



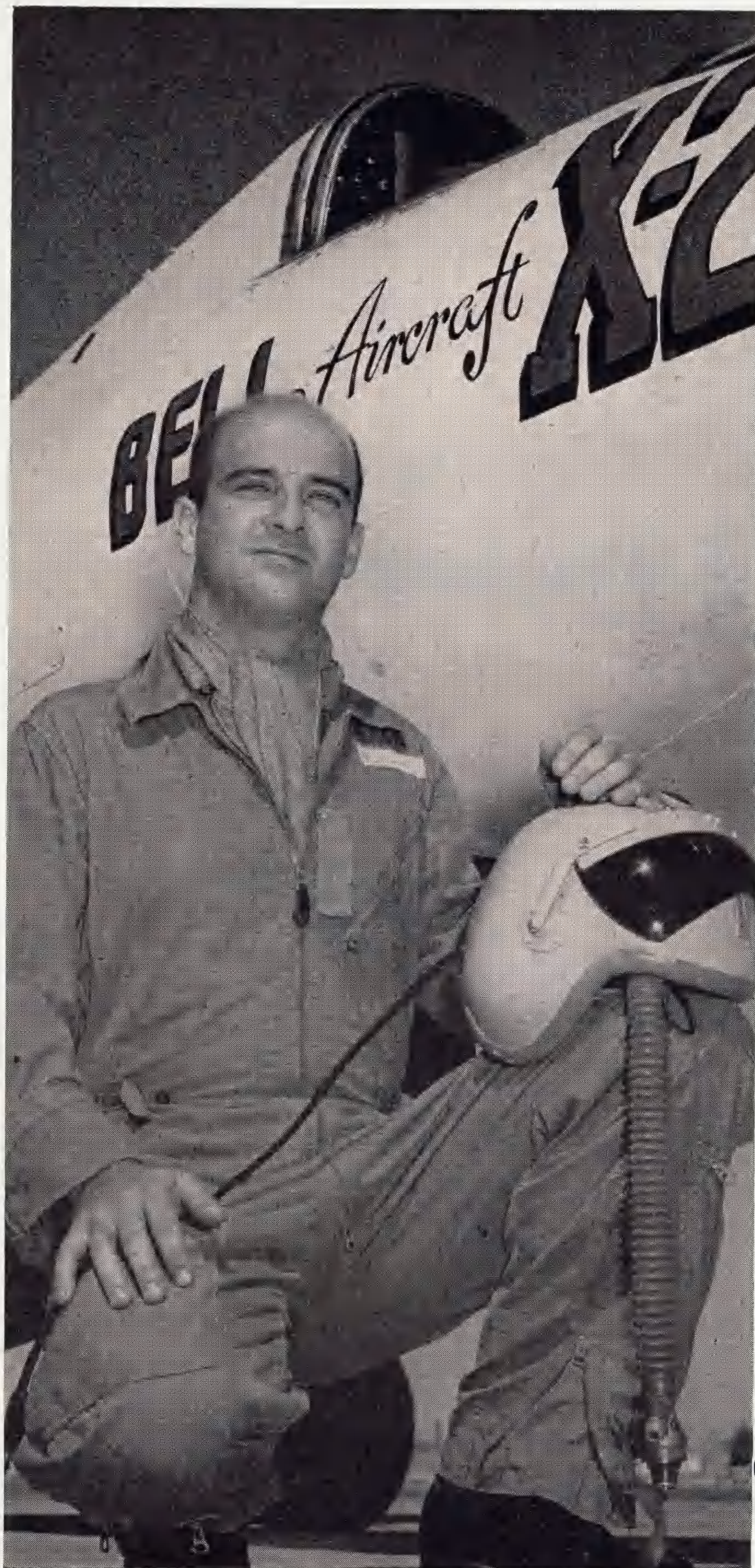
The Last Flight of the X-2

By Clay Blair, Jr.

In the last few years a new breed of airplane has been built. It is called the X series—X for Experimental. These are powerful rocket planes, each icebox white, small, and more powerful than any engine man has ever built. They are rapier-nosed guided missiles, guided by men who are a new breed of pilots. These pilots have flown the X planes through the sound barrier, and to the very threshold of space. Probing the unknown, their missions are dangerous. Occasionally, when they break records, they make headlines. This is the story behind a headline one test pilot made in an X plane last autumn. It was the last flight for both.

