

IT'S ARMY-NIKE WEEK

The Redstone Rocket

Published by Jack W. Hoffhaus, Hartselle, Ala., a private individual in no way connected with the Department of the Army. Opinions expressed by the publishers and writers herein are their own and are not to be considered an official expression by the Department of the Army. The appearance of advertisements in this publication does not constitute an endorsement by the Department of the Army of the products or services advertised.

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REDSTONE ARSENAL, HUNTSVILLE, ALABAMA

JUNE 10, 1964

Arsenal-Wide

Spot News

Dial 112

Ack-Ack Now Acq-Track

NIKE DEFENSE 10 YEARS OLD

On Nov. 27, 1951 a drone B-17 flying at 33,000 feet above the desert at White Sands Missile Range, N. M. was struck by a blast 57 feet slightly under and to the right of the flight deck.

The blast was caused by a device known as a "spotting charge" located in the nose of a new, secret weapon being developed by the U. S. Army.

Two months later a similar drone flying nearly the same path became a casualty and crashed in the desert. In that case, the weapon plowed into the plane's tail-wheel well and came out the top of the fuselage.

The weapon was the Nike, a slender, finned projectile that could be guided in flight via electronics. The words electronics and missiles are household terms today. But 20 years ago when the Nike system was conceived the word missile was synonymous with the German V1 and V2 missiles, there were fewer than 10,000 TV sets in the country, people rated radio sets by the number of tubes they had and few people had ever heard of a gadget called a computer.

This month the Army is celebrating the 10th anniversary of the operational deployment of the first Nike system. It is the Free World's primary missile defense against high flying aircraft. A focal point for these celebrations is

manned both by U. S. Army troops and those of our allies. Nikes stand guard in Alaska where the white radomes of their radars blend in with the snow. And, during the Cuban crisis of 1962 Nike missiles were raised in the shadow of the palm trees in southern Florida.

Product of WWII

The Nikes were as much a product of World War II as the atomic bomb and jet airplanes. The Nikes also owe a lot to Peenemunde not only in the way of technology, but also in the very reason for their being.

It has been estimated that during World War II some 17,000 rounds of conventional ammunition were fired for each plane brought down. And, planes continued to get faster, fly higher and bomb with increased accuracy even while maneuvering. Radar and computer controlled guns were developed late in the War which nullified some of these advances. However, there was still one great disadvantage to using bullets against airplanes. Namely, once the bullet was fired its course was fixed; it could not be made to pursue a maneuvering plane.

A young Army Lieutenant thought he saw the answer to the problem. Lt. Jake Schaefer had been laboring on radar gun directors at Frankfort Arsenal in Philadelphia and he saw a logical extension in their use. Thus on a warm August day in 1944 he presented his commanding officer with a four page memorandum and a drawing revealing his thinking on a "guided projectile." It would use a radar and a computer to track planes just as radar controlled guns had. But, the new wrinkle was the addition of a radar controlled missile which could be guided in the air. It sounded simple. But, there were many drawbacks. For example, no one was quite certain how an airborne body could be controlled once it exceeded the speed of sound as Schaefer's projectile would have to do if it was to overtake and destroy fast, maneuvering aircraft.

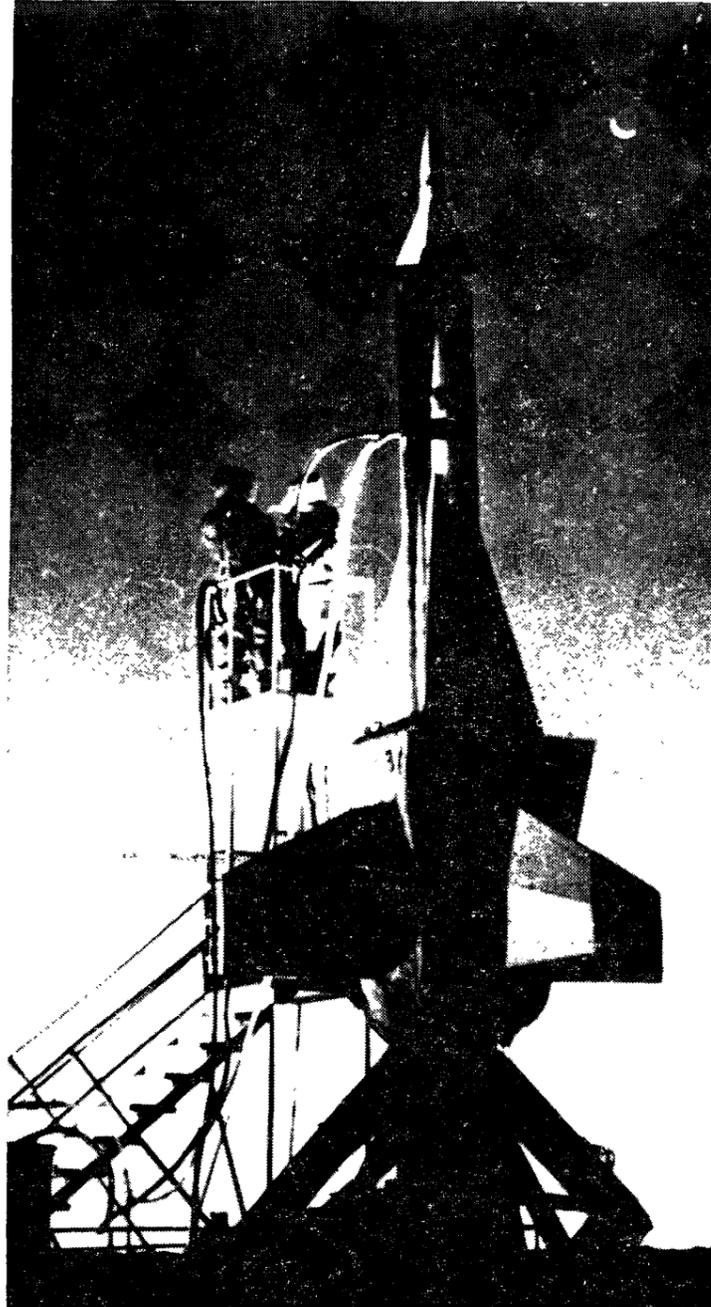
Design Started 1945

On Jan. 26, 1945 the Army Ordnance Corps decided to find out if the problems could be overcome. Bell Telephone Laboratories, through the Western Electric Co., was given a contract to design the system which was named Nike for the Greek goddess of victory.

From there it was a matter of hard work, heart-breaking failures and high hopes until the slender bird that could stalk its prey in the air was sent out to relieve the guard ten years ago.

Just as the Nike Ajax ushered in a new era in air defense, it too was soon to be replaced by a bigger and more potent weapon. This was its lusty new brother, the Nike Hercules, which by mid-1958 was replacing the Ajax as

(See NIKE DEFENSE on Page 5)



THE AWKWARD AGE—"Nobody knew how to build a supersonic guided missile," one of the early developers of the Nike systems said, "so we set out to find the way." Some of the early attempts looked like this. While a quarter moon hangs in the desert sky at White Sands Missile Range, N.M., technicians mount a scaffold to fuel an early version of the Nike Ajax. This particular missile had four booster engines. Later these were reduced to one engine which appeared on the tactical version of the missile. The box-like launcher enclosed the missile up to the nose fins. For a picture of the missile in flight see page 3.

Army Association Triples Membership In '64 Drive

Like a good day on the stock exchange, the membership closed "up" at the end of the annual drive for new members by the Tennessee Valley Chapter, Association of the United States Army at Redstone Arsenal.

In fact, the membership more than tripled. Maj. Gen. John G. Zierdt, Commanding General of the Army Missile Command, said:

"We now have a total of 3132 members in the AUSA and I think this fact indicates that a real fine job was done by the Missile Command. I think you all know how I feel about the AUSA and though our membership campaign, as such, is over I still think people ought to be encouraged to join."

"I am happy at the results and I want to thank everyone who worked on the drive for doing such a splendid job."

A. A. Stewart, the executive

chairman for the drive this year said it was conducted with the same format that has proved so successful with the United Givers Fund drives in the past. "I personally feel that the drive has been a success," Stewart said.

The comment of the membership chairman for the Tennessee Valley Chapter, John A. Muller, was in accord with those from the Missile Command. "The portion of the drive conducted at the Arsenal was a tremendous success," he said.

"Response was excellent and memberships tripled at the Army Missile Command and at the Ordnance Guided Missile School," Muller praised. "Outside response wasn't as good as we hoped for," he said, "but the drive is continuing downtown with several merchants and commercial organizations

(See AUSA on Page 4)

Contracting Consolidates In Defense

Secretary of Defense Robert S. McNamara announced Friday that the management for the consolidation of field contract administration offices of the military department and defense supply agency would be assigned to the Defense Supply Agency.

Consolidation of these offices is a result of a study known as Project 60, initiated in August, 1962, to examine the organization and procedures of these groups for supervising the performance of contracts after they had been awarded. Implementation of the organizational changes resulting from the study will take place over the next two years.

As a result of its new assignment DSA will have a parallel mission of supply and logistics and contract administration services. Military and civilian personnel now performing contract administration functions in the military department will be transferred to DSA for its new mission.

A savings in manpower of approximately 10 per cent, with attendant reduction in overhead cost is expected from the reorganization.

Of equal significance to industry will be simplified procedures and a reduction in the number of Defense Department activities dealing with contracts.

A national planning group will be established under the Director, DSA, to develop a plan for consolidating the more than 150 affected contract administration services offices, employing in excess of 20,000 people, into a common support service to all departments of defense and National Aeronautics and Space Administration procurement offices.

The services to be provided by this organization consist of such functions as inspection and acceptance of material, accounting for government property, security clearance of contractor facilities and personnel to handle classified information, and payment of contractors.

The plant representatives of the Army, Navy and Air Force who are situated at key plants produce (See CONTRACTING on Page 4)

PLANES-PHONES

Bell Telephone Laboratories was chosen as the development contractor for the Nike System and Douglas Aircraft Co. became the missile airframe sub-contractor.

Brig. Gen. H. N. Toftoy, then head of the Army's missile program, observed one day while acting as chairman of a classified presentation on Nike before the Institute of Aeronautical Sciences:

"It is interesting to note that the success of the project under these conditions was made possible by the rapid communications and transportation provided by the peacetime products of two concerns—the telephone and the airplane."

Redstone Arsenal where Nike project headquarters are located.

Nike has come a long way since that chill November day in 1951. The latest version, the fourth generation of the famous family, is being developed to destroy not 700 mile per hour airplanes but 17,000 mile per hour intercontinental ballistic missiles.

The first generation Nike system—called the Nike Ajax—became operational on Memorial Day, 1954. It was placed at Ft. Meade, Md., to protect the Washington-Baltimore area.

Today Nike systems protect most of the major cities in the United States as a part of the North American Air Defense Command (NORAD). Still other Nike sites are in operation overseas,

Washington Announces Hourly Pay Increases

An increase in pay rates for Federal Wage Board (hourly) employees in the Huntsville area was announced today by the Army-Air Force Wage Board in Washington.

The rate increases range from about five to seven cents an hour, depending on the employee's position, and will go into effect on June 21.

About 1,500 employees of the Missile Command and Ordnance Guided Missile School here will be affected by the increase.

The new rates resulted from the recent wage survey conducted in the Huntsville area by the Army-Air Force Wage Board.

The Redstone Rocket

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Rocket Ruminations

"Aggressive fighting for the right is the greatest sport in the world."
—Theodore Roosevelt

Happy Birthday

It is an honor and a pleasure to extend greetings and best wishes for continued success on the occasion of the 189th anniversary of the United States Army this 14 June 1964.

For nearly two centuries of continuous service to the Nation, the Army's hallmark has been the successful achievement of every undertaking, whether the effort has been in peaceful pursuits or in the traditional role of prompt and sustained combat on land. From the frontiers of the wilderness to the frontiers of space, the Army has played a major role in the growth of our country and the preservation of our liberties.

Today, the defense of freedom is a global task demanding the highest professional standards of readiness and the resolute determination to resist any aggression whether on the ground or through the skies. As we celebrate our anniversary, let us remember with pride the legacy of our past and rededicate ourselves to the service of our country.

EARLE G. WHEELER
General, United States Army
Chief of Staff

Nike: Symbol Of New Army

In this issue of The Redstone Rocket are photographs and features that attempt to tell the story of the Nike family of Army air defense weapons from beginning to now.

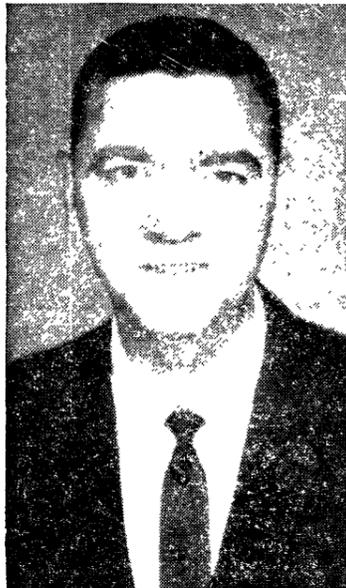
Unfortunately, neither the hardware stories nor the photographs can ever accurately tell the complete story of the Nike family. Words nor a camera can record the millions of manhours conscientiously contributed to the Nike programs by the men and women engaged in missile work at Redstone Arsenal.

