Several among them are missile engine technicians, one of whom is shown at right making minute adjustments to the powerplant labeled "sustainer." Helium gas is used to maintain pressure in both of the main tanks . . . pressure that forces explosive liquid oxygen and RP-1 into engine combustion chambers. A far cry from the work of the World War II "grease monkey" is the task of these highly trained and skilled airmen. Yet, mechanical brains to the contrary, man is still the decision-maker . . . in the assembly building . . . or on the launching pad.

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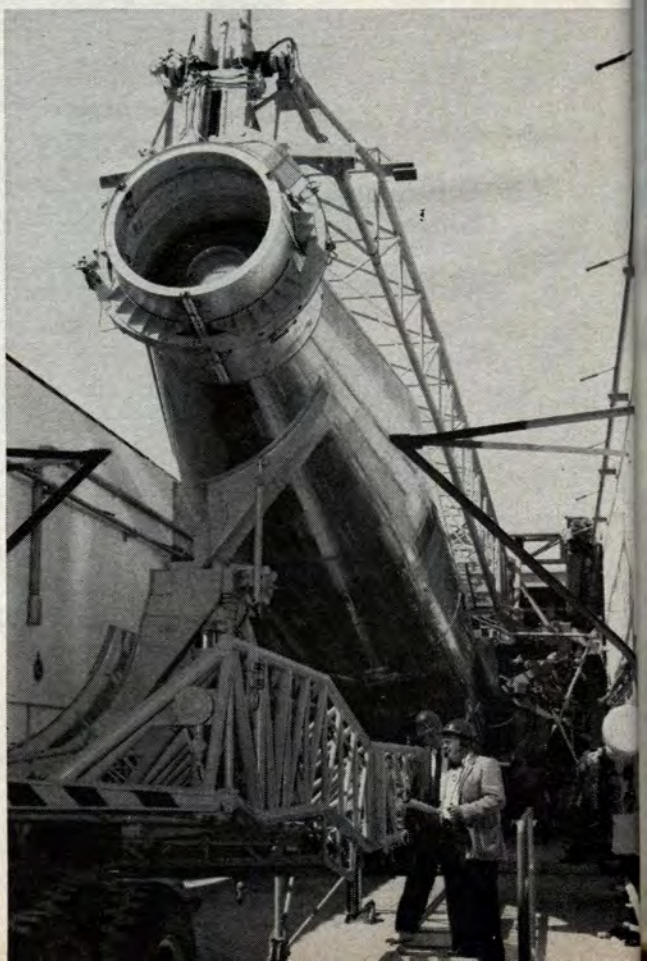
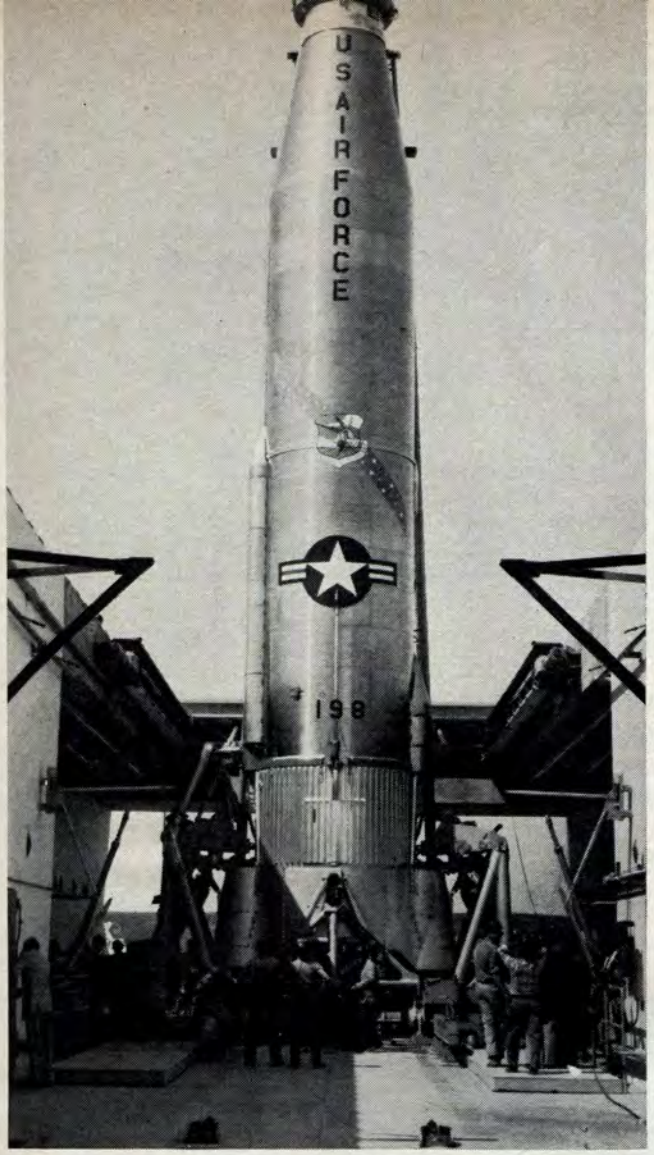
In the final stages of its technical ordeal in the assembly building Atlas' plumbing is checked with the aid of this hydraulic pumping unit. Earlier in the missile's brief operational history, many of these time-consuming checks were performed manually. Nowadays, thanks to the ingenuity of dedicated engineers, machines have been developed that immeasurably shorten the missile's march from manufacturer to launching pad. In the process, technicians have been relieved of many a tiresome and repetitious chore. This tester is a portion of APCHE (Automatic Programed Checkout Equipment), an electronic brain of sorts, that enables technicians to "see" the missile's complicated innards at long range. It may never have left home, but, by means of APCHE, Atlas may be "flown" its full range at a technician's convenience.