AT five-thirty on the morning of September 27, 1956, the alarm clock jangled harshly on the bedside table of Capt. Milburn Grant Apt, thirty-two, a senior test pilot at Edwards Air Force Base, Calif. Apt shook himself awake and dressed hurriedly. He had good reason: this day was the high point of his flying career. After many long months of anxious waiting,

pleading, and prayerful hope, he had at last been detailed to fly the most advanced airplane in the Free World: the Bell X-2 rocket ship. This remarkable craft had already brought great fame to two other Edwards test pilots: Lt. Col. Frank "Pete" Everest, who established a world's speed record of 1,900 mph, and Capt. Iven Kinche-
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loe, who had stood the X-2 practically on end, and blazed his way to 126,000 feet altitude—to the edge of space.

In less than four hours, balding Mel Apt would exceed Everest's speed record by more than 200 miles an hour, and a few seconds later he would be dead.

Apt hastily downed a breakfast which had been prepared by his wife, Faye. The two children, Christine Lorrie, five, and Sharman Jean, two, were still asleep when Apt, buttoning his jacket against the cold desert wind, climbed into his splotchy-painted model-A Ford, and jounced down the blacktop road toward the flight line. The dim headlights of the Ford flicked across the sagebrush and joshua trees. There is no record of what he thought about during this period. However, Kincheloe and Everest, the only other men who have flown the X-2, say the worst part of the flight is not actually in the air, but on the ground just before, and during the ride up in the mother ship. "Your stomach grows hard. You are not at ease," says Kincheloe, in the masterful understatement of the test pilot.

Stocky, dark-eyed Mel Apt was a man who spoke quietly, but positively, and liked to spend much of his off-hours time with his family. A do-it-yourselfer, he had paneled the den, put in a patio, and nursed along a striking flower garden. "He made the best martinis around here," says a test pilot. "Used to make a gallon at a time and put them in the freezer." But Apt's primary interest in life was flying, and according to the other flyers at Edwards, he was a superb pilot. In seven years of testing new jet airplanes (his pay was \$800 a month), he had built up 3,505 hours in the air and had flown all the new, tricky Century Series fighters—the F-100, the F-101, the F-102, and the Mach Two F-104. He was project officer for the F-105, Republic's still-classified supersonic fighter-bomber. Apt, they say, was also a very courageous man. On one flight he brought the F-105, worth millions, back to base with an engine fire, the most hazardous situation possible in a jet. "He hated to lose the airplane. And, as a result of getting it back, the plane was extensively redesigned," an Edwards test pilot says. "All of the manufacturers used to ask for 'the guy with the bald

Shortly before his death, Capt. Milburn G. Apt kneels beside the Bell X-2, the plane which took his life the first time he flew it last fall.



Capt. Iven C. Kincheloe, who became a jet ace in Korea, went on to pilot the X-2 to a record of 126,000 feet.