There have been headaches and heartaches, long hours and lost week ends contributed to the research, development, procurement, production, supply, maintenance and miscellaneous support required for the success of the Nike systems.

In fact, not many persons who have been at Redstone any length of time could inventory present and past jobs without recalling being connected with one or more of the Nikes.

It is by no accident that this issue of the Rocket also marks the Army's 189th birthday June 14. Nike in many ways symbolizes the new face of the 189-year-old Army.

Nike, from Ajax to the ICBM killer Nike-X, represents the kind of work Redstone people are capable of doing. Before one project is finished a more challenging one is coming along and all hands are eagerly wanting to help.



HERCULES MANAGER — E. L. Smock is the acting Nike Hercules Project Manager. His experience in missile-type weapons dates back further than the Nike itself. In 1944 Smock was involved with remote controlled drones, aircraft and bombs. He has worked on the Terrier missile and been a technical advisor to NATO for the production of the Hawk missile overseas.



THEY GUIDED THE NIKES—As the years passed Nike took on greater responsibilities and achieved greater successes—and so did the Army officers who were in charge of building the systems. Here, standing in front of a display of Nike Ajax, Nike Hercules and Nike Zeus, are Col. John G. Zierdt who headed the Army Rocket and Guided Missile Agency and Col. Glenn Crane, Deputy Commander for Ballistic Missile Defense. Maj. Gen. Zierdt is now Commanding General of the Army Missile Command and Col. Crane is Chief of the Nike-X Pacific Field Office on Kwajalein Island in the Pacific.



COL. JOHN G. HIGGINS
Post Surgeon

Post Hospital Has New Surgeon

The new Post Surgeon at the Army Missile Command began his career as a flight surgeon during World War II.

He is Col. John G. Higgins who came to Redstone Arsenal from Sandia Base Army Hospital at Albuquerque, New Mexico.

Col. Higgins replaces Col. Harry C. McClain who retired at the end of May after more than 20 years of Army service.

The newly assigned Post Surgeon was in the China-Burma-India theater during World War II, a flight surgeon in the Army Air Force. After the war he elected to specialize in psychiatry and when given his choice between Army and Air Force commissions, Col. Higgins chose the Army.

He is a native of Pennsylvania who was reared in Jersey City, N.J. After graduation from high school, he studied biology at New



NIKE-X MANAGERS—Col. I. O. Drewry, left, Project Manager for the Army's new Nike-X ballistic missile defense system runs one of the Army's biggest programs. With his deputy, Col. R. B. Braid, right, he manages the expenditure of about a million dollars a day in Nike-X development funds. From his office at Redstone Arsenal Col. Drewry is responsible for development and test activities that stretch nearly half way around the world from Ascension Island in the Atlantic to Kwajalein Island in the Pacific.

York University, New York City, and received his A.B. Degree in 1937. In 1938 he enrolled in the Loyola University School of Medicine at Chicago, Ill. and earned his M.D. degree from there in 1942. Soon after, the Army commissioned him as a first lieutenant. Col. Higgins has served in Army hospitals at such widely separated places as Panama and Walla Walla, Wash., at Fitzsimons Hospital in Denver, Colo. and at Ft. Rucker, Ala., the Army Aviation Center. From 1953-1962, the Colonel was at Brooke Army Hospital at San Antonio, Texas. At Sandia Base, Col. Higgins was

chief of Professional Services. The colonel expects his wife and their children, Alice, 13, and Robert, 16 to join him at Redstone Arsenal about June 30. They stayed in New Mexico until the school year ended.

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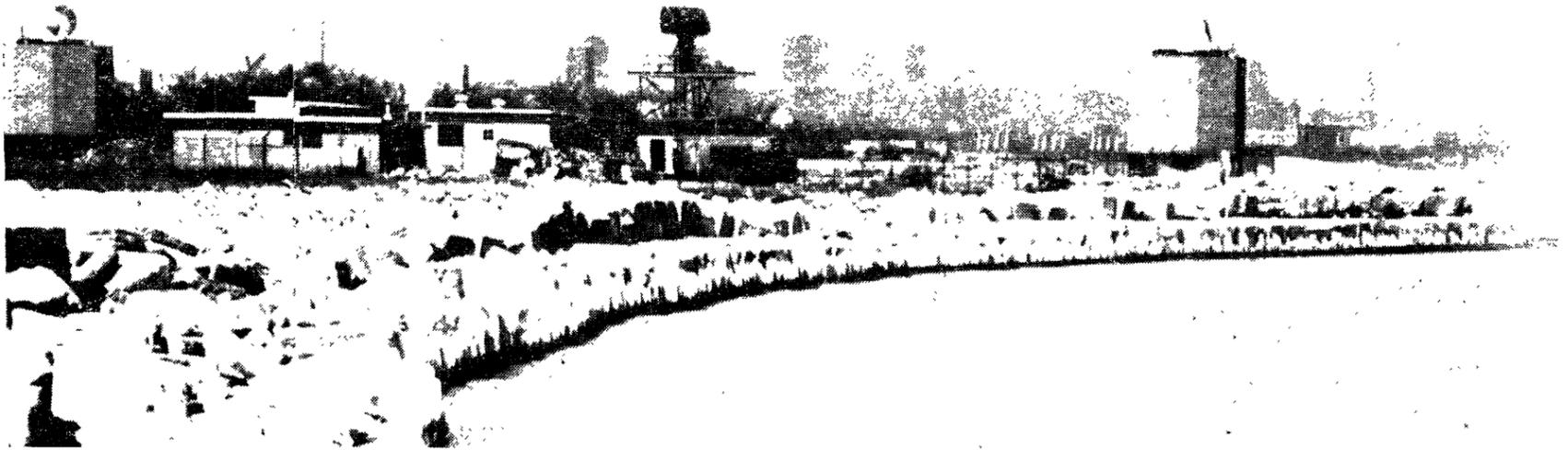
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NIKE ON SITE—One of the first Nike Ajax sites was built on the shores of Lake Michigan to protect the Chicago area. Here the sky line of the Windy City provides a backdrop for this site. Now, less than a decade later, Nike Hercules sites protect major cities throughout the United States. The Army Missile Command has a vital role in supporting not only these sites in the continental United States but also others scattered throughout the Free World. Shown here are the elevated missile and target tracking radars flanking the oblong acquisition radar, also elevated. Barely visible to the right center in the background are the erected Nike Ajax missiles.

The Redstone Rocket —
June 10, 1964 Page 3

SUN, SAND, PILE OF ROCKS FIGURED IN NIKE HISTORY

Developers Roughed It, Carved Missiles Of Wood

If you've never driven up the Desert Road to White Sands Missile Range on a chilly blue morning when the sun is just rising over the Sacramento Mountains and sparkling off the snow on Organ Peak you've missed a beautiful sight.

Coyotes and roadrunners scurry through the low-lying mesquite and eagles perch on the roadside telephone poles. Off to the right, in the direction of the Army's McGregor Range, missile vapor trails and the blossom-like burst patterns of their warheads are often traced against the light blue sky of a desert morning. Later the blue turns to white hot.

The Desert Road winds 40 miles around stark, needle-sharp mountains up from El Paso. For a great part of its way the road threads between small arms and artillery firing ranges operated by the Army artillery center at Fort Bliss on the edge of El Paso. Signs along the way caution the traveler in both Spanish and English that very live ammunition is used on these ranges.

Rutted Road

The Desert Road was hardly more than a pair of rutted tracks back in 1946 when the first bits and pieces of a new missile system called Nike were being put together. While World War II "ack-ack" guns were being fired on Dona Ana Range beside the Desert Road, 20 miles further north at

White Sands their successor, the Free World's first air defense missile system, was being born to the sound of thundering rocket motors. "Ack-ack" was changing to "acq-track" (Radar Acquisition and Tracking).

The Nike shared the range with another curious missile originally known as the V-2. Working with this corpulent bird was a group of better than 100 German engineers and scientists who had just recently come from a missile test area of a different kind called Peenemunde.

Today White Sands is picturesque. Trees line the streets around its administration buildings and laboratories. Mountain peaks that are capped with snow most of the winter rise almost straight up from the main street. With the mountains to his back a person can look down a broad desert valley stretching as far as the eye can see. The valley is dotted with radars, missile launching pads, telemetry towers and other strange accouterments of this landlocked sea of sand where the missile age was born in America. Carved in the solid rock sides of the mountains are static test stands capable of holding down huge rocket motors during test firings.

Slept On Cots

White Sands in the early days of the Nikes "was a hole," according to one early pioneer in the program. Where multi-story masonry buildings stand today the Nike developers worked in temporary wooden buildings. If they stayed at the Sands — and many did, leaving their families behind — they slept on cots and found inches of sand covering everything if someone forgot to close a window. Some lived on nearby cattle ranches and found them unlike anything on "Gunsmoke."

If the desert sand and sun were a nuisance to personnel, they could play havoc with delicate equipment. The Nike trailers, though they were tightly built, had to be vacuum cleaned almost daily. Radar specialists were the victims of a particularly cruel hoax played by the hot New Mexico sun. In the morning their tracking radars worked fine. But as the day grew on they began to gradually lose accuracy.

The problem was finally tracked to the massive tuning fork shaped castings that supported the radar

antenna. The sun on one side of the fork caused it to expand enough to tilt the antenna out of adjustment. Later sun shields were installed.

"Our job at that time was to marry radars and computers," one developer explained. In addition, there was the problem of building a missile crammed with explosives, propellant, and electronic gear which could be guided at supersonic speeds and still remain glued together. If the development of radars and computers was not new, the development of such a missile was new enough to be revolutionary.

And, out of those early days came some of the strangest tales of the entire Nike development program.

Super Zoomer

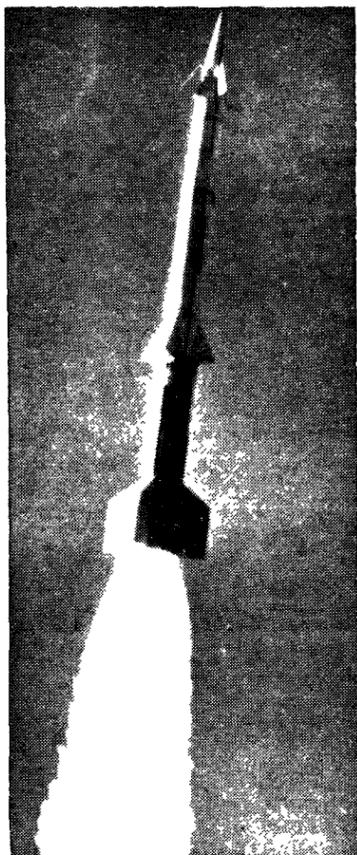
First off, the missile did not start life as the Nike Ajax, or even the Nike anything. Instead, early reports gave it the highly descriptive name of "super zoomer." A Pentagon official with a flair for mythology gave it the name Nike in honor of the Greek Goddess of

Victory.

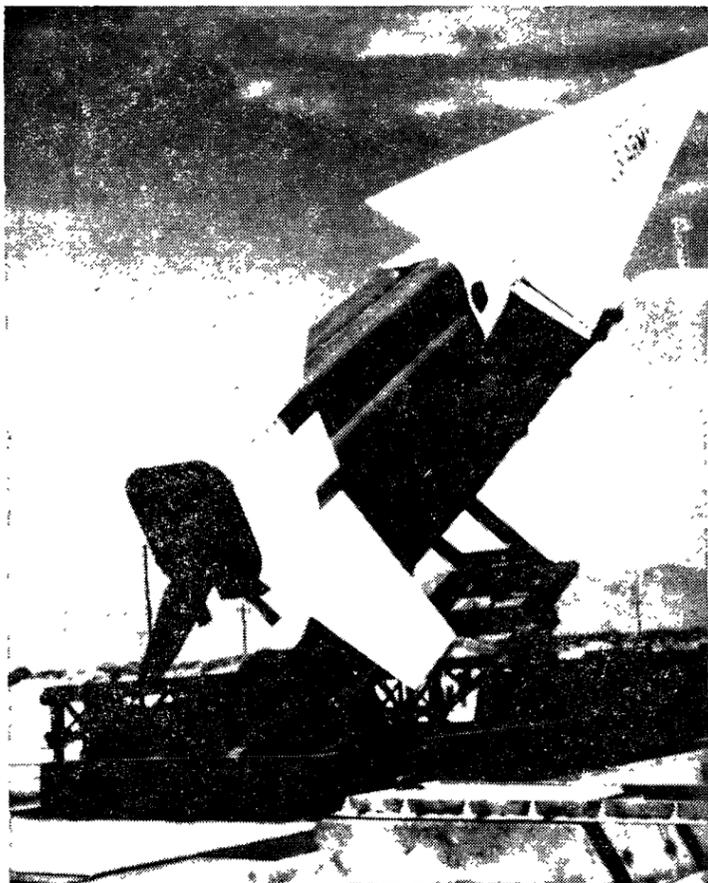
The first Nikes were made of solid mahogany. From the bottom of the sustainer to the tip of the nose the body was made of highly finished wood. "We sat on the edge of our seats for years," one official said, "waiting for someone to ask; why mahogany? The answer was simple. Those Nikes were built during the closing days of the war and government priorities had most other suitable materials tied up. For some reason there was no priority on mahogany and it could be obtained quickly. We saved two months by spending an extra \$50."