Now, at long last, Atlas is ready for mating to its launching pad. Thousands of electrical circuits have been tested and found functional. Subsystem after subsystem has been checked with the painstaking attention to detail upon which a successful launching will inevitably depend. Engines have been prepared for flight. And, finally, assembly technicians are finished: The missile is **trundled** across Vandenberg proper to the "576-B" area, a brushy California hillside pockmarked by semihardened Atlas launching sites. Here, the weapon, on its unique trailer, is backed into position and its base clamped firmly into the spidery launching mechanism. Throughout the operation, of course, interior tank pressures must be maintained and care taken that the missile's tender skin remains unbroken. Then, at a signal from the pad chief, Atlas is raised slowly upward. . . .





Upright in its steel and concrete bed, Atlas points for the first time toward the big emptiness: space. Ahead, somewhere in its operational or training future, there could lie a one-way trip to flaming oblivion via the airless void.

But such a fiery end is a future matter. More checks and rechecks are its immediate business. Linking bird and blockhouse are thousands of electrical circuits that must now undergo tests. Elaborate consoles that monitor fuel flow and engine starts must be hooked up, the airborne guidance system test flown, all the myriad subsystems inspected yet again.

To the taxpayer, this burnished steel finger pointing at the heavens represents an investment of nearly one million dollars.

SAC missilemen, well aware of this salient budgetary fact, are determined that Atlas will pay its way. Each well groomed bird constitutes a sizable premium on our policy of deterrence. The technicians take no chances.

A finishing touch . . . the Strategic Air Command's colorful crest is affixed to the missile's tankside. Planning for inclusion of Atlas into the SAC weapon systems inventory began several years ago. Eventually, it is planned that three categories of missiles will become operational throughout the command: Intercontinental Ballistic Missiles (ICBMs); Intercontinental Cruise Missiles (ICCMs); and Air-to-Surface Missiles (ASMs). ICBMs, the Atlas and Titan, are both powered by liquid fuel, boast ranges in excess of 6,300 miles. Atlas is a stage-and-one-half vehicle; the Titan is a two-stage rocket. To date, the latter has been successfully fired in research and development tests only, but is slated to make its operational bow at Vandenberg in the near future. Minuteman, a solid-fuel ICBM, will enter the SAC inventory in approximately twenty-four months. Snark is an example of the cruise missile, or pilotless aircraft. Powered by a turbojet engine, it flies at near-sonic speeds a distance of 5,000 miles. Hound Dog and Quail are both air-to-surface missiles. The former, tucked beneath the wing of a B-52, is capable of carrying a nuclear warhead, is powered by a J52 engine that generates a maximum of 7,500 pounds of thrust. Quail is also launched from an airborne carrier, but will be employed as a decoy missile—to confuse, not destroy—enemy defensive weapon systems.

