

Considering that it is traditional for sailing men to study the sun and stars — a necessity if they are to navigate desolate seas with any assurance of success — it could be said that the United States Navy has always had an interest in space. It could also be pointed out that the Navy established its base of space technology, the Depot of Charts and Instruments — later renamed the U. S. Naval Observatory and Hydrographic Office — over 140 years ago. Among its duties was the preparation of celestial charts and spatial information.

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It looks like a good day to set an altitude record.” And, with that, Lieutenant Pat Bellinger, Naval Aviator #8, climbed into a Curtiss AH-3 pusher and soon found himself at 6,200 feet over Annapolis, claiming the first unofficial world’s altitude record for seaplanes. The date was Friday the 13th, June 1913. (Always one to push his luck, Pat went on, the next year, to become the first Naval Aviator to be shot at. Over the many years of his full life, he happily pursued adventure.)

Because seaplanes were not yet a *recognized* category, his feat was never set down in the record books. But it represents the manifest desire of early Naval Aviators to join others of their kind in reaching out from earth to climb ever higher toward outer space.

Bellinger challenged the heavens again in 1915, making it to 10,000 feet over Pensacola in a Burgess Dunne AH-10 — a vehicle to which modern sweptback wings can trace their ancestry. Later that same year, Lieutenant “Caswell” Saufley flew in an AH-14 to 11,975 feet and, in 1916, successively to 16,010 and 16,072 feet. Shortly afterwards, he crashed to his death while setting an endurance record of

eight hours and 51 minutes over Santa Rosa Island, off Pensacola.

Some years passed before there was any official differentiation between land and sea planes by the accepted authority, the Federation Aeronautique Internationale (FAI). By 1923, however, when the categories had expanded to 42, including seaplanes with various payloads, the Navy’s Bureau of Aeronautics was credited with 22 out of the 33 world records then held by the United States. And by the end of the Twenties, the books showed that out of some 100 competitive events involving altitudes, flight duration, distance and speed, Americans held over one-third the honors, including the coveted absolute altitude record for Class C landplanes. In the latter category, two Naval Aviators had emerged to gain this honor: Lieutenant C. C. Champion (appropriately enough) and Lieutenant Soucek — whose first name was Apollo.

In 1927, the Navy had a unique airplane, the diminutive Wright *Apache*. Its purpose was to fly higher than any other machine — to probe the chilling secrets of the blue above

the earth. Not a war plane, its lines were conventional. Still, it was a fighter. Its adversary? — *air*. Two basic elements made up the Apache project: the airplane and the man who flew it. Both needed *air*, in an environment where the “breath of life” was, literally, rare.

A reciprocating, gasoline-driven engine needs air, with its high content of oxygen, to function. So does a man. The engine of the *Apache* was a Pratt & Whitney *Wasp*, a radial engine of the type Naval Aviation (with considerable wisdom and foresight) had put its money on. But it had a few improvements attached: Scintilla magnetos, a special Stromberg carburetor, “BG” spark plugs, and a “Rootes-type” *supercharger* — manufactured by the Allison Engineering Company. (A supercharger can, by various means, increase the volume of air inducted by an engine — a useful item in situations where you don’t have much to begin with.)

A man is more delicate; you can’t just pump him up with a Rootes blower. So, early in the game, it was learned that a certain amount of extra oxygen could be carried and administered in a fairly simple flask-and-tube

There are those who believe the matter should stop right there. After all, they argue, it is a Navy's business to sail its ships upon *terrestrial* waters — and not become involved with grandiose notions about seas of space. But if we contemplate the motives of that unknown man in ancient times who first hacked and whittled out a log and then paddled into the unknown, we can more easily understand his modern counterpart. The tools have improved; the ponds are larger. But *he* is still the same old *restless* fellow.

for the Oceans of Space

fashion. What was not fully understood was the effect on a human body of low atmospheric pressure at high altitude. It was thought that inhalation of oxygen by the pilot would be sufficient for survival. The facts refuted this hopeful theory.