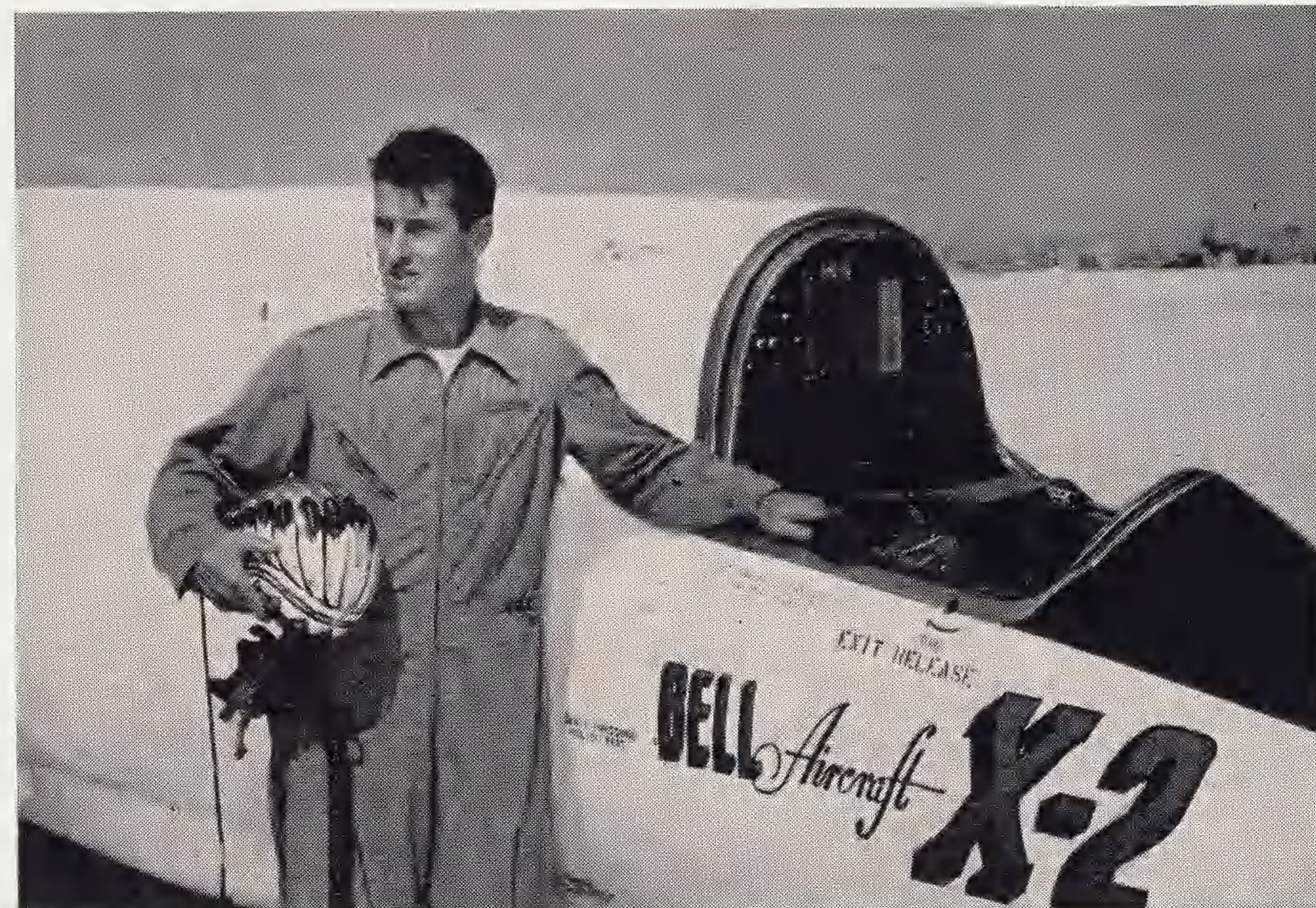


Maj. Charles E. Yeager, who was the first man to fly faster than sound (in the X-1), pioneered with the X-1A.

head.'” The story of how Apt pulled a fellow pilot, Capt. Richard J. Harer, from a burning Lockheed F-94C after Harer had crash-landed on the desert is recalled with awe, even in a place like Edwards where heroism and bravery are everyday things. Apt had smashed the cockpit canopy of the burning plane with a five-gallon POL can. He was awarded the Soldier's Medal for saving Harer's life.

In February 1956 when the decision was made to transfer Pete Everest, the original X-2 pilot, to school, and to give other test pilots X-2 experience, Apt, along with Iven Kincheloe, was picked from the small band of test pilots in the fighter section at Ed-

wards. Apt was singled out not only because of his flying ability, his diminutive size, his demonstrated coolness, but also because he had an engineering degree from Kansas University. Such a degree is almost necessary in operating a ship like the X-2. The way the program was mapped out, Kincheloe was assigned to make the altitude attempts with the X-2. Apt would concentrate on speed, picking up where Pete Everest had left off. The purpose of these flights was not, as has been widely reported, so much to probe the “thermal thicket”—to study the effects of aerodynamic heating—but rather to establish the operating limits of the aircraft, so that scientists at NACA, to



Lt. Col. Frank K. “Pete” Everest, chief of flight test operations at Edwards, stands with the stainless steel research plane he flew to a record 1,900 mph.

whom the plane would soon be assigned, could carry out this mission with a wider margin of safety.