The celebrated mahogany missiles were fired to altitudes in excess of 100,000 feet at supersonic speeds.

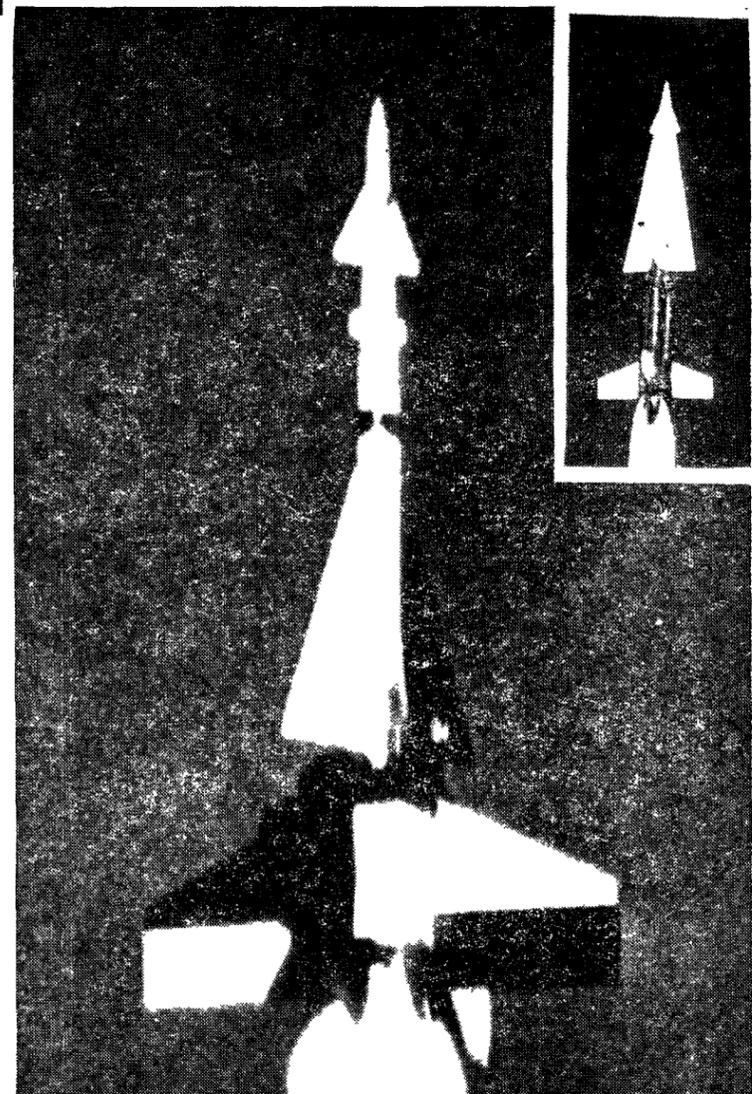
Once a missile was fired search parties loaded into jeeps and weapons carriers and headed up range to look for pieces. Often they found the bird was buried its full length, some 21 feet, in the sand. The mahogany missiles left a big "X" mark in the desert. "The X is (See SUN & SAND on Page 4)



ZEUS — The Zeus missile, developed under the supervision of the Army at Redstone Arsenal, became the first missile in the Free World to intercept an ICBM boosted target.



THE CHALLENGER—This is the Nike Hercules, the missile that stands guard for the Army around the world. Weighing five tons and armed with a nuclear warhead, it is capable of destroying squadrons of aircraft. The Nike Hercules Project Office at Redstone is responsible for supporting the Hercules system and supervising new developments.



THE VERY OLD AND THE NEW—An early experimental model of the Nike Ajax missile that was flown at White Sands Missile Range in the late 40's is shown here just after liftoff. Inset shows the Nike Hercules missile, latest of the anti-aircraft Nikes. Though years and several new designs came between the two there are still some close similarities.

SUN, SAND

(Continued From Page 3)

very easy to spot from air," one mathematician who doubled as a wreckage hunter noted.

The mahogany missiles were unguided. Later, however, the electronics were added to the bird and except for huge fins on the booster it began to look like the Nike Ajax we know today.

Cheap Target

With guidance came the necessity for targets to pit the missile against. One of the first was a POR target; "the cheapest we ever built," according to a Bell Telephone Laboratories engineer. POR stood for "Pile Of Rocks."

The rockpile was located 17 miles up the desert from the Nike launching site. Five engineers spent an afternoon building it "from materials at hand."

Later a camera was installed at the target to record the terminal flight of the missile and its impact. The camera was designated on maps of the test area as the "IPOR Camera Site." IPOR stood for "Instrumentation Pile of Rocks."

The first shot at the POR target missed it by only 100 feet.

Part of the accuracy of the early Nike system could be attributed to the care with which its radars were zeroed in. Often stars, particularly Polaris or the North Star, were used to align the radars. At the range and accuracy which the Nike was being developed to meet, a radar error of so much as a few lengths of a degree could mean the difference between an intercept and clean miss.

So some of the country's top talent was put to shooting the stars with Nike radars. One was C. W. Tombaugh, a noted astronomer and discoverer of the planet Pluto.

The whole tapestry of the Nike development program was shot through with glittering threads of talent and imaginativeness. Of the 14 members who made up the original Project Nike at Bell Telephone Laboratories, one became president of the vast Thompson Ramo - Woodridge Engineering Company, two became vice presidents of American Telephone and Telegraph Co., and two others became vice presidents of the Laboratories. Two others became Laboratories directors.

First Intercept

The first intercept of an airplane by a Nike missile using a live warhead occurred on April 10, 1952 and for the occasion "White Sands Missile Range was loaded with brass" an observer recalls. Another remembers that among the "brass" were Army and Air Force Chiefs of Staff.

A drone B-17 was brought down from Holloman Air Force Base and set to flying on an oval "race track" course 10 miles long and 2 miles across. On the turns the plane went through a 3 G maneuver to test the Nike against maneuvering targets.

A turn was selected which would bring the intercept in full view of the visiting officials. There were a few minor holds while little malfunctions were corrected. Finally all lights went green on the fire control panel and as the drone entered the turn the fire switch was flipped.

The following scene was too much for men with weak hearts or excitable ulcers.

The missile left the launcher in what appeared to be a perfect lift-off. Then, at the end of the boost stage, it blew itself to bits while the unscratched drone flew on as haughty as a dowager who had been approached by a panhandler.

Second Missile

Fortunately, the firing crew was playing a hedged bet. Another Nike was sitting on the launcher to backup the first one. The target was brought around, lights went green and the firing command was flashed. This time the B-17 literally disintegrated in mid-air from an almost direct hit. The Nike warhead broke the drone in two just behind the wing and the engines broke away from the spinning wings.

The point had been proven—a guided missile could be built which would kill maneuvering, high speed aircraft. Two years remained before the Nike system was declared operational, on-site and on guard.

Numerous other intercepts were made in the following two years while the bugs were ironed out, various improvements were made to the system and the rough R&D models were smoothed out and streamlined for troop use.

And, in the Army a brand new title was born—"Missileman."

AUSA

(Continued From Page 1)

who have not reached their goals."

Muller said that total memberships have passed the 3700 mark. "We had two big objectives in the drive," Muller said. "We hoped to at least triple the membership and we hope to foster in the area a greater understanding of the Army and its needs."

The Association of the United States Army is a voluntary, educational organization of American citizens who manifest an interest in a strong Army to advance the

security of the country.

Word from the Commandant of the Ordnance Guided Missile School is that Col. William J. Macpherson is highly gratified. He said, "The number of members at the Missile School tripled and I hope that the insurance offered by AUSA will act as a continuing stimulus."

The annual meeting of the members and election of new officers will be at the Squirrel Hill Officers Club June 30. John Hatch is now the president.

March 11, 1941—Congress passed the Lend-Lease Act.

CONTRACTING

(Continued From Page 1)

ing major weapons systems are not involved in the consolidation. They will continue to report to their respective military departments. Other offices not affected by the consolidation are such specialized groups as the Army Corps of Engineers, Navy Bureau of Yards and Docks and Navy supervisors of ship building.

Aug. 25, 1916—National Park Service established as part of the Department of Interior.

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NIKE DEFENSE

(Continued From Page 1)

fast as equipment became available. The Ajax weighed a ton at liftoff—the Hercules five times that. Ajax had a range of some 25 miles—Hercules was designed with a range many times that. Today all Nike sites are armed with the big Hercules missiles capable of hurling aloft either a massive high explosive warhead or a deadly nuclear device.

Now, instead of three radars found in the early systems there are six from which possible combinations can be made for specialized purposes; one of them being one of the most powerful tactical missile radars ever built.

And, in a series of tests, the Nike Hercules has knocked down ballistic missiles in flight. The significance of this last feat is not to be overlooked.

Rockets may well be the prime bombardment weapons of a future war.

ICBM New Threat

If by 1945 jet airplanes were giving air defense planners ulcers, by a decade later another weapon had compounded their problems. This was the long range, city-killing ICBM. The answer to the ICBM was sought in the Nike systems and their effective command guidance principle. The outgrowth of the search for a weapon to defend against ICBMs was the Nike Zeus anti-missile missile system. Development work on this system began in earnest in 1957.

For it were designed radars much more powerful and accurate than ever designed for a missile system before. The three-cornered transmitter element of the Nike Zeus acquisition radar alone measured 80 feet on a side. From it radiated power measured in millions of watts. The receiver element of this radar was housed in a radome some 100 feet in diameter. Replacing tubes in the electronic portions of the system were startling new devices called transistors. And, its tracking radars made use of something hardly anyone had ever heard of called a MASER, an acronym for "micro-wave amplification by stimulated emission of radiation."

Zeus Missile

The Nike Zeus was designed to intercept ICBM warheads during the terminal or final portion of their trajectory. The 42-foot Zeus missile was built to operate even outside the Earth's atmosphere. Once an ICBM target was detected the Nike Zeus system went into completely automatic operation, relying on a computer that could make some 233,000 calculations per second.

Like the earlier Nike systems, the Nike Zeus used the same basic arrangement of a target acquisition radar, a target tracking radar and a missile tracking radar. A computer used data received from the radars to calculate guidance instructions for the interceptor missile. For ICBM intercepts a fourth radar was added. This was the discrimination radar, designed to sort out live warheads from any accompanying "decoys." Decoys are fragments of booster tanks or even specially designed objects made to look like warheads for the purpose of confusing the defense.

When the Army began testing the Hercules missile at White Sands Missile Range it had to move the backwall of that shooting gallery out to 140 miles. But to test the Zeus called for even greater ranges—intercontinental ranges to be exact. Two large islands on nearly opposite sides of the world in addition to White Sands were equipped as Nike Zeus testing sites. One was Ascension Island roughly midway between South America and Africa. The other was Kwajalein Island, a palm dotted, 700 acre bush of coral 2,000 miles southwest of Hawaii.

Both were chosen because they were just about 12,000 miles away from the big missile launching sites on the east and west coasts of the United States.

Intercept

Just after dark on the night of July 19, 1962, a Zeus reared from its launching coil on Kwajalein, its fiery plume reflecting momentarily in the lagoon and the thunder from its booster shaking coconuts from nearby trees.

The target which presented itself in the Zeus was a special test

ICBM nosecone launched by a Titan I booster barely 30 minutes earlier at Vandenberg Air Force Base, 5000 miles away on the coast of California.

The test was a success. For the first time in the Free World an ICBM had been intercepted by another missile while in flight and traveling a true ICBM path. Since that time a number of other successful intercepts have been announced.

The Nike Zeus System approach was good. But, once again Nike was in for a change. The fourth member of the Nike family—Nike-X—was launched officially on Jan. 5, 1963, because, in so many words, technology had reached the point where it was possible to build a better missile defense system.

The Nike Zeus system became the first Nike to not go operational. Science caught and passed it before it reached the operational state.

Nike-X

Nike-X might be called the freak in the family, in regard to looks at least. One radar called a multi-function array radar, or MAR for short, is being developed to do the work of three. And, in ad-

dition, a new interceptor missile called Sprint will be the fastest guided missile ever built by the Army.

The old Nike Zeus test areas are still in use for testing new techniques and components for the Nike-X System. And, the Zeus missile will be retained as one of two interceptors in the system.

The Nike-X MAR will be a radar with few moving parts as opposed to conventional radars which rely on moving antennas for beam direction. Instead, the MAR radar beam is moved electronically, making it far faster than mechanical systems.

Two of these type radars—the second one called the Missile Site Radar or MSR—will be used in the system. Instead of being vulnerable, above-ground radars they will be housed in squat, concrete structures with large ports in their sides for the radar to "look through."

The first test version of the MAR is now nearly completed at White Sands.

Highly Advanced

Like the Nike Zeus, the Nike-X is being designed to protect cities (See NIKE DEFENSE on Page 16)



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Nike Replaced Big Guns In Atomic Age Warfare

Was First Missile To Protect Cities

When the atomic dust drifted away from Hiroshima and Nagasaki, the message written in the devastation below was clear: a new weapon was needed to combat high-performance aircraft. A single bomb could now destroy an entire city.