On the morning of July 25, 1927, Lt. Carleton C. Champion took off from the Anacostia Naval Air Station in Washington, D.C., in an attempt to break the existing landplane altitude record of 37,569 feet, then held by Lieutenant John A. Macready, U.S. Army. The 425-hp. *Apache* climbed to a height registered as 47,000 feet on the cockpit altimeter when two cylinder heads on the Pratt & Whitney Wasp engine suddenly blew off. Parts of the broken engine hurtled past Champion's head, tearing pieces from the plane's wings. As he ducked, the rubber oxygen tube popped from his mouth. He passed out within a few seconds, and the *Apache* rolled over, uncontrolled. As the plane fell towards denser air, Champion awakened in a semiconscious state and found his machine falling and afire. Groping around, he found the lost tube, righted the plane and went into a series of sideslips and dives to blow out the



Lieutenant Patrick N. L. Bellinger, Naval Aviator No. 8, at the controls of a Curtiss AH-3 pusher-type seaplane. Bellinger was the first Naval Aviator to be shot at — in 1914.

flames. The strain of these maneuvers further tore up the engine. Still half conscious, he glided to a cornfield, having fought four fires on the way down. An official examination of the instruments showed that Lt. Champion had actually reached a height of 38,419 feet, a new record.

In spite of the victory, obvious physiological problems had yet to be overcome. Champion's successor saw the need for a face mask which would ensure that oxygen, *under pressure*, would reach the lungs.

The man named Apollo (he was

called "Sockem" Soucek by his friends) won his wings in 1924 and three years later found himself assigned to the *Apache* project. As a member of the Power Plants Division of the Bureau of Aeronautics in Washington, Soucek shuffled papers for a year before he ever saw the research plane, which was then undergoing a complete overhaul. But from all the technical correspondence and plans he was handling, he became intimate with every detail of the Wright machine. A consuming desire to fly it prompted Soucek to ask his boss, Admiral Wil-

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liam A. Moffett, if he could step into Champion's shoes. The visionary leader of Naval Aviation gave the go-ahead and Apollo Soucek prepared to venture out beyond all men.

One part of the training bears examination — a contrast to today's multi-million-dollar space flight simulators (described later in this publication). In order to test an individual's capacity to function at high altitudes, the subject would be placed in a gradually rarefying atmosphere where, under the scrutiny of flight surgeons, he would attempt to do a number of things, all at once. There was a panel of little lights; if one came on, punching a switch beneath would put it out. On the side was an ammeter and a knob. Turning the knob at the proper rate would keep the meter's needle zeroed. With both hands thus occupied, attention was given to the feet: by pumping furiously on a pedal, the irritating whine of a supercharger-like device could be diminished.

Apollo did fine on this curious exercise — for a while. But as the air within the chamber grew thinner, confusion limited his ability to play the "one-man-band." After what seemed an eternity he was too exhausted to go on. The lights flashed, the needle had run amok, the screaming noise pierced his ears. But only 25 minutes had actually passed and Sockem was deemed "qualified to go to an altitude of 28,000 feet without oxygen!"

Although an understanding of the need for pressurization in flight suits and cockpits was yet to come, the requirement for oxygen at altitude was well known. The method of applying it was interesting. Of his self-designed breathing device Apollo

said, "I obtained the necessary parts from the naval hospital, from the air station and from local drug stores."

The apparatus consisted of oxygen flasks in the *Apache's* open cockpit, rubber tubing to the mouth, "a clothes pin-like gadget to clamp the nostrils shut," and a tube attached to a hot water bottle, "thus enabling the operator to breathe normally — almost."