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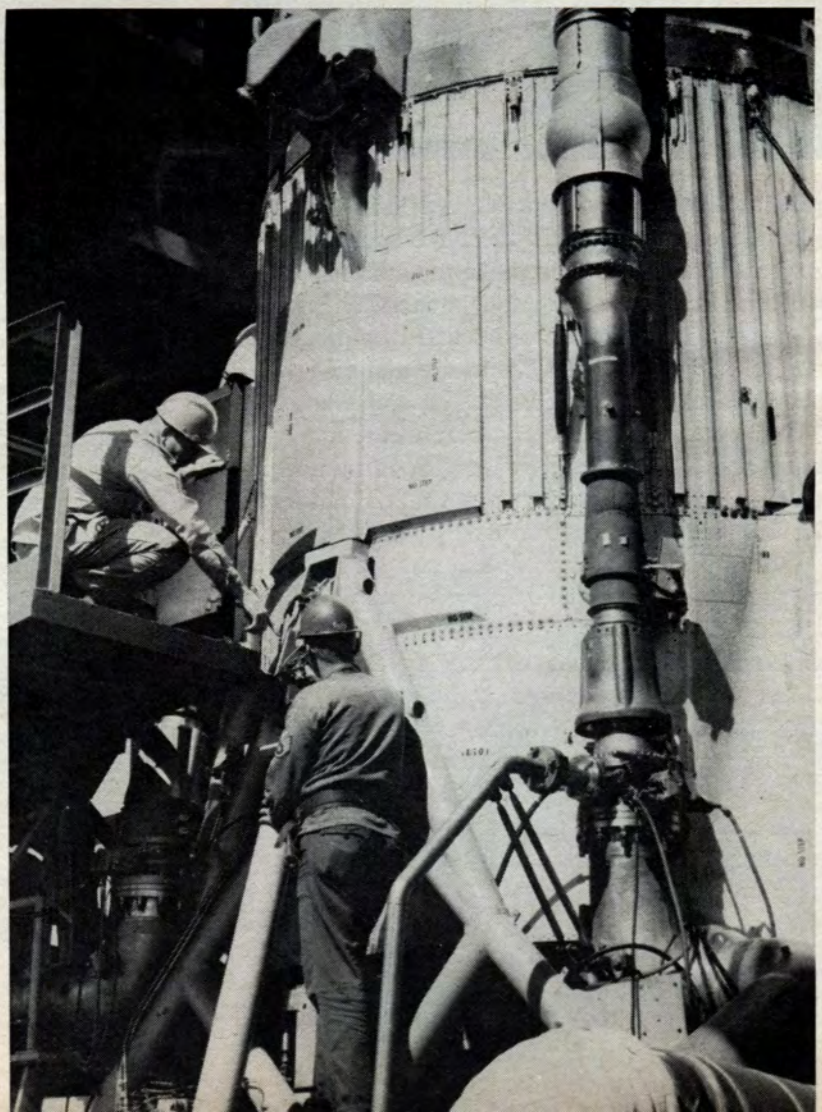
Complexity of the Atlas weapon system is apparent in this glimpse of the missile's tethered end, with its maze of pipes and tubes and cable that interlace the launcher mechanism itself. Liquid oxygen and fuel lines snake their way among the ducts that supply constant heat to sensitive guidance controls; smaller hydraulic lines wind like spaghetti through the whole. Each is a possible source of malfunction, each must be leak-checked periodically. Projecting from the base of the pod is one of Atlas' two "tiny" vernier engines—of the power of 1,000 horses each. Also visible are several removable panels that permit access to the missile's main powerplants.
The noncommissioned pad chief (below left) is a veteran of World War II, who cut his mechanical eyeteeth on the famed B-17 Flying Fortress, the deadliest weapon system of its time. He's still in the business—and still responsible for the deadliest thing that flies.



