Colonel William J. ‘Pete’ Knight and an X-15
The New Mexico Museum of Space History (NMMSH), a branch of the Department of Cultural Affairs of the State of New Mexico, was founded in 1976 as the International Space Hall of Fame.

Publisher’s Note:
The New Mexico Museum of Space History (NMMSH) is pleased to announce publication of Curation Paper Twelve, edited by Assistant Curator Jim Mayberry. It is an oral history of Colonel William J. ‘Pete’ Knight (USAF, Ret.). The interview was conducted in 1998 for the New Mexico Museum of Space History (formerly the Space Center Museum) by Museum volunteer Lt. Col. Wayne O. Mattson (USAF, Ret.) and George House, Museum Curator.

The New Mexico Museum of Space History includes the Clyde W. Tombaugh IMAX Dome Theater and Planetarium; the International Space Hall of Fame; the John P. Stapp Air and Space Park; and the Hubbard Space Science Building (the NMMSH’s Archives and Research Center). All are located on the slopes of the Sacramento Mountains, overlooking Alamogordo, White Sands, and much of the rest of the Tularosa Basin.

The Museum is charged by the state to educate residents and visitors to New Mexico about the history of the exploration of space, with a special emphasis on the role New Mexico has played in those efforts. The International Space Hall of Fame was established to honor those who have helped advance humanity’s understanding of the universe. The museum houses invaluable artifacts and informative exhibits of the remarkable achievements of humanity’s exploration of space.

The Archives and Research Center of the New Mexico Museum of Space History is home to the museum’s archival and artifact collections, as well as a library and research and curatorial offices. The John P. Stapp Air and Space Park, located outside of the Museum, contains large artifacts such as missiles, Little Joe II (the largest rocket ever launched in New Mexico), the Sonic Wind I rocket sled ridden by Colonel (Dr.) Stapp, and other historic items. The IMAX Dome Theater and Planetarium, an Alamogordo fixture since 1980, offers first-run IMAX movies and special presentations, most of it associated with space history and public education.

This issue, Curation Paper Twelve, contains an oral history of William J. ‘Pete’ Knight (USAF, Ret.). He played a key role in the testing of the X-15 rocket plane. On October 3, 1967, he set a world-record when he piloted an X-15 to a speed of 4,520 miles per hour. Equivalent to Mach 6.7, this is still the fastest any winged craft has ever flown.

This interview of Colonel Knight was conducted for the New Mexico Museum of Space History by Museum volunteer