Before attempting his assault on the altitude record, Soucek made five familiarization flights in the little plane, each time flying higher than before. He discovered that his limit was about 33,500 feet; beyond that his goggles frosted over and he couldn't see the instruments. This seemingly insurmountable problem (which also induced the fear of "frozen eyeballs") was eventually solved by Apollo's brother, Zeus. The younger man, a Naval Aviator attached to the Naval Aircraft Factory in Philadelphia, flew down to Anacostia with a special set of electrically heated goggles he had made. The lenses, a standard, pilot's type, were equipped with a wire element which was attached to an eight-volt, rheostat-controlled storage battery. In principle, this arrangement later proved excellent, the only objectionable feature being the weight of the battery, eight pounds. "That isn't much on an ordinary airplane," said Apollo, "but in one where ounces mean reduced height, the addition of extra pounds is most undesirable." As it turned out, Zeus arrived too late; his brother had already taken off.

Above 25,000 feet the temperature drops as low as 89 degrees below zero. Experience from the Arctic, dating back to 1913, indicated that a proper flying suit, if made from the right material (caribou skin), need weigh no

more than nine pounds and yet would provide complete comfort. The user was advised, however, to refrain from wearing any clothing underneath. The fur suit was to be worn next to the skin. Therefore, Soucek's attire consisted of: a caribou suit; a nutria fur-lined helmet/face mask; fleece-lined, vented goggles; lambskin boots; two pairs of muskrat mittens ("the second pair makes one's hands rather clumsy"); golf stockings; and an athletic supporter.

"The golf stockings and jockey strap," said Soucek, "were in a sense unnecessary refinements. By wearing them I violated the underwearless doctrine. They provided no additional warmth and were worn for civilized purposes only."

On May 8, 1929, the *Apache* was fueled with 40 gallons of gas, while the flight surgeon packed Soucek's nose and ears with Vaseline-coated cotton wads. Then the suit was donned, "the ends of the trouser legs wrapped around and gripped in place by the clamping effect of the boot tops." His nose clip was attached and the helmet put on. "The pilot must see to it," Soucek later advised, "that the assistants do not draw up the helmet and neck piece straps too tightly; the entire clothing regalia should fit loosely in order that blood circulation not be retarded. Over-zealous helpers are apt to draw up any slack strap very firmly in order to make the grotesque looking pilot appear as shipshape as possible."

After a run of less than 75 feet, the *Apache* leapt into the air and climbed smoothly. It was an uneventful flight to 38,000 feet, the engine and oxygen systems of the little research plane functioning perfectly. Thereafter, prog-

ress lessened. "At this height, the frost began to appear on the goggles" and, by the time he reached 40,000 feet, engine rpm had dropped, "About 40 minutes had elapsed since leaving the ground . . . I periodically felt weak. Frost now covered the inside of the goggles. But I knew that a record was within my grasp, so I decided not to return until I had gone as high as I could.

"I pushed the goggles up on my forehead and placed my head as low as I could in the open cockpit. To my surprise, I felt no excruciating pains (from frozen eyeballs) whatever. Instead, the new visibility was encouraging. I could discern colors on the ground; the earth presented a beautiful sight — perfectly natural but greatly reduced in size. I thought I was over the city of Washington, but was mistaken as subsequent events disclosed.



Lieutenant Carleton C. Champion at the time of his harrowing but record-breaking flight to 34,419 feet in July 1927. During his descent, Champion successfully fought four fires.

At left, Lt. R. C. Saufley, Naval Aviator No. 14, smiles in this 1915 photo. Saufley established several world's altitude records before crashing to his death at Pensacola the following year.

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“Soon the skin around my eyes began to hurt, but my eyes themselves did not pain. Fearing the results of frozen skin, I pulled the goggles back down. Then I could not see the instruments, much less the horizon or any reference point.”

Soucek was flying blind, barely. The *Apache* became extremely hard to handle; it was near its stalling point. The grease in the control system had become stiff, causing difficulty in movement of the stick — “it required every bit of strength I had to lift a wing. I attempted to use my knees on the stick and my right hand to hold the goggles away from my eyes about an inch.”