Arriving at flight operations, Apt parked his model-A and went directly to the locker room. There he met Kincheloe, who was scheduled to fly “low chase” on the X-2 in a North American F-86 Sabrejet, a job that Apt himself had done for Kincheloe and Everest on many occasions. Also on hand was Capt. James Carson, a test pilot who would fly “high chase,” at 50,000 feet in a North American F-100. There were not many words exchanged. Kincheloe helped Apt into his skin-tight pressure suit, a device that would protect him in the event the cockpit pressurization in the X-2 failed. There was a joke about locking Apt away so that Kincheloe could make the flight instead. Then Kincheloe asked: “How do you feel, Mel?”

“Fine,” Apt replied. “Ready to go.”

In the wake of his first—and last—flight, the question of how ready to go Apt actually was has become a matter of considerable speculation. Of all the rocket planes built, the sweptwing X-2 was far and away the most difficult to fly, largely because of its higher performance. After it was hauled aloft by the mother plane and dropped from its belly like a bomb, it was a glider. (“The world's heaviest,” says Everest). Then, once clear of its carrier, the power was kicked in. For approximately 140 seconds, while the rockets pushed it forward in a kind of controlled explosion which could be heard for twenty miles, it was a tiny thing of immense power and speed. On cloudy days, men on the ground have observed the X-2's supersonic shock wave with their naked eye. If the plane was climbed at too steep an angle, the rocket engine would die. If it nosed down too sharply after a drop, so much time and fuel would be lost in the recovery that the flights were often canceled.

There was an ever-present danger of the plane tumbling nose over tail out of control in the thin air, as Chuck Yeager and Arthur Murray had done in the rocket-powered X-1A—at 1,400 to 1,600 mph. This X-2 was subjected to a weird variety of aerodynamic phenomena such as control reversal in high-speed rolls, or loss of elevator control. Her instruments usually lagged far behind actual performance. Her rockets often stopped with a bone-jarring semi-explosion, or with a tail-fire.

Then, at the end of its powered run, the X-2 reverted to being a glider.
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An earlier Bell test plane, the X-1A, piloted by Chuck Yeager, begins its record flight. He hit nearly 1,650 mph.

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Landing it dead-stick on the packed-sand desert was no cinch either; on his first three tries Everest plumped the plane down on its steel skids (conventional landing gear was left off to make more room for fuel), and due to a faulty nose-wheel, found himself spinning across the desert, on a hundred-mile-per-hour wild merry-go-round ride.

With planes of this type and size, there is no way to carry along another pilot to teach him the ropes. It is possible to drop a beginner from the mother plane and, without making the powered run, let him glide down to earth, as Everest did on his first few flights. However, long ago authorities at Edwards concluded this had no practical value, since it was manifestly the easiest part of the flight. The system employed today, which may be changed in light of Apt's experience, is to put the pilot in the plane and let him sink or fly. Apt's background instruction for flying the X-2 consisted of (1) flying "chase" behind the X-2, (2) riding in the mother plane, (3) sitting in the cockpit on the ground during static engine run-ups, handling the throttleable engines, (4) studying the plane and movies of previous flights, (5) talking with Everest and Kincheloe, and (6) operating the ground "simulator." The latter consists of a kind

of electronic brain, with a stick and oscilloscope. Through a complex electronic process, flight data can be pumped into the computer, and the pilot can "fly" the machine, watching a picture on the oscilloscope to see how well he does. But this machine does not—nor does anything else—give him the "feel" of the airplane. Even so, in the opinion of his superiors at Edwards, "few people had as much preparation and background for the flight." An Air Force officer adds: "The truth is that Mel Apt was probably over-trained."

At approximately 8:15, Apt walked out to the flight line, where the Boeing B-50 mother plane was waiting, the gleaming white X-2 snugged up in her bomb-bay belly. He climbed up into the bubble-nose of the B-50 and the pilot, Capt. Fitzhugh Fulton, started his engines, the first step of 200 that would be carried out, and checked on a list, before the final drop of the X-2. At 8:30 the B-50 was airborne. Apt climbed back through the plane toward the bomb bay. There one of his assistants helped cinch up the pressure suit, and strapped on his parachute.