Mere attrition of attacking aircraft was no longer enough. Attackers must now be denied penetration even of one lone aircraft in the air-space over a target area.

It was nearly a decade before the first effective response to the new threat came into being. That was on May 30, 1954, when the United States Army placed into operation on 24-hour alert its first Nike Ajax guided missile unit.

Nike Ajax was the first guided missile to protect American cities against air attack.

From the outset, the Nike project had some specific objectives. Nike would have these characteristics:

- Supersonic speed and rocket power free of dependence on this atmosphere for its supply of oxygen.
- Ground-based guidance equipment which would not be expended each time a missile was fired.
- A warhead of sufficient power to destroy its target without scoring a direct hit.
- Self-sufficient capabilities for covering the range of the air battle, if necessary, from detection through destruction of enemy targets.
- An open-end design—that is, a system capable of accommodating improvements economically with the least obsolescence of existing components.

All of those concepts were realized when Nike emerged to take up defense sites.

In general, the assignment of producing the Nike was carried out on two fronts—Douglas Aircraft Company being responsible for the design and development of the missile and its handling equipment, and Bell Laboratories devising the computer, radar, and electronic components, and the intricate "brain" of the guidance system.

It took some more doing before all the components could be joined in an effective package system, which included an assembly of more than 1½ million parts. But developments were spurred on by the news in the fall of 1949 that an atomic device had been exploded inside the Soviet Union. Nike was placed on a high priority basis.

The Army's confidence in the successful development of Nike never swerved, but at one time it appeared that Navy time scales would lead to production of the Terrier ship-to-air missile before Nike could become available. As a result the Army decided to use Terrier as an interim surface-to-air missile, and Army Ordnance was directed to develop suitable landbased control equipment for the Navy missile.

Before the ground system for Terrier was complete, the Navy's schedules slipped to the point where Nike would be available first. The Army's Terrier ground equipment was turned over to the Marine Corps.

On October 28, 1953, the first "package" of Army troops trained to use the Nike, fired their new anti-air weapon for the first time at Red Canvon Range, one of the Antiaircraft ranges of the Army Air Defense Center located at Fort Bliss, Texas.

In December of 1953, part of that troop unit package moved to temporary missile sites established at Fort George C. Meade, Md., to commence on-site training with other members of the 36th Antiaircraft Artillery Battalion. The 36th AAA Gun Battalion was converted to a missile battalion in January, 1954, and the on-site training began in earnest.

The nationwide force of Army

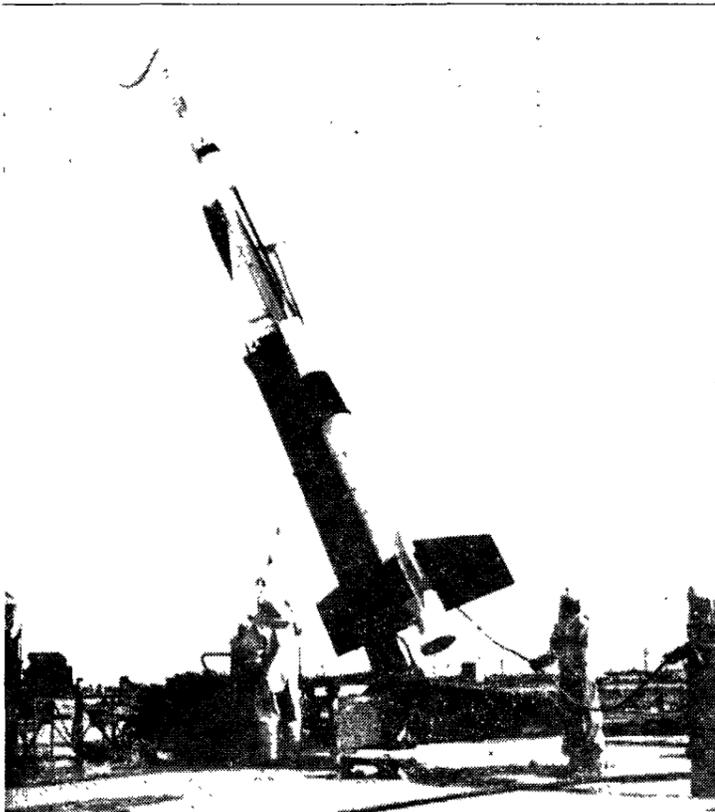
antiaircraft artillery guns—at one time more than 1000 big guns in all—rapidly gave way to the missiles.

On February 26, 1957, with Nike Ajax missiles standing guard in more than 20 defense areas, the

Army announced completion of final tests of the Nike Hercules, the nuclear-capable second generation of the Nike missile family.

A significant development late the same year, on December 5, was the Army's unveiling of its first Missile Master, a semi-automatic electronic system for coordinating the firing of Army missiles, at Fort Meade in the Washington-Baltimore defense.

Although the last of the big 90-millimeter and 120mm antiaircraft guns had been phased out of the defense system more than a year earlier, it was not until June 15, 1960 that the last gun unit, a 75mm, was inactivated.



EARLY NIKE-AJAX—Suited up like spacemen these technicians prepare to fuel up an early development model of the Nike Ajax missile. This picture was taken at White Sands Missile Range, N.M. during the late 1940's when the Nike Ajax was being developed by the Army as the world's first anti-aircraft missile system.

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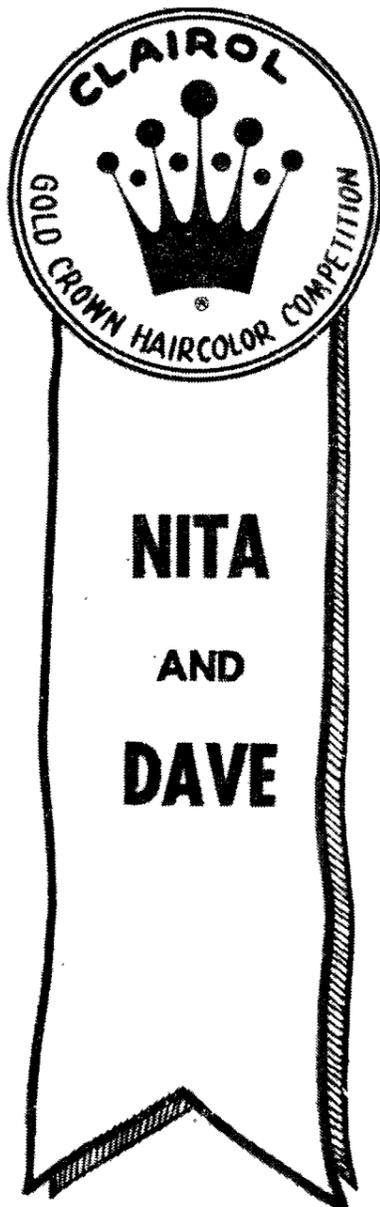
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Nita and Dave were sponsored in this team contest by Karhill of Memphis, both winning trophies. Nita for the lovely style so rightly named "Ruffles," Dave for the popular seasonal color red. The idea of the Clairol Gold Crown competition was conceived to give recognition to the colorist as well as the stylist.

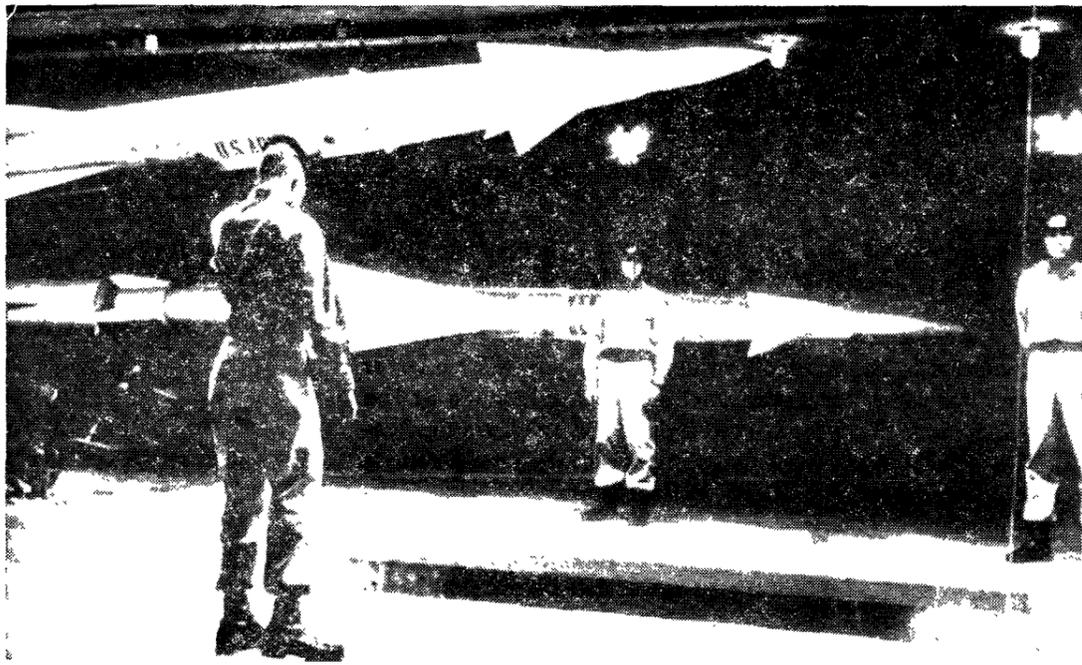
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NEW BREED OF SOLDIER—When this picture was taken at Fort Meade, Md. in the early 50's these three men were members of an elite group of soldiers who were as rare as mule drivers in the Army. Shown with their Nike Ajax missiles are three members of the first Nike battery at Fort Meade. Today missilemen make up a sizeable portion of the Army.

BARGE PARTY PLANNED
 The final meeting for 1963-64 of the North Alabama Section of the American Institute of Chemical Engineers will be a barge party on Saturday, June 13. All members, their wives and friends are invited to attend this annual event. The barge will depart from the Alabama Brick and Tile Dock in Decatur at 2:30 p.m. and will return at 8:00 p.m. The barge party will include an excursion on the Tennessee River, swimming, dancing, refreshments and dinner.

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Engineers To Meet m. tomorrow night at the Southern Cafeteria in the IHC building. The Alabama Society of Professional Engineers will meet at 6 p. Tom Gilbert, newly installed

president, will introduce William B. Farris, Area Secretary of the Tennessee Society of Professional Engineers a retired Naval Commander, who will talk about "Civic Affairs: Its Obligations and Benefits."

AIEE TO MEET

Harold J. Podell, Chief Integrated Systems Development, Brown Engineering Co. will address the American Institute of Industrial Engineers June 15 at Dale's Restaurant.

Podell will speak on "Linear Programs in the Information Sciences." He will present an example of how linear programs are being used in the PRINCE System (Parts Reliability Information Center).

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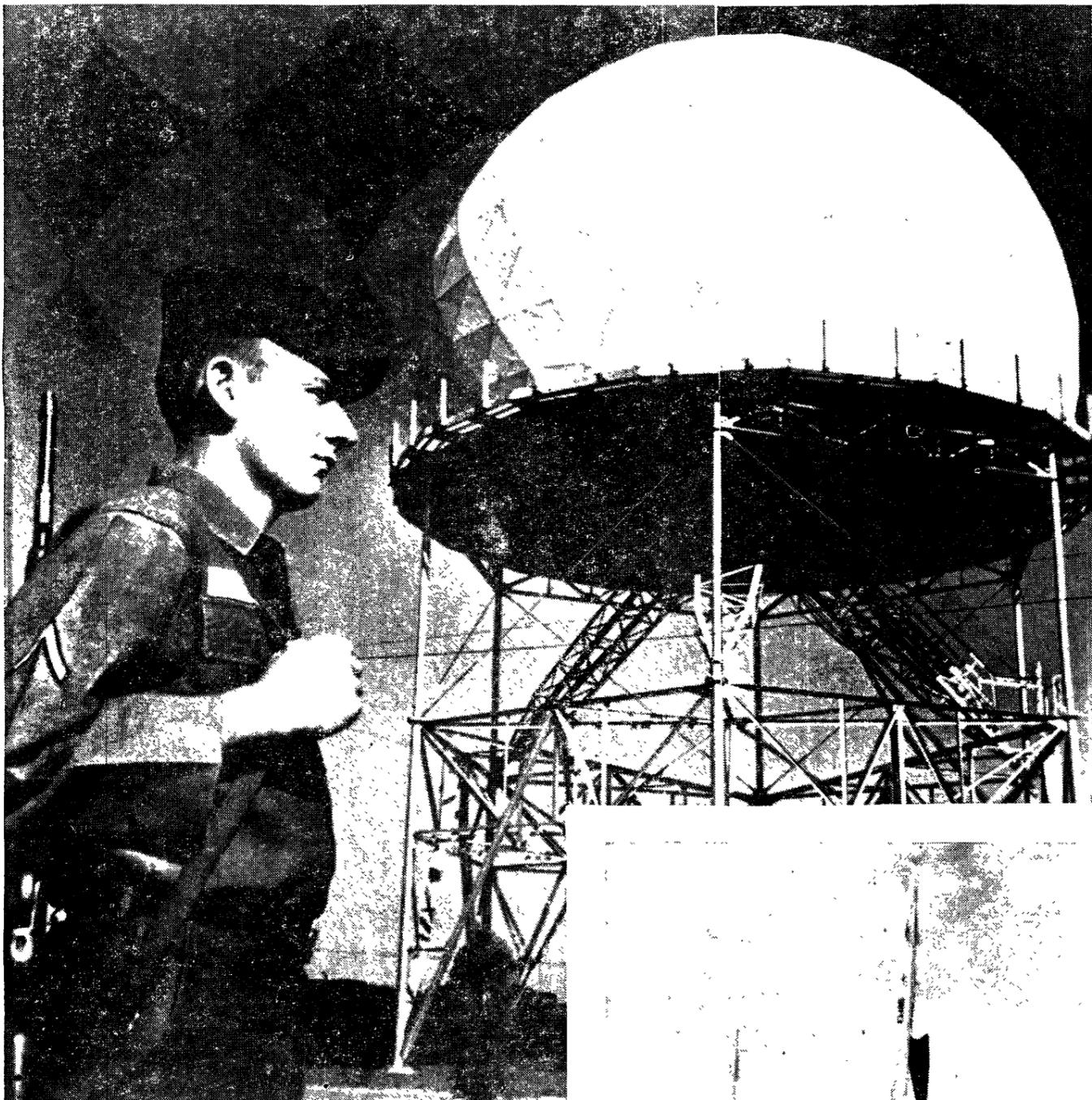
Missilemen USA

At McGregor Range, N. M., where Nike Hercules crews train, the words "hostile target" spoken by a radar operator set off a chain reaction. A siren sounds at the missile launching area, a red light flicks on above the battery commander's head and simultaneously a gong sounds inside the control trailers. Special targets are the "hostile aircraft" fired on at McGregor. So realistic is this training exercise however, that the same procedures would be followed if the target was a Russian bomber and McGregor was New York City.