To make matters more difficult, Soucek had to operate the emergency oxygen valve with the same, heavily be-mittened hand while his left was employed exclusively for the throttle

‘ . . . our last record will serve only to sharpen the keen edge of foreign competition.’



LT. APOLLO SOUCEK, SUITING UP AND READY TO GO

and supercharger valves. As a safety precaution in case of blackout, those controls were tensioned with a bungee cord. To keep them open required a constant forward pressure. The fatigue began to tell.

“The plane dropped off in a right spin. Removing the goggles entirely, I grabbed the stick with my right hand and released the throttle and supercharger controls from my left. Both levers immediately closed. The spin cost 2,000 feet of altitude; to regain that, plus a few additional feet, did not appear at that time to be possible. Besides, I was somewhat alarmed to find myself over Chesapeake Bay.” It took 25 minutes to get back to Anacostia and land — where it was found that eight gallons of fuel remained in

the *Apache*’s tank. But the Navy pilot had set a new world’s altitude record.

Although Apollo Soucek went on to greater heights, his comments on that particular flight are noteworthy. “It was valuable. Something was gained. In the Navy, we enter research work such as altitude flying for a definite purpose; records are secondary matters that are useful only as goals for which we strive. The *Apache* is a flying laboratory; the height she attained proved the experiments were based on correct formulas. The equipment in some parts of the plane and its power-plant is just a step in advance of what will appear on standard aircraft of tomorrow.

“It is natural to suppose that men in

foreign countries will go beyond the mark set by the *Apache*; our last record will serve to only sharpen the keen edge of foreign competition.

“Many people have congratulated me on my successful effort. Some of my friends and acquaintances have been most enthusiastic in their expressions: however, I fear that some of my more intimate friends do not think very highly of my spiritual standing. More than one of them has remarked, ‘Well, I suppose that’s about as close to heaven as you’ll ever get!’

“A remark like that causes one to think and wonder about his past life. But I’m not so sure that heaven is such a desirable place, after all, if conditions are anything like those I experienced above 40,000 feet.”



WRIGHT
APACHE

S. NAVY

Soucek's predictions were correct; two weeks after the flight just described, a German pilot did better. Other records were set, including some by Soucek, but it had become apparent that aircraft of that time could not truly provide the sealed, pressurized environment for the safe study of the upper atmosphere. The answer lay in balloons.

Settle Up - Settle Down

It was one of those rare, crisp, clear mornings in the District of Columbia, when I knocked on his door, a half-hour early. A man in a robe greeted me, saying, "I was in the shower. Come in and get comfortable. I'll make some coffee when I come down." Vice Admiral Settle (Ret.) went back upstairs to complete his ablutions.

The house was in an attractive, northwest Washington neighborhood. Looking out the window of the dining room, I could see the sloping, wooded yard and then, gazing upward, follow the lines of tall trees, their leaves almost blanking out the blue sky overhead. It was a curious setting; the sylvan scene was somehow incongruous. For, as I thumbed through the scrapbooks he had left on the table — two marvelous, meticulously maintained albums with green leatherette covers and gold inscriptions stating simply: "Campaign I" and "Campaign II" — I reflected on the fact that the friendly, unassuming man upstairs, who lived in a house surrounded by trees, had once been the focal point of the beginnings of the Race for Space.

In 1927, when Captain Hawthorne Gray of the U.S. Army lost his life due to oxygen failure in an open balloon

basket at 42,000 feet, a young Naval Aviator decided to build a better vehicle. The airship officer, Thomas ("Tex") Settle, working with C. P. Burgess of the Bureau of Aeronautics, came up with a design for a sealed cylinder, about seven feet long, in which a man with a life support system and instruments could ride into the stratosphere. He called it "The Flying Coffin." When Settle showed the proposal to Admiral Moffett, the Bureau's Chief ordered its construction at the Philadelphia Naval Aircraft Factory.

But about this time there was another of the ever recurring "tight money" situations. As a result, budget problems forced the cancellation of a number of research projects, including The Flying Coffin. Nevertheless, the idea persisted. In Europe, physicist August Piccard developed it into a spherical gondola and, by 1932, had made balloon ascensions to 53,000 feet.