Meanwhile, technicians at control panels in the B-50 were keeping a close watch on the pulse of the X-2, while others finished filling her fuel tanks with highly volatile liquid oxy-

gen and alcohol. When the B-50 had reached an altitude of 7,000 feet, Apt was fitted with a glass-plated space helmet, then, following an item on the check list, grabbed two yellow bars and lowered himself into the cockpit of the X-2. A shoulder harness, a crotch strap, and a regular safety belt were tightened, then a heavy canopy, with special tinted glass to screen infra-red rays of the sun, which are intense at very high altitudes, was lowered and locked into place.

The cockpit of the X-2 was so small that both Apt's shoulders pressed against the sides of the fuselage. There was only an inch or two clearance above his helmet. Through the small canopy panels he could see the gleaming desert lake below. The instrument panel was a maze of gauges and switches, most of them designed to control the powerful rocket engines. Every minute from this point on Apt would be in relative danger. At least two X-model rocket planes had exploded while still in the bomb bay. The first was the original X-2. Bell test pilot Jean L. "Skip" Ziegler and a mother-ship crewman had been killed. Seemingly oblivious to this danger, Apt flicked his gloved hand across a row of switches, running through fifty-one items on the check list: Engine master switch OFF; Forward LOX tank pres-

surization switch PRESS; Fuel jet-tison switch OFF, etc., etc.

At 9:00 o'clock, when the B-50 had reached an altitude of 15,000 feet, Fulton radioed the "low chase" plane piloted by Kincheloe, and told him to take off. At 20,000 he called "high chase," piloted by Carson. The two jets zoomed skyward; Kincheloe taking position just to the right and behind the B-50; Carson went up to 50,000 feet. Tension was beginning to build up inside the B-50, as the men methodically ticked off the check list: open line drain switch; retract X-2 air scoops; check pump #1 switch to RUN position. By now, Apt had gone through an additional twenty items, including a test of the control surfaces, which Kincheloe, in the chase plane, observed and confirmed. They were reaching a critical point: if any of the sensitive machinery of the X-2 malfunctioned, the flight, in spite of days of preparation, would be canceled.

At approximately one hour after take-off, the B-50 reached drop altitude—30,000 feet. While the men in the B-50 continued down the check list, Fulton pushed over the nose of the bomber, to build up to 220 miles per hour airspeed so that the X-2 would

not stall on drop. On the ground, radar operators, radio operators, recorders, men manning special photo theodolite cameras, got ready. Apt may have felt alone—and apprehensive—in the X-2's cockpit, but he was not actually alone. All told there were no fewer than one thousand men at Edwards directly participating in the X-2 flight.

When all was set, Fulton reached down beside his seat and removed the safety pin on the "DROP" handle. Then he spoke into the open radio circuit, which was being monitored by Apt in the X-2, the chase planes, and the ground installations: "Ready to drop." It was now 9:30.

In the X-2, Apt intoned: "Five . . . four . . . three . . . two . . . one . . . DROP." Fulton pulled a handle beside his seat and Apt and the X-2 dropped from the dark shadow of the B-50 into the brilliant sunlight. Apt's stomach tingled as though in a rapidly descending elevator. The X-2 was now ready to begin its thirteenth powered flight.

The flight profile of the X-2 was so complex that it had to be worked out on an electronic computer. On most speed flights, after drop and engine light-off, the plane was directed on a course which resembled, roughly, the

trajectory of a howitzer shell—that is, a large arc. The flight plan was dictated by factors such as a constantly and rapidly diminishing weight during powered flight (the X-2 gulped more than a ton of fuel a minute), altitude, speed, and G forces which could be expected on the airplane. It was almost impossible to keep the X-2 on its planned flight pattern. In his eight powered flights in the X-2, Everest managed to come close only once—the last time when he achieved a speed of 1,900 miles per hour. It took Kincheloe four tries to reach his peak altitude of 126,000 feet.