With precision born of long practice the missile crews perform their individual tasks. Banks of lights in front of the commander tell him when each section is ready to fire—and at the appropriate time he will lift a red protective cover and push a switch, sending a missile aloft.

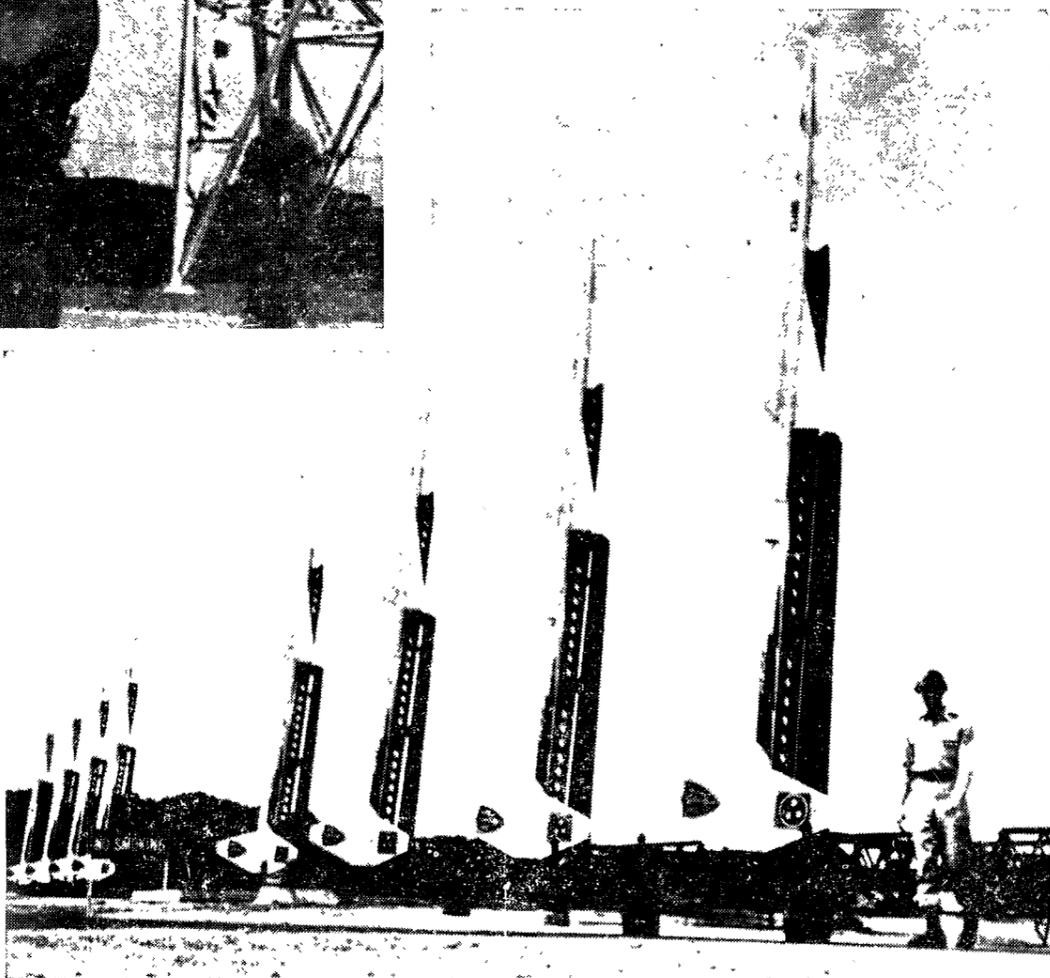
Training such as this makes possible photos like those at right as well as those below of missilemen on site.

BROTHER ACT —
against brother Herc
encounter 15 miles



SHOT DOWN —
controlled B-17
first victim of a
—a Nike Ajax.

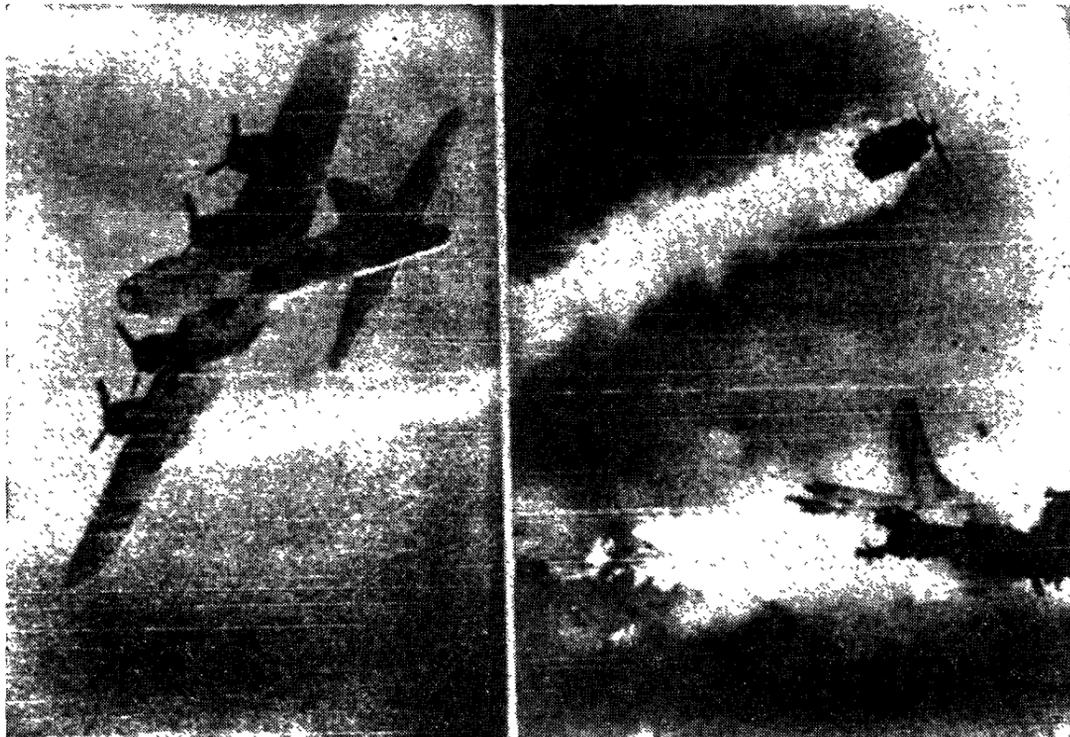
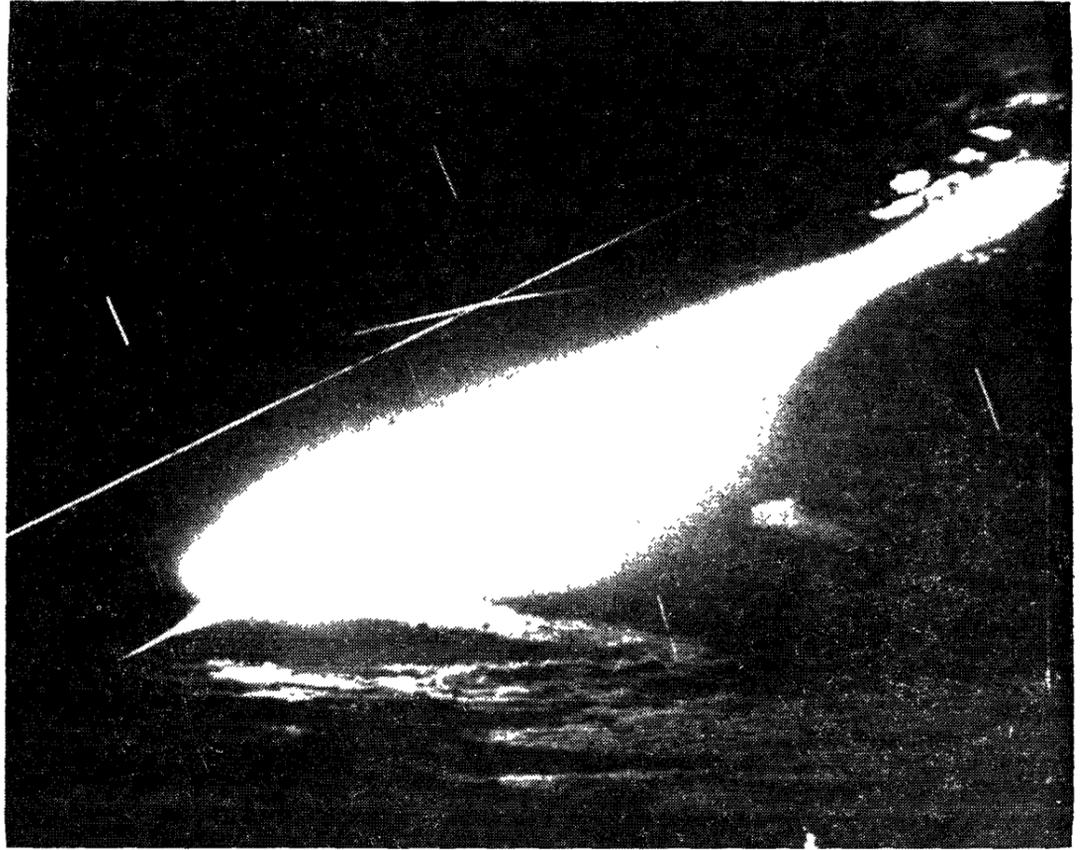
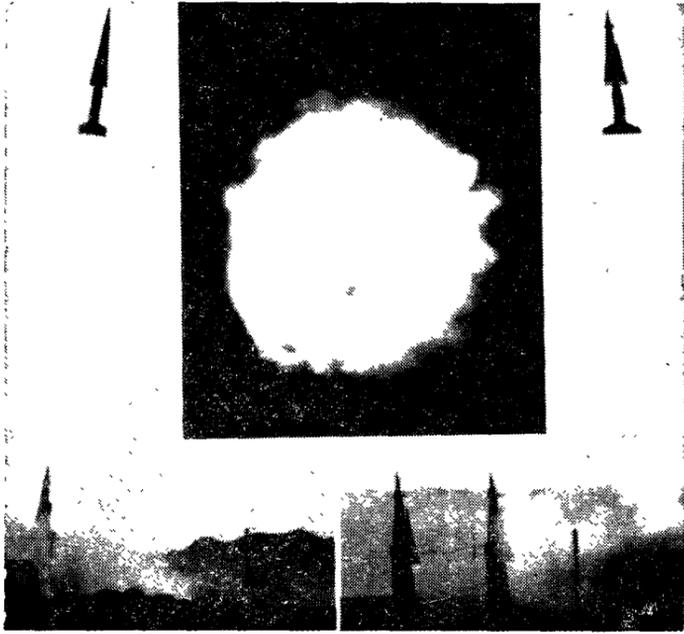
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the Nike Zeus m
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tried on another
Hercules.



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To ICBMs

INTERCEPT!!



HISTORIC INTERCEPT — A lazy "X" in the sky marks the Free World's first intercept of an ICBM-launched target by another missile—the Zeus.