The following year, Piccard made a lecture tour in the United States. Suggesting that a new flight be made at the Century of Progress Exposition in Chicago, he succeeded in acquiring the necessary backing. The National Broadcasting Company and the *Chi-*

cago Daily News would be co-sponsors. Goodyear would provide the balloon; Dow Chemical, the gondola; and Union Carbide, the hydrogen. Scientists Arthur Compton and Robert Millikan offered equipment to study cosmic rays. For an American pilot, the Navy brought forth the only man in the world licensed to fly all types of aircraft, "lighter-than-air" specialist Lieutenant Commander Tex Settle.

The ascent from Soldier Field was planned for August 1933. Although the gondola was designed for two men, it was decided that in the interest of saving weight, Settle would fly solo. Once again, the "Lone Eagle" concept came into play and LCdr. Settle became a page-one excitement to millions of Depression-ridden Americans. Radio and newspapers followed every step of the preparations until, on the night of August 4, tens of thousands of people jammed into Soldier Field to watch the spectacular takeoff. As searchlights played, the 600,000 cubic foot "A Century of Progress" — the largest balloon in the world — was gradually inflated from a nearby stack of 700 steel hydrogen cylinders. By two in the morning, the 105-foot-diameter balloon, straining at the lines gripped by a score of Navy men,



LCdr. "Tex" Settle looks on as a University of Chicago scientist checks special instrument and flight equipment prior to assault on the world altitude record. Below, the scene at Soldier Field, Chicago, on the night of August 4, 1933 as 125,000 cubic feet of inflammable hydrogen gas mushrooms the gigantic balloon up over the assembled crowd.



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loomed above the crowd. Then utter silence fell as Settle announced he was going to test the gas release valve, a critical control. He pulled the cord, which went up through the folds, and then let go. To his dismay, a shrieking hiss persisted far too long. The valve was not closing properly; somewhere above, the cord was binding. Flight was impractical. Yet, to rip the bag and release the hydrogen in the midst of the crowd was a more dangerous alternative. Settle made his decision: "Let's go!"

Riveted by searchlight beams, A Century of Progress rose to 5,000 feet in the pre-dawn Chicago darkness. Settle worked the cord again. This time the valve remained fully open and the balloon fell toward the railroad yard. Ballast was dumped to lessen the rate of descent. The 15-minute flight ended ignominiously with a crash across the railroad tracks. A morning paper headlined the event: "SETTLE UP! SETTLE DOWN."



There is something about the demise of an aerial machine that *does something* to people. The souvenir hunter emerges. Crowds have been known to rummage through wreckage, their apparent objective being to make off with whatever is portable. At times, even tattered human flesh has had a peculiar appeal. If the wreck is remote, the finder has



A CENTURY OF PROGRESS AT AKRON

opportunity to even *toy* with it. A case is recalled where a farmer leisurely bulldozed over the remains (including the pilot) of a plane which had crashed in his field. The scheme was to hide it from searchers and then sell the metal as junk, later.

But, when in a pack, a dog works fast to get a bone. So, when Tex Settle crawled out of his gondola in the middle of downtown Chicago at an early morning hour, he was naturally concerned by the sight of the mob which was stomping all over his limp balloon. Puffing on cigarettes, a few were already cutting up the fabric, oblivious to the presence of explosive hydrogen. It wouldn't take them long to get to the instruments.

Fortunately, the Marines arrived. As part of the launch crew, they had observed the fall of the balloon and Major C. L. "Mike" Fordney and four of his men had taken a bearing and followed by automobile. The ensuing operation "to keep the peace" until reinforcements arrived was fortunately successful and was noted with cryptic praise by an appreciative press. The bag was saved, would be repaired, and Settle would try again. But an the

next attempt, regardless of weight considerations, he would have a partner to help: Maj. Fordney.