In laying out Apt's first flight plan, his superiors, drawing on the experience of Everest and Kincheloe, concluded that he had "one chance in a thousand to fly a perfect flight pattern," and thus come anywhere near the dangerous speed levels which Everest had established. Before the flight, Apt's boss, Brig. Gen. J. S. Holtoner, had considered giving Apt a specific speed limit. But, General Holtoner says today, it was believed that it would be better if, on his first flight, Apt would not have to concentrate on the machmeter. It was enough to watch the accelerometer (which measures G forces on the plane) and the controls. This is a decision General Holtoner now regrets. He says: "It was one of those chances we didn't allow for. I think that every supervisory guy from me on down has criticized himself because if we had told this boy to stop at a specific speed this wouldn't have happened." When Apt went aloft, his only orders consisted of vague instructions to "stay within the envelope of knowledge" of the X-2; that is, not to exceed any forces—particularly G forces—that the plane had not been subjected to previously.

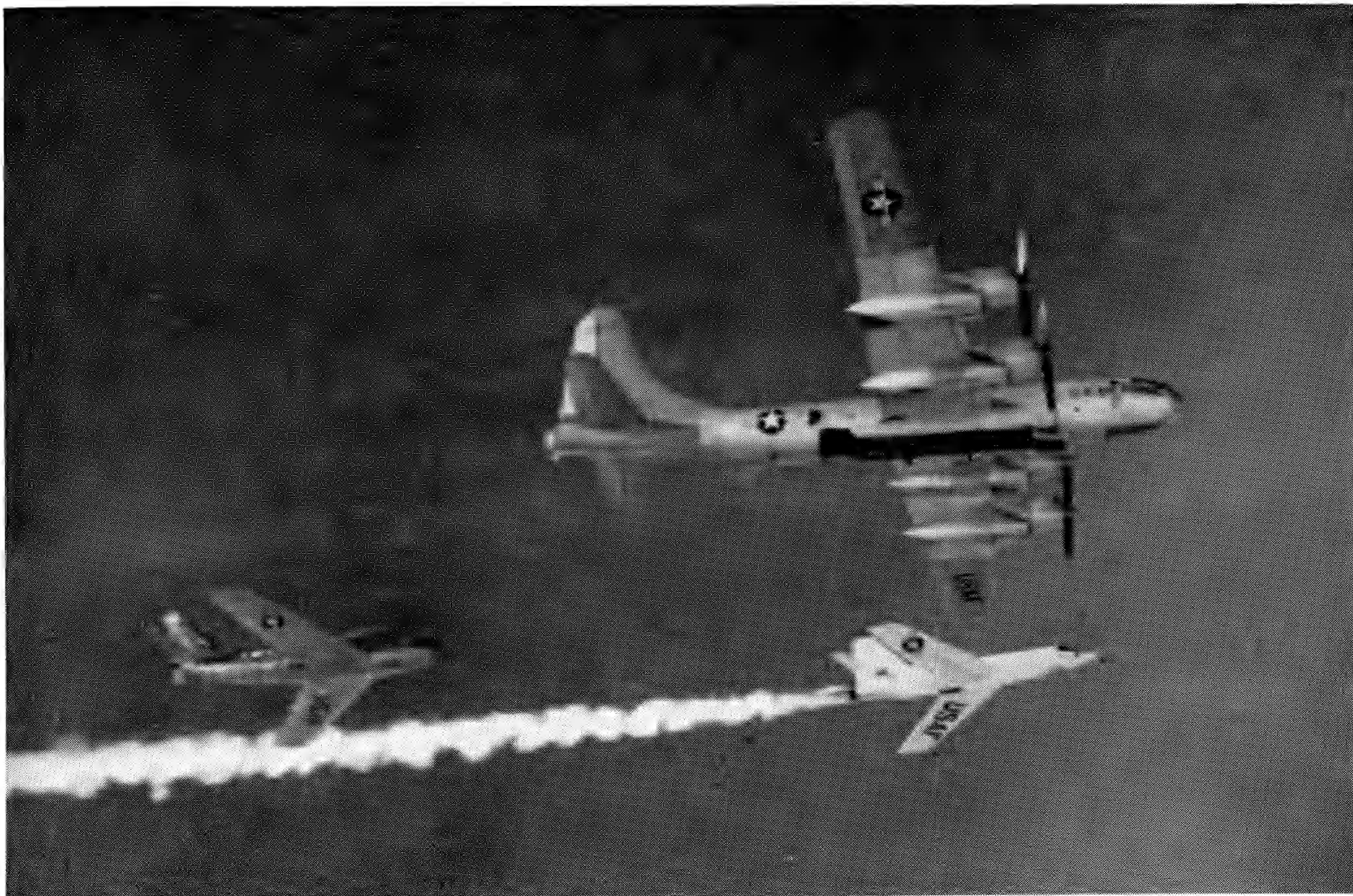
Moreover, if unexpected trouble did develop in flight, theoretically, the X-2 had a means of escape with which no other rocket plane had been equipped. The X-2 was the first US plane to incorporate an "escape capsule." The whole forward portion of the fuselage, including the cockpit, was fixed so that it could be exploded away by the pilot in case he got into trouble. Once the capsule was free of the main body of the airplane, an arresting parachute would open automatically, slowing the capsule to 120-150 miles an hour. To get out safely, the pilot needed only eject the canopy, unbuckle his safety belt and harness, then climb over the side and bail out, using his regular parachute for the remaining descent to the ground. The escape capsule in the X-2 was designed, like the rest of the plane, ten years ago. (Pete Everest has been highly critical of it.) The