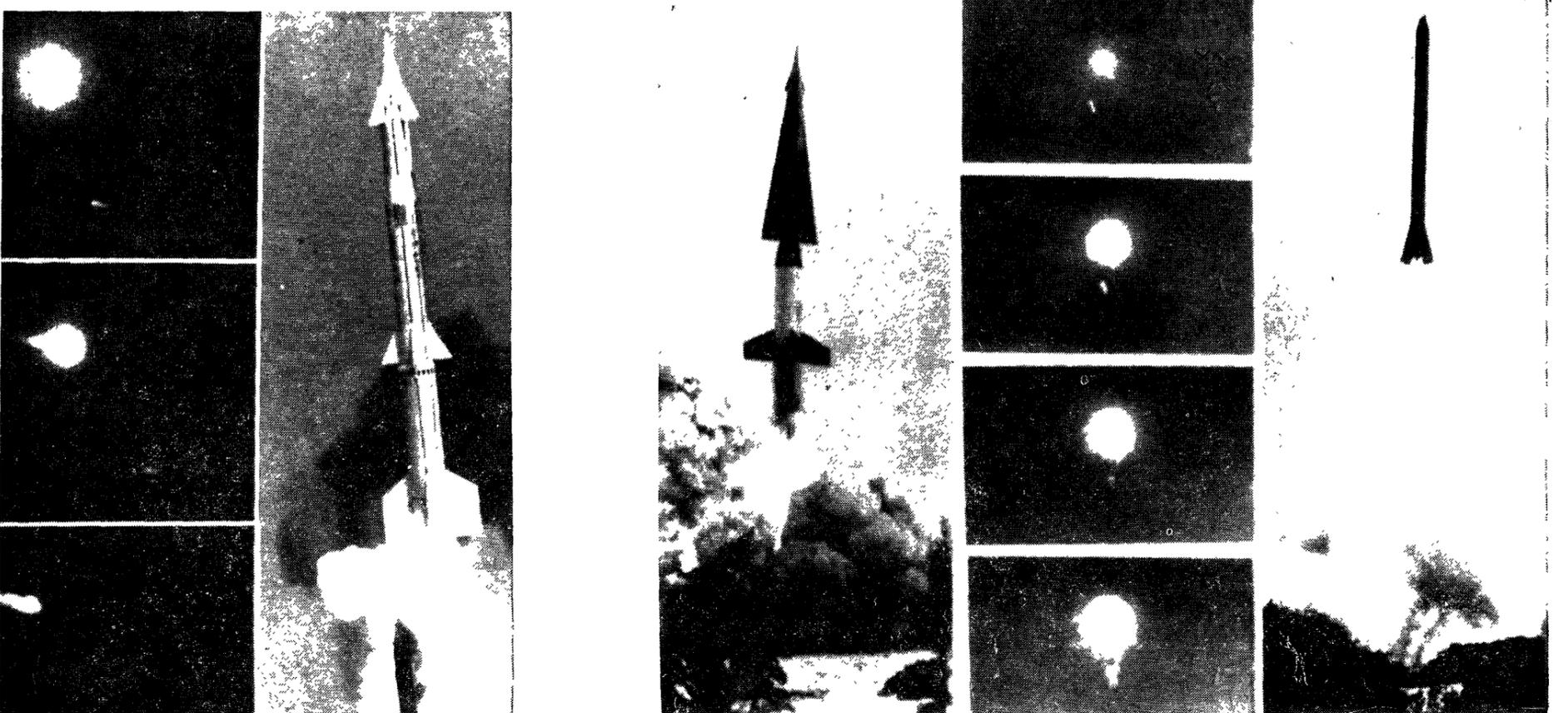
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END OF A NONCOM — Hercules kills a Corporal in a test of the Nike missile against another missile.



Congratulations



NEW MILESTONE REACHED—Two dollar bills fill the fountain at Thiokol's celebration of four million manhours worked without a lost time or disabling accident. Approximately 1,000 employees received \$10 in two-dollar bills and they will receive \$15 if they pass the five million mark without an accident. On hand to help celebrate are: (Front row: (L to R): G. D. Jackson, Travelers Insurance Co.; T. W. Davidson, Army Missile Command; Brig. Gen. H. P. Persons, Army Missile Command; John H. Goodloe, Thiokol Chemical Corporation; Col. W. F. Register, Jr., Army Missile Support Command; Col. E. V. Lau, Army Missile Command. (Back row, L to R): Robert Turpin, First National Bank; Mayor R. B. Searcy; George Spragins, First National Bank; P. L. Moring, Army Missile Command; L. L. Roberts, Marshall Space Flight Center; E. H. Haynes, Army Missile Support Command; J. A. Muller, Army Missile Command; F. W. James, Army Missile Command; and J. F. Harbarger, Manager Safety Department, Thiokol.

Harry Vincent Pioneered Among Nike Missile Men

An engineer who worked side by side with Harry Vincent during the early days of the Nike development program described him as "the smartest man I ever knew." During the early 50's Vincent was chief of all Army's air defense missile projects at Redstone Arsenal, including the Nike Ajax, Hercules and Hawk.

Today he is Director of Projects for the Missile Command's Directorate of Research and Development. A true indication of how far missile technology has come in the past ten years is a comparison of the type of problems Vincent tangled with then and the ones that occupy his mind now.

In 1951, for example, when the missile engineer entered the Nike program a missile that could kill an airplane was not even a proven reality. The first successful test intercept was not to be made until late that year. Transistors, which are used today in everything from missile radars to pocket radios, were still a laboratory novelty. And, in 1951, the Ordnance Corps was just setting up a school at Redstone Arsenal to train soldiers in the maintenance of missile systems.

Today Vincent overseas development work on such advanced equipment as LASERS, phased array radars, so-called "adaptive computers" that are modeled on the human brain, a giant plasma jet that generates heat approaching that of the sun, and radars so accurate they can track a bullet in flight.

And, from a fledgling start in 1951, the Ordnance Guided Missile School has grown to become the third largest educational institution in Alabama with some 37,000 graduates from the United States and 17 foreign countries.

stage loaded with JP-4 (a high grade kerosene) and red fuming nitric acid.

During one early troop firing at White Sands, before procedures were well ironed out, the first—and certainly the last—paint thinner fueled missile was launched. Through a mistake in supply the wrong drum was delivered to the launching area and its contents loaded into the missile. "Later the troops would have been able to catch the mistake instantly by smell, if nothing else," Vincent

Vincent recalls that during the early days of Nike, American troops being introduced to this new weapon after years of firing conventional artillery found some of its demands confusing. Instead of powder, the Nike was propelled by a solid booster and a sustainer



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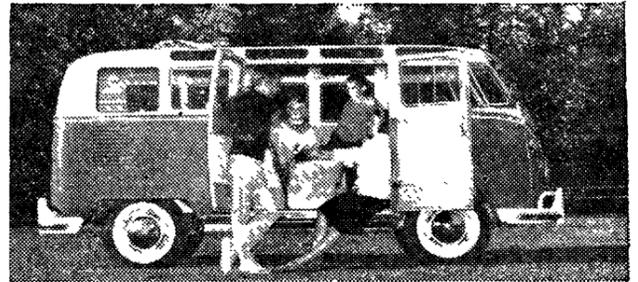
The Ajax performed perfectly while the booster was burning. But, when it came time for the sustainer with its load of thinner to ignite and carry the bird to its target, the best it could manage

was a weak sputter.

The first training crew in many cases proved overly zealous in their attentions to the new system. Major checks and adjustments designed to be pulled monthly—an operation comparable to tighten-

(See VINCENT on Page 11)

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VINCENT

(Continued From Page 10)

ing every bolt on your car— were often done daily, Vincent remembers. Adjustments which were to give a reading on a certain meter of within 10 volts were sometimes made to give a 5 volt accuracy on the theory that the finer adjustment made the system more ac-

curate.

Quite often the first missilemen found from experience better ways to operate the system and maintain it than the engineers who built it had figured out, Vincent admits.

In an effort to straighten out some of the procedures he left Redstone with a group of technicians to sit down with the troops to wring out their problems.

Vincent, who was chairman of the "Fact Finding Committee," recalls the trip as a "crucial point" in the life of the system. No longer was the Nike a laboratory for scientists and engineers where failures were sometimes welcomed because they pointed out the right way to do the job. Instead, in a few months the Nike was to become operational. The troops who were to operate it did not have the advantage of long years of living with the system and knowing its intricate workings almost by second nature as the engineers did.

The procedures had to be prepared in such a manner that a missileman with only a few months of school training on the system could keep the system in top notch operating performance no matter what happened inside its million or so parts.

Today the technical manuals covering the operating and maintenance procedures for the Nike Hercules System contain more than 137,000 pages.

But even the serious task of the fact finding committee had its lighter moments. Vincent recalls that the report of their survey was to be made to Maj. Gen. Mickelson, CG of Ft. Bliss, Brig. Gen. Toftoy who was the head of all Army missile development activities; the Office, Chief of Ordnance; and top officials of Bell Telephone Laboratories which developed Nike.

"The committee stayed in a motel close to Red Canyon, a bowl of lava dust and the part of White Sands Missile Range where the Nike training was being carried out. We worked nights, Saturdays and Sundays. He said, "When the time came to print the final report we found there wasn't a duplicating machine to be found anywhere nearby and no time to locate one. The motel manager was talked into letting us use a mimeograph machine he kept around to print menus and we printed the

whole report in green ink also used for the menus."

Despite the fact that the report was done on a menu duplicator and in a vivid hue, Vincent received a letter saying "well done" from Gen. Toftoy.

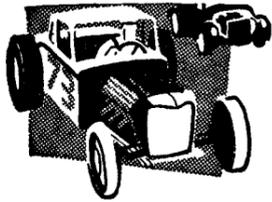
Vincent is a native of Union

City, Tenn., and holds a B. S. degree in electrical engineering from Washington University in St. Louis. Long associated with missiles in one form or another, he came to Redstone Arsenal from the Air Force Long Range Proving Ground at Cocoa, Florida.

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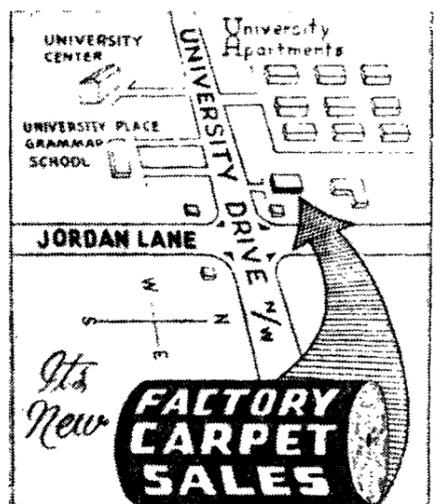
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Reserve Officers Attend Meeting In Portland, Ore.

The National Convention of the Reserve Officers Association will be held in Portland, Ore. on June 10-12.

Those attending from Huntsville are: Lt. Col. John L. Edgar, chapter president; Col. J. V. Klima, Commander, 3367th Logistical Command; Lt. Col. P. E. Redding and Austin Gabel and Capt. Paul Neilsen.

There will be nine officers from different Chapters throughout the State in the Flight Group. Lt. Col.

Loren L. Perdue is president of State of Alabama Department.

The Huntsville Chapter Reserve Officers Association is sponsoring a number of resolutions on National Defense and Security Matters in addition to proposed legislation now before Congress. Lt. Col. Edgar announced there was unanimity in supporting legislation for the ROTC, new Military Pay Increase Formula, and a Four Year Term for the Joint Chiefs of Staff.

A team of three Chaplains will hold Memorial Services during the National Convention, in honor of Pres. John F. Kennedy, Gen. Douglas MacArthur and three former ROA National Presidents, Maj. Gen. deLessups (Chep), Morrison, Brig. Gen. John R. Delafield and

Births At Post Hospital

Stephen Edward Culberson, 7 lbs., 9 ozs., May 28, son of 1/Lt. and Mrs. Henry E. Culberson.

Michael Alan Robinson, 6 lbs., 6 1/2 ozs., May 28, son of Sp4 and Mrs. Richard L. Robinson.

Steven Edmond Bohn, 6 lbs., 1/4 oz., May 29, son of 1/Lt. and Mrs. Henry E. Bohn.

Randall Cassius Monroe, 7 lbs., 5 1/4 ozs., May 29, son of Sp4 and Mrs. Daniel C. Monroe.

June Pugh, 7 lbs. 1 oz., May 29, daughter of A1C and Mrs. Jack W. Pugh.

Robbin Sue Higgenbotham, 7 lbs., 7 3/4 ozs., May 30, daughter of SSGT. and Mrs. Richard E. Higgenbotham.

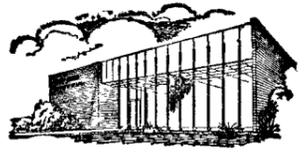
Leonard Holsey Bennett, 7 lbs., 4 ozs., May 30, son of Sp5 and Mrs. Eric L. Bennett.

Brig. Gen. Henry J. Reilly. Lt. Gen. Lewis B. Hershey will be presented the ROA's highest Award. "Hall of Fame" citation.

May 5, 1961—Commander Alan B. Shepard, Jr. was rocketed from Cape Kennedy (formerly Cape Canaveral), Florida, in a Mercury Capsule for the first U. S. manned sub-orbital space flight.

May 14, 1959—A Jupiter IRBM made a successful 1500 mile flight from Cape Kennedy (former Cape Canaveral), Florida, and the Army announced that the weapon was ready for operational use.