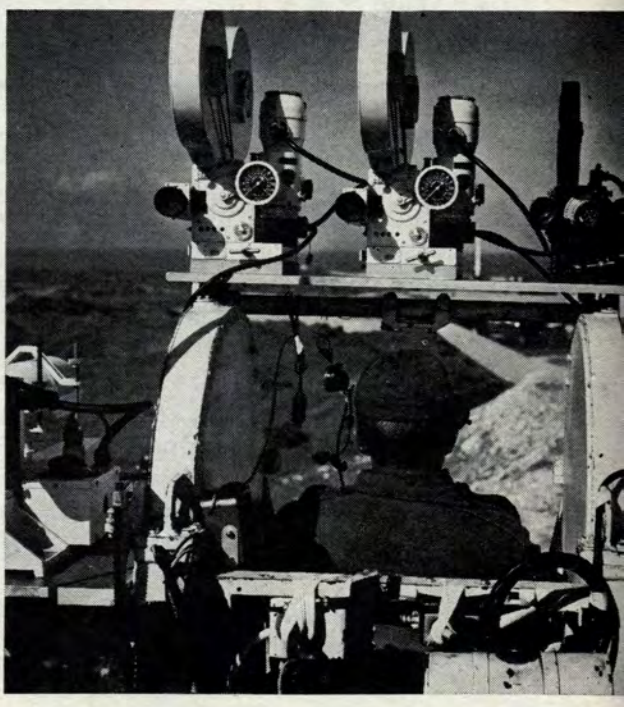
Entrances to all Vandenberg blockhouses are tightly guarded and, as the sign points out, each area is patrolled regularly by burly air policemen and their extremely unsociable canine companions. Before every firing, two sets of heavy steel doors are swung shut to seal the buildings, which are buried beneath many feet of packed earth. The walls are constructed of steel-reinforced concrete. Each structure boasts its own ventilation system and is deemed capable of withstanding any and all blows —short of a direct hit by a nuclear weapon.

Chief of the blockhouse firing team is the launch control officer, shown here seated at his centrally located console. The LCO in this case is Major Earnest E. Bankey, Jr., who superintended the initial Atlas launch by a SAC crew at this West Coast base. His assistant is Master Sergeant Wesley M. Sorum, a missile analyst technician. And now the weeks and months of training are at an end—for the moment. The bird on the pad outside is ready for firing. The weather is clear, ideal for maintaining visual contact with the ascending missile. At 0500 the readiness countdown begins. At a signal from the 1st Missile Division Command Post, the machinery is set in motion that will culminate in a combat training launch. The countdown clock is started. Time: "T" minus 180 minutes. In rapid-fire order, all agencies that must be read in prior to a peacetime firing are notified. High on the list is the range safety officer. Then, additional words of warning are flashed across the Pacific . . . from Point Arguello . . . to Hawaii . . . to Wake Island . . . to Guam. Shipping has already been cleared from the intervening sea lanes. The impact area is deserted. More calls . . . more voices . . . more people. And the clock moves on . . .

ATLAS AT VANDENBERG . . .

Now the complex facilities operator swings into action. At his fingertips are controls that distribute power throughout the entire pad and blockhouse system. An electrical generating plant, large enough to accommodate a fair-sized city and utilizing six electro-diesel generators, supplies the power. During launch and immediately following, the complex facilities operator will deluge the flame bucket beneath the pad to keep blast damage to a respectable minimum. At the left is Master Sergeant Bethal C. Boisky, of Athens, Ga., who alone is responsible for ascertaining the position and state of readiness of dozens of supporting facilities. For example, a battery of TV cameras must be operable and directed. Firefighters and disaster control teams must be alerted. Voltages and pressures must be maintained, both on the pad and in the launch control center itself. And the complex facilities operator must be prepared—in the event of malfunction or disaster—with a plan for counteraction.

While Atlas trembles at the ready, a cameraman atop Vandenberg's guidance control center aims his battery of glittering lenses at the launching pad. At the instant of liftoff, in the same manner a gunner might track a distant target, the technician will begin following the rising rocket. In addition to conventional cameras, a number of the high-speed variety will film Atlas for a period of approximately twenty seconds after blastoff. Should it become necessary to destroy the missile, valuable clues as to what went amiss may be captured on film. An uneventful flight, documented by extensive film footage, may supply confirmation of a successful Atlas modification or perhaps an innovation in launching techniques. Missilemen are still learning . . . and the cameraman's contribution on launch day cannot be overestimated.



Today's launch is trouble-free. Inexorably, the countdown moves toward its fiery climax. Again the LCO's voice is heard: "On my mark, we will pick up the final commit sequence. MARK!" Less than two minutes remain before liftoff. The guidance system analyst tolls off the seconds ". . . on my mark 50 . . . 40 seconds, MARK. . . . 30 seconds. . . ." Suddenly, furiously, the tension begins to build. Now, pressure is being transferred internally from the pad to the bird. Airborne batteries are being activated. Flight and hydraulic pressures are building up. The end . . . or the beginning . . . is at hand. And now the key is turned. With an angry bellow that vibrates ponderous blockhouse walls, five Atlas thrust chambers roar to life. "Three . . . two . . . one . . . zero . . . LIFTOFF!"