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A top view shows off the clean lines and the swept wings of the Bell X-2.

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The X-2 began its test flights in August 1955. Here, in an early test, the X-2 is dropped from its B-50 "mother."

main disadvantage—presumably to be corrected in capsules on our forthcoming fighters—was that it was not completely automatic. Unlike newer capsules, which should be fully automatic, the X-2's depended in large part on the pilot's maintaining consciousness.

After Apt and the X-2 fell away from the B-50, a series of "miracles" began to occur.

First, Apt's drop attitude from the B-50 was "perfect." As he began to fall away, Kincheloe, following close behind in the chase plane, yelled over the radio: "Suck your nose up now, Mel. That's a boy. Keep coming back."

Second, his reaction time on the light-off was amazingly good. As Apt fired the lower, larger rocket, Kincheloe, referring to it by code, snapped: "Ten's going good." The impact had punched Apt in the back. Then Apt fired the second, smaller rocket chamber, and Kincheloe reported: "Five's going." Flames 100 feet long trailed the X-2.

Kincheloe rattled on: "Keep her coming back, Mel. Keep her coming back. You got her . . . come on back some more . . . you got her . . . you're in good shape . . . looking good."

Then as the X-2 zoomed skyward like a giant roman candle, leaving Kincheloe hopelessly behind, he radioed from the F-86 to Carson in the F-100: "He's starting to come now, high chase."

The third "miracle" was now taking place. Apt, on his first flight was actually staying precisely on the profile—the first time any X-2—or any other rocket plane—pilot had done so. As he rocketed upwards, the radar called off points on the flight path: "One . . . Four . . . Five . . . Up . . . Up . . . Up. . ." The fact that Apt was sticking exactly on the profile meant that he was building up maximum speed faster than any of his predecessors. The machmeter spun dizzily: "2.2 . . . 2.5 . . . 2.8 . . . 3.0 . . ."

Apt, himself, had no sensation of speed. He was flying so fast that the noise of his rockets was left far behind him, and except for an occasional crackle in his radio earphones, an unearthly quiet pervaded the cockpit. The temperature outside the plane was minus sixty-seven degrees. The thin air pressure would make his blood boil were it not for cabin pressurization. When flying the X-2 the pilot must concentrate intensely on the in-

struments, particularly the accelerometer. There was no time to speak over the radio, or to look outside at the deep intense blue of the high sky.

Had Apt been a conservative pilot, he would have thought at this point that he was coming close to exceeding the "envelope of knowledge." He might have shut down the rockets. An Air Force colonel quotes Chuck Yeager as saying: "The temptation to keep her wide open is almost overwhelming." The temptation to beat Everest's record must also have been overwhelming for Apt kept the rockets wide open.

Then the fourth "miracle" occurred. The usually cranky and temperamental rocket engines had performed perfectly, burning six seconds longer than they ever had previously.

The machmeter in the X-2 moved ahead: 3.1 . . . 3.2 . . . 3.3 . . . 2,178 miles per hour—thirty-six miles per minute—at Apt's peak altitude of about 70,000 feet. He had broken Everest's old record by 278 miles per hour!

Apt came on the radio: "They're cutting in and out," meaning that the rocket engines were running out of fuel. Meantime, he was now arching downward, and the radar noted his

progress: "Ten . . . Eleven . . . Down . . . Down . . . Down . . ."