Be A Successful Secretary . . . Attend N.A.A.C.



REGISTER NOW FOR SUMMER TERM BEGINNING JUNE 15TH

Beginning and Refresher Classes in Gregg Shorthand, Space, Missile and Engineering Shorthand, Typing, Accounting and Stenograph Machine Shorthand.

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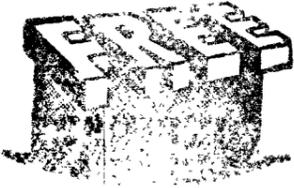
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Cash You Get ↓	MONTHLY PAYMENT PLANS		
	36 months	24 months	12 months
\$500		\$24.73	\$46.81
700		34.30	64.92
1000	\$40.05	48.76	92.30
1500	59.80	72.80	137.80
2000	78.96	96.13	181.96

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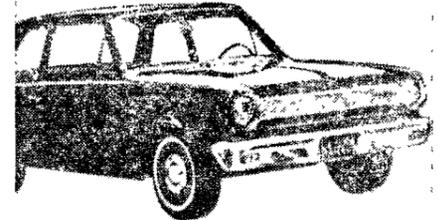
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YOU CAN EXPECT GOOD TRADE-IN ALLOWANCES



\$1699

\$109 Down Cash or Trade . . . Plus Taxes and 36 Mos. at \$53.49 PER MONTH!

WEEKEND SPECIALS!

A-401-A-1959 Chevrolet, 4 door	\$ 975 00
A-236-B-1962 Chevy II, 2 door	1475 00
A-362-A-1956 Chevrolet, 2 door	475 00
R-60-1958 Chevrolet, Station Wagon	875 00
A-384-A-1959 Dodge, 2 door Hardtop	975 00
A-396-A-1960 Ford, 4-door Sedan	975 00
A-341-A-1961 Ford, 4 door Station Wagon	1475 00
R-48-B-1961 Falcon, 4 door	1075 00
A-306-B-1958 Ford, Station Wagon	375 00
A-367-A-1962 Ford, 4 door Galaxie	1675 00
A-244-A-1960 T-Bird	1875 00
A-67-A-1958 Mercury, 2-door	675 00
A-326-A-1959 Mercury, 2 door Hardtop	875 00
A-327-B-1956 Olds, 4-Door	210 00
A-180-B-1959 Olds, 4-door Sedan	1175 00
A-400-A-1957 Olds, 4-door	475 00
A-334-A-1958 Plymouth Convertible	2475 00
A-265-A-1959 Rambler, Station Wagon	475 00
A-234-A-1962 Rambler, 2-door	725 00
A-232-A-1961 Rambler, Sedan	875 00
A-264-A-1958 Rambler, 4 door	675 00
A-349-B-1961 Rambler, Convertible	1175 00
A-327-A-1961 Rambler, 2-door	875 00
A-347-A-1960 Rambler, 4-door	875 00
A-219-J-1958 Rambler, 4-door	475 00
A-173-A-1959 Rambler, 4-door Station Wagon	675 00
A-149-A-1963 Rambler, 2-door	725 00
U-22-A-1958 Rambler, 2 door Hardtop	1675 00
A-313-A-1963 Rambler, 2-door Sedan	1575 00
A-389-A-1958 VW, 2-door	475 00
A-235-A-1961 Valiant, 4-door	1275 00
R-61-A-1955 Chevrolet, Station Wagon	875 00
A-353-A-1957 Mercury, 2-door Sedan	375 00
A-147-A-1958 Rambler, Station Wagon	475 00
R-63-1963 Rambler, 4-door Station Wagon	2175 00
R-66-1959 Rambler, American	475 00
R-65-1963 Rambler, 4-door	1575 00
R-64-1963 Rambler, Convertible	1975 00
A-338-A-1958 Chevrolet, 4-door Station Wagon	375 00
A-104-B-1951 Chevrolet, 2-door	275 00
A-177-B-1959 Simca, Sedan	475 00
A-359-A-1962 Rambler, Station Wagon	1575 00
A-350-A-1962 Rambler, 4-door American	1175 00

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529 MERIDIAN ST. N. PHONE 534-4514 CLAYTON MANCE, Service Manager

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UNUSUALLY GOOD TRADE-IN ALLOWANCES GIVEN HERE

Adams Named Deputy Chief Of Personnel

A native Alabamian has been named Deputy Chief of the Civilian Personnel Office at Redstone Arsenal, the U. S. Army Missile Command announced last week.

He is Luther F. Adams who has been Chief of the Position and Pay Management Division since April, 1962.

A native of Centreville but reared in Montevallo where he graduated from high school, Adams graduated from the University of Alabama in 1950 with a B.S. Degree in Business Administration. He came to Redstone Arsenal in

1951. He has served in various supervisory capacities, among them as Chief of the Employee Utilization Branch, Personnel Officer in the Army Ballistic Missile Agency and as Deputy Chief of the Civilian Personnel Office under the old Redstone Arsenal organization.

Adams served in Europe with the 80th Infantry Division, Third Army, during World War II where he was presented two battle stars along with the Army Occupation Ribbon and Unit Citation.

Now active in both church and civic work, Adams is married to the former Irene Foster of Huntsville. They have two children, Eric and Amy Irene and they live at 2600 Alabama Street, N.W.

Aug. 8, 1854—First metal cartridge patented in Springfield, Massachusetts, by D. B. Wesson.

— EQUITY SALE —

FULL BRICK — 3 BEDROOMS

Separate panelled den, separate dining room, fireplace, wall-to-wall carpeting, built-in kitchen with oven, surface unit, garbage disposal, dishwasher, central air conditioning by an electric heat pump, 2 full ceramic tile baths with vanities, double garage, built-in laundry area, large patio, fenced in yard. Truly a home of quality and comfort. Shown by appointment only.

Located in Southeast Huntsville—corner Strong and Curtis Drives. Equity Price \$4500.00. Assume monthly payments of \$179.80.

Ensor Real Estate, Inc.

Phone 881-0152

If No Answer . . . Phone 533-1849



MAR—The building of the Nike-X system Multi-function Array Radar represents another first for the Army. Never before has a phased array type radar been developed to perform the functions of several specialized radars. Here under construction is the first test version of the MAR at White Sands Missile Range, N.M. Now nearly completed, the MAR is scheduled to go into operation within a few weeks. Workmen stand atop the receiver dome of the radar while in the right foreground and to the left are shown the smaller transmitter domes. Equipment for the radar is located in a two-story building beneath the domes.

NORTH AMERICAN WILL DEVELOP TARGET MISSILE

The U. S. Army has announced the award of a \$900,000 contract to North American Aviation's Columbus, Ohio Division to develop and flight test an advanced version of its Redhead-Roadrunner target missile.

The development program involves the design, development and testing of Redhead/Roadrunner using a larger ramjet engine than those now being used.

Redhead/Roadrunner target missiles are ground-launched by a solid propellant booster rocket which drops away after burnout.

May 25, 1945—Joint Chiefs of Staff approve directive for Operation OLYMPIC (invasion of Japanese home islands) scheduled for November 1.

Current Roadrunners, which simulate high performance aircraft attacking at low altitudes, meet existing target missile needs for the Hawk air defense system.

The contract was awarded by the U. S. Army Missile Command. Technical supervision for the development program is under the direction of the Directorate of Research and Development, Target Missiles Branch at the Army Missile Command.

Americans, primarily school children, are now purchasing U. S. Savings Stamps at the rate of more than 100 million separate pieces per year. The stamps may be purchased by anyone at anytime during the year at post offices.

May 24, 1824—Coast Artillery School established at Fortress Monroe, Virginia, as "artillery school of instruction."

PUBLIC AUCTION

Valuable Real Estate

29 Acre Tract More or Less

20 Very Desirable Building Lots

Property of Mrs. Reba Hanson

Located in west section of Arab within city limits and lying on both sides of Arab to Cullman Highway on

THURSDAY, JUNE 18

1:30 P.M.

On The Premises

29 acre tract lies level to gently rolling. Practically all in cultivation.

Improved with 7 room house. City water and well in yard. Good frontage on highway and county road. Has great possibilities for a sub-division.

Also 20 large desirable lots just across highway from the tract. Splendid location. Served by utilities.

TERMS: 1/3 Cash, Balance 1 & 2 years.

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in A JACK CUMMINGS GEORGE SIDNEY PRODUCTION
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You pay only \$200 closing to own a three bedroom and den home. Priced from \$16,700 and up on VA loan. Several under construction. Select colors now.

—DIRECTIONS—
Drive west on Oakwood Avenue 5 blocks past Pulaski Pike to Oakmont.

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REALTORS Phone 539-1759

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Some Are
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\$15,800 TO \$17,600

MOVE IN 10 DAYS

All have 3 bedrooms, 1 1/2 baths, attached garages, glass sliding doors to patios, built-in oven, ranges, vent hoods and vanities in baths.

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Page 14 The Redstone Rocket — June 10, 1964

1. For Rent

FURNISHED 2-ROOM APARTMENT — Includes lights, water, use of telephone. 601 Holmes Ave., N.E. Phone 534-5763. ttc

FURNISHED—1 or 2 bedroom apartments on dead-end street away from noise, yet very convenient to Gates 1, 8 and 9. Call 536-8775. ttc

FOR RENT—TV's, portables, UHF-VHF, by day, week or month. 1964 models. Phone 536-9761. Central TV and Stereo Co., Inc., corner Governors Drive and Parkway. Open 8 a.m. to 7 p.m. daily. ttc

ROOMS FOR RENT—Single and double for men with good habits, completely and newly decorated, economically priced. Central Y.M.C.A. Dial 534-6452. ttc

FOR RENT 4000 sq. ft. workable area office space, second floor Quick Building. Available July 1, 117 Green St., Downtown Huntsville. Phone 534-5127 or 534-4551. ttc

2. Cars For Sale

1963 AUSTIN HEALY SPRITE — WW, radio, red, heater. \$1595 or best offer. Contact Warren Campbell at 877-3556. ttc

MERCEDES DIESEL FOR SALE — By owner, gray, 1960 model, 190D sedan, true economy, 30 to 60 miles per gallon of Diesel fuel. Call 534-0522 after 4 p.m. ttc

3. Miscellaneous

BRELAND SECRETARIAL SERVICE in HOME at 2630 Bonita Circle. Typing, Notarizing, Mimeographing, Editing, Assistance with composing letters, resumes, etc. Satisfaction guaranteed or no charge. 539-2834. 6-17p

GUNTERSVILLE LAKE BOAT STORAGE—Open slips, covered slips, waterfront cabin sites for sale. Enquire at Snug Harbor Borer on Highway 431 South. Phone Huntsville 536-3113. 6-10c

ABS SECRETARIAL SERVICE, 915-F Franklin St. SE (Franklin Center) Phone 534-6451 For: Photocopying, Mimeographing, Transcribing (Dictaphone) telephone answering, Employment applications prepared (Government and other) Notary Public. Our office or yours. ttc

FOR SALE—1963 Nimrod Camper complete with extra tire and zip on 8'x12' family room. Contact DR. JOHN D. CHANDLER, 409 Rock St., Hartselle, Ala. 6-9c

FOR SALE
Beautiful Brick 7-Room Home in choice residential area, 7 Oak Lane, Hartselle, Ala. Plenty of modern built-ins step-down living room with big fireplace, screened back porch, fenced patio, carport, on large lot with trees.
SPEAKE REALTY CO.
Hartselle, Ala.
Pho. 773-8282; nite 773-9205
or **FLOYD F. ANDERSON**
221 Leesburg Pike,
Falls Church, Va.