As work progressed at a comfortable pace, word suddenly came from across the seas that a foreign attempt was being made on the high altitude record. On September 30, 1933, a sealed-cabin balloon named the "USSR," manned by three Soviet aeronauts, achieved a height of 62,230 feet! Although Russia was not a member of the FAI and therefore did not qualify for official recognition, the record was a challenge.

Sensing a potential for disproportionate publicity if another attempt were made from Soldier Field, Settle shifted operations to Akron, Ohio. In spite of the move and the relative privacy afforded by the Goodyear zeppelin dock, newspapers continued to give the preparations major treatment — making much of the competitive characteristics of the Russian and American craft. News-hungry reporters devoured every bit of information they could get, and sensational accounts of the supposed "effects of cosmic rays" splashed across the Sunday supplements.

our countries continue to contest the heights.'

Vice Admiral Settle gently stirred his coffee, his eyes lingering on the towering trees beyond the window. "The fruit fly experiment," he said, "was interesting. I read this morning, in the paper, a short article about the *Apollo 12* astronauts who observed the effect of cosmic rays on a human being — they saw little flashes of light, even when their eyes were closed. In a way, the cosmic rays are still mysterious. They certainly were in 1933, and much more was made of them.

"Back then, there was a belief that cosmic rays might affect the gender of a living creature. Since the reproductive cycle of the fruit fly is rather quick, it was decided to install a number of these insects in the gondola for the flight into the stratosphere — into that region where they would be bereft of normal sky protection. The jars were prepared, each with an air hole, of course, and each containing what was claimed to be a virgin fruit fly. Where this notion came from, I can't imagine. For, as bad weather moved in, and the flight was repeatedly delayed, the jars were constantly full of tiny offspring. Noting the concern about this particular experiment, the reporters speculated. And, somehow, the idea developed that a man at high altitude, bombarded by the dreaded rays, might come back — as a woman!

"Confronted with this strange proposition of the Press, I struggled for a reply that would satisfy. I told them, in a very knowing manner, that if, upon return, Maj. Fordney and I discovered ourselves not to be as we had left, we would immediately go back up, get another dose, and be ourselves again.

"But then they asked, 'What if one of you is more susceptible and changes

before the other?' Mmm. I said, 'In that case, upon observation of such phenomenon, the unchanged one will quickly don a parachute and bail out, returning as rapidly as possible to the safety of Earth. The other, continually exposed to the strange rays, will wait until the cycle makes full turn and then follow suit.' I almost had them believing it."

On November 17, the balloon, A Century of Progress, manned by a Naval Aviator and a Marine, arose from the Ohio landscape to an altitude of 61,237 feet — a new, official world's record — yet still short, by almost 1,000 feet, of the actual Russian mark. The Soviets were magnanimous in their praise of Settle's achievement, but part of one of the congratulatory messages gave clue to their intent: ". . . may both our countries continue to *contest the heights* in every sphere of science and technique."

On January 30, 1934, the *Oso-aviakhim* made it to 72,182 feet before plunging back to Earth in a crash

which killed its three crew members. It was said that the Russian balloon may have iced up. The time of year was a factor, too. Some reports claimed that Stalin, against advice, had ordered the dangerous flight in conjunction with the 17th Communist Party Congress then being held in Moscow. He had pointed to heaven and said, "Go!"

The competition went on, but the Russians' worthiest opponent had left the arena. LCdr. Settle went off to China to take command of the Yangtze River gunboat, *Palos*. After a long and distinguished career in both the air and surface Navy, he finally retired from active duty, as a vice admiral, in 1963.

Thomas G. W. Settle, Class of '15, sipped his coffee and, with a sparkle in his eyes, thought back on an adventure that earned him the Harmon International League of Aviators Medal and the Count de la Vaux Medal. The flight was termed "another victory for the American eagle" by the FAI but, as far as Tex Settle is concerned, it was the starting flag of the Race for Space.



MIKE FORDNEY AND TEX SETTLE