Now Apt was on the air again: "She's cut out . . . I'm turning." With his rocket engines now completely dead, he had started the long, gliding turn, which would head him back toward the great dry lake landing strip. The chase planes, which, as usual, had lost sight of the X-2, were searching wide-eyed. Jim Carson in the F-100 temporarily caught sight of the X-2, but then it flew into the sun and never came out.

Kincheloe, on low chase, was looking hard, too. It would be his job to steer Apt back to the lake. He came on the radio: "Mel, do you read me?"

A few seconds later, a voice that was obviously Apt's broke the radio silence with an unintelligible phrase, something like "Aaaawaaak," the sound a man might make who had been slugged unexpectedly in the belly.

Alarmed, Kincheloe came back on the radio instantly: "Mel, Mel, do you read? Radar, do you have him?" Then, in the confusion that followed, radar switched to the wrong airplane, and kept reporting Kincheloe's position. Men on the ground stared hard at the snake-like vapor trail which the X-2's rockets had spewed across the sky. But there was no trace of Apt or the X-2.

Twenty-eight minutes later, search aircraft found the X-2, smashed into the ground fifteen miles east of the main base. Both of its stainless steel wings had sheared off on impact. The tail surfaces were intact. The rudder was locked—as it should have been for normal speed runs. Five miles away lay the escape capsule, shrouded by the arresting parachute. When the ground parties reached the capsule they found Apt's body inside.

Movies, taken both inside the X-2 cockpit and from the ground, helped piece together the probable cause of the crash.

After his record-breaking rocket run, Apt, as he reported on the radio, had started his turn—six seconds after burnout. At that point he was still traveling at a high rate of speed. Because he had made a perfect profile run, and because the rockets had burned longer than previous X-2 runs, he now found himself farther away from the dry lake than any pilot before him, a fact which may have caused him to turn too soon. In any case, after he went into the turn, Apt lost control of the X-2. It pitched and rolled violently, and began falling across the sky, subjecting Apt to unimaginable G forces.



With a rocket engine that was able to develop almost as much power as a Navy cruiser, the Bell X-2 flies over the AF's test center at Edwards AFB, Calif.

In a matter of seconds, the X-2 fell from 70,000 to 45,000 feet. During this fall, the plane's speed was reduced considerably, and in spite of the tremendous forces working against him, Apt was able to unlock a safety switch, then reach down between his legs and pull a handle. This set off a charge which blew the capsule away from the main body of the X-2. As the old-fashioned capsule tumbled through the sky, Apt once more was subjected to a severe beating. The camera inside the cockpit, which up to this minute had recorded his every move, was separated from its power source, and stopped running.

Cameras on the ground saw the automatic arresting parachute on the capsule unfurled. The jolting, opening shock once more bashed Apt around in the cockpit. He may have blacked out, momentarily losing consciousness. But somehow he regained enough

strength and presence of mind to begin the bail-out procedures. He pulled the handle which ejected the canopy. He unbuckled his seat belt. But before he could get out, the capsule slammed into the ground at a speed estimated at between 120 and 150 miles an hour. Apt was killed instantly.

The X-2 was not the first X-model lost. Mel Apt was the thirteenth test pilot to die at Edwards since 1950. But his death was not without meaning. Elaborate instrumentation which was recovered undamaged from the X-2 recorded every split second of the flight and every detail of the aerodynamic phenomena which caused his death. It will be used in widening the envelope of knowledge. Because of Apt and the X-2, future Air Force pilots flying hypersonic fighter planes in the defense of the nation will have a greater measure of confidence and safety.—END

ABOUT THE AUTHOR



Clay Blair, Jr., the Pentagon correspondent for *Time* and *Life*, wrote the article "The Man Who Put the Squeeze on Aircraft Design" for our January '56 issue. Earlier we ran part of his book *Beyond Courage* (June '55 AIR FORCE). Mr. Blair's other books include *The Atomic Submarine* and *Admiral Rickover and The Hydrogen Bomb*, written with James R. Shepley. A native of Lexington, Va., Mr. Blair served in the Navy in WW II. He spent almost two years in submarines, including war patrols against the Japanese.