REFRESHER MATHEMATICS COURSE — Private instructor wants 2 groups of 10 people, interested in refreshing or learning higher mathematics. Practically individual instruction. Classes will be held 2 evenings per week, from 7 p.m. to 10 p.m., Monday and Wednesday, and Tuesday and Thursday. \$15.00 per month. Call 536-6611. ttc

MODERN HEALTH CLUB SERVICES—Central Y.M.C.A., 203 South Greene St. is offering massages, turkish baths, electric heat, cabinets, ultra-violet and infra-red lamps, diathermy sun lamp, swimming pool. Graduate masseur in charge. Phone 534-2444. ttc

LOST—1 film, 166mm, black and white, optical sound, entitled Missile Reliability Program. Finder please call 876-6074 or 876-6988, Smith. ttc

WANTED — Students we have openings for 5 students at Nitas and Daves Beauty College. Tuition can be financed. Earn top wages, be a professional trained by trophy winner Nita Hetherington. Call Nita & Dave's Beauty College, 539-2461 or come by Governors Drive across from Butler High School. ttc

FOR THE BEST PRICES, come to Anderson Boat and Motor Sales in Cullman. Closing out some 63 model motors at a bargain. Mercury outboard motors and 14 different lines of boats to choose from. We are open on Sunday afternoon and night by appointment. Call 734-1354. Anderson Boat and Motor Sales, 31 Highway North, Cullman, Ala. ttc

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North Alabama's largest sales and service dealer for Zenith, RCA and Motorola TV and Stereo. Our prices are equal to or lower than advertised so called "discount or wholesale" prices. Price, then compare. Our merchandise is visually priced tagged at all times. We accept trade-ins. Used TVs sold for \$20 and up. We service all makes and models. Picture tubes, 21 in. 90 degrees, \$21.00 exchange with 1 year guarantee. TV rentals by day, week or month.
CENTRAL TV & STEREO CO.
Cor. Governors Drive & Parkway
Phone 536-9761

FOR SALE—Newly reupholstered couch and chair, like new condition. Phone 539-0382. ttc

4. Mobile Homes

FOR SALE OR RENT—In excellent condition, 1956 American trailer, 2 bedroom, Lot 96, Triana Trailer Court, 4509 S.W. Triana Blvd. or Call 881-2506 after 7 p.m. on Sundays. ttc

Glen Park APARTMENTS
Completely furnished including air conditioning and TV outlet, lovely 2 bedroom, living room, kitchen and ceramic tile bath. Convenient to schools, churches and shopping.
852-0131

FOR SALE BY OWNER—1 month old National Mobile Home, \$1,000.00 equity for \$850.00. \$350.00 down, owner will finance balance of equity, set up on shady lot, monthly payments \$65.00. Phone 536-4007. ttc

5. Houses, Lots - Sale

SALE: LAKE FRONT HOME — An exceptionally fine home in lovely Honeycomb Valley, situated on a beautiful water front lot. 3 bedrooms, 2 1/2 baths, dining room, den. Only 25 minutes from main gate of arsenal. Owner will finance with down payment and no closing costs. **BOONE REALTY CO** Gunterville 582-4311. 6-17c

FOR SALE—Acre lots priced \$2,000.00 up. One lot has 3 bedroom full basement permastone house priced at \$18,500.00, located on Hwy. 72 West, 13 miles from Bldg. 4488, thru Gate 7, 10 miles from Memorial Parkway. Phone 539-8039. ttc

FOR LOTS, ACREAGE, HOMES, BUSINESS Opportunities and full information on Florida properties write Mamie P. Smith, "Reg Broker," 140 N.W. 1st Ave., Homestead, Florida. ttc

FOR SALE—Lot in Hartselle. 200x150 ft. Phone 773-7428 after 6 p.m. 6-16c

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"Your Authorized VW Dealer"
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Service men, all ranks and ages, also Civilians
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—Or active duty military planning retirement. To represent 97 year old national concern in Huntsville area. Complete training program. Applicant must have management potential and 5 figure income objective. \$500 per month training allowance plus commissions to qualified representatives. Non military with sales, teaching or executive background also eligible. Replies in strict confidence must include age, education, past experience and marital status. Write Frank Williams, 1010 Frank Nelson Building, Birmingham 3, Alabama. 6-17c

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6% Bank Interest
First or second mortgage loans on personal or commercial property. Signature loans considered. ANY AMOUNT. TO 7 1/2 YEARS TO PAY.
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OFFICE—539-1769
HOME—852-2332

FOR SALE—41 acres, located 35 miles south of Huntsville, practically new 3 bedroom dwelling with all modern conveniences. Good tenant dwelling with bath, 9 acre cotton allotment, price \$12,700. 100% loan to G.I.
20 ACRES located 15 miles east of Cullman, 35 miles south of Huntsville, 1/2 mile south of Hulaco, 6 room dwelling with bath, 2 jalouse porches, triple carport with workshop, 2 large block chicken houses, block barn, all land fenced and in permanent pasture, fish pond, 3 wells. A real country estate. Owner will finance. Price \$38,500.00. E. G. WILLIAMSON, Real Estate Broker, Phone 734-6294, Cullman, Alabama, P. O. Box 41. ttc

FOR SALE—54 acre cattle ranch, Marengo County. Fence 12-acre stock pond. On paved road, \$150.00 per acre. Possession given January 1st, 1965. 6-17p

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(With This Ad) Reg. \$6.50 Value
Fast Service - Expert Wheel Mechanic
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The Lowest Prices Ever!
DON'T MISS THIS SALE . . .
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FOR SALE—3 bedroom, white brick home, den with fireplace. Many extras including wrought iron trim and special cabinet work, air condition, including carpeting and draperies. Many large trees, Blossomwood school area, 1006 Cleermont Drive, \$25,500. Phone 536-0204 or 876-0195 ttc

FOR SALE—96 acres, cattle farm, level land, all in permanent pastures. Very best of fences, plenty of water. On paved highway. Good six room dwelling, electric heat, modern bath, 70'x70' three car garage. Large barn, tool shed, grain bins, storage bldg., utility building with laundry room. Storm cellar. On school bus and mail route. Good churches, excellent community. Must be seen to be appreciated. Located nine miles southeast of Hartselle in Massey community (Reason for selling — ill health) **PENN AND ORR FARM**, Darville, Ala., Rt. 1. Phone 462-3222. 6-16p


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PHONE 534-7651

Prime Contractor Receives Lance Engineer Hardware

First engineering model hardware for the Army's new Lance ballistic missile system was delivered this week to the prime contractor, the Army Missile Command announced. Included in the initial delivery of equipment were two fully mobile tracked vehicles, designed to make the Lance system self-contained and self-sustaining in a tactical situation. Also delivered was the first engineering model of the system's

Light Weight Launcher which will ride piggy-back in one of the tracked vehicles. The Light Weight Launcher also can be towed by standard Army vehicles and lowered into a combat zone by helicopter.

The Engineering models were delivered to Ling-Temco-Vought's Michigan Division near Detroit by the FMC Corporation, which is building the tracked vehicle at its San Jose plant, and Hawker Siddeley Canada Limited, of Toronto, Canada, which is building the Light Weight Launcher.

The equipment, following check-out, will be assembled and integrated into the weapon system by Ling-Temco-Vought personnel prior to extensive testing scheduled by the Army.

The development of the Lance missile system is under the direction of Lt. Col. Walter H. Mehlinger, Lance Project Manager for the Missile Command.

Delivery of the engineering model equipment was conducted under the direction of Clem Rhodes of the Missile Command and Al Yee of Ling-Temco-Vought's Michigan Division.

Lance will be the first Army missile system to use pre-packaged liquid fuel. It is being designed to replace the Lacrosse, Honest John, and possibly the Littlejohn.

The highly mobile missile system will complement division tube artillery and will extend the division commander's capability for nuclear and non-nuclear supporting fire.

May 26, 1917—Maj. Gen. John J. Pershing designated Commander-in-Chief of the Army Expeditionary Forces.

Nike Hercules Trainers Contract Given Bendix

The Army announced the award of a \$5,394,480 fixed price contract to the Bendix Corporation at Teterboro, N. J., for the production of trainers for the Nike Hercules air defense missile system.

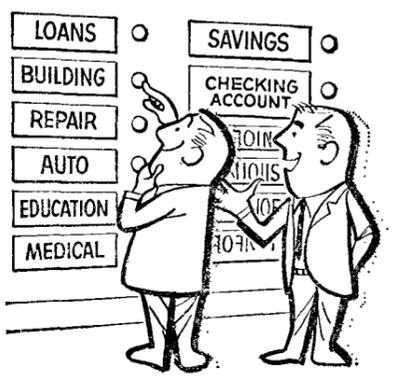
The trainers, each one occupying a van type trailer, are used to give missile crews practice in running engagements. Attached to a Nikes Hercules system, the devices electronically create attack

situations. Bendix was selected as a result of competitive negotiations. The work will be performed at the company's Eclipse Pioneer Division at Teterboro. Negotiations on the contract were conducted by the Army Missile Command, Redstone Arsenal, Ala., with contract administration to be carried out by the New York Procurement District. The missile system, under the technical supervision of the Nike Hercules Project Office at Redstone is the United States' primary high altitude air defense system.

BOOK OF THE WEEK
The Burden and The Glory
 BY PRESIDENT JOHN F. KENNEDY
 EDITED BY ALLEN NEVINS
\$4.95
 WITH FOREWORD BY PRESIDENT JOHNSON
 ● The Hopes and Purposes of President Kennedy's Second and Third Years in Office.
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 SIX LOCATIONS TO SERVE YOU
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You'll hardly be able to believe your own eyes next fall when you see what wonders we work with them.

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 OPEN 7 A.M. TO 7:30 P.M. DAILY



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MUFFLER SHOPS

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 • NO MONEY DOWN
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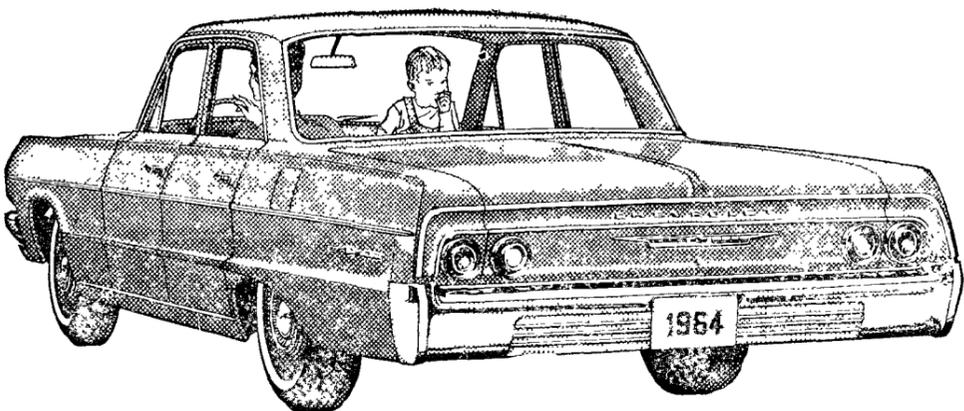
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Oakman Is OGMS Dean Of Nikes

If the Army Ordnance Guided Missile School needed one man to personify the 10th anniversary of the Nike missile system, he would be Clyde L. Oakman.

For the past decade, Oakman has spent all his working hours teaching young men of many nations how to maintain the weapon in the manner which she demands.

Oakman's tenure at OGMS actually antedates the arrival of the first Nike at Redstone. He arrived in March of 1952 when the huge training center here was just beginning and was still designated the Provisional Redstone Ordnance Missile School. That was a good two years before the first Nike showed up at the School. In fact, Oakman got here only 4 months after the first successful Nike intercept had given the United States its pioneer operational guided missile.

Since teaching his first class of about 12 men the fundamentals that have grown into missile maintenance technology, he has seen more than 10,000 students graduate in Nike classes—nearly one-third of all graduates from the "Missile Academy."

Was M/Sgt.

He was picked as an instructor because of his experience in hydraulics, pneumatics and remote control systems. At that time he was a Master Sergeant at Aberdeen Proving Grounds, Maryland.

NIKE DEFENSE

(Continued From Page 5)

and heavily populated areas from nuclear bombardment by ICBMs. Twenty years ago Nike-X would have been inconceivable because man did not know enough about the necessary electronics, physics and chemistry. But through the years the Nikes have reflected the latest developments in science.

For example, the Nikes like most missile systems are based to a great extent on man's knowledge of electronics. The first Nike contained literally thousands of electron tubes. Today a complete logic device in the Nike-X computer containing several transistors and their related circuitry is being built in a solid glass pellet smaller in size than a pencil eraser—dozens of lines smaller than a single electron tube.

Such are milestones in the life of the remarkable Nike family which only 10 years ago brought about a revolution in air defense.

When he came here, there were no missiles or missile parts or radar parts, or for that matter any of the things that are now taught to missile maintenance men.

First classes were conducted on hydraulics, pneumatics and remote control systems as they related to ordinary aircraft, with an eye to the day when missiles would become operational and the same principles could be applied to the new concepts of air defense.

Since those days of makeshift instruction without actual experience with missiles, Oakman has watched the system change in many ways. Maintenance has been simplified—which has made it more efficient and much easier to teach. The problems of handling and storing have been greatly reduced, and the teaching time has been cut down considerably.

Saw Changes

The missile has changed from the old "one-barrel" Nike-Ajax, propelled by a liquid fuel second stage, to the "four-barrel," all solid propellant Nike-Hercules and

the Improved Hercules. The range and effectiveness of the missile has been increased with powerful new radars. But basically the Nike system—the command-guidance system—has been retained.

In 1959, Oakman retired from the Army and began to work as a full-time civilian instructor in the Nike Branch. In sharp contrast to the days when he had to teach with the aid of old airplane parts and relate them to imaginary missiles, he now has at his disposal all the actual missile parts and numerous training aids. From the original class of 12 men, the curriculum has grown to include a variety of courses on the missile's major components.

Plans for training men on the Army's new Nike-X system are well along at the Missile School. A large group of veteran Nike system specialists has been at work for months preparing lesson plans, texts and training aids.

Should the new system take its place in the front line of the free world's missile defenses, the Missile School will be well prepared to train the men who will keep the latest Nikes constantly groomed for battle.



NIKE PIONEER—Surrounded by the Nike "family" in the Nike shop at the Army Ordnance Guided Missile School, Clyde L. Oakman, who has been an instructor on the air defense missile system since it first proved operational, looks over the Ajax (foreground)—the first missile in the system. The Nike-Hercules (background)—is the present operational generation. Oakman was the first instructor in the Nike system at the school and has seen the missile progress from the liquid-fuel Ajax to the solid-fuel Hercules and is looking forward to the Nike-X system, newest member of the family, that is now in the testing and development stage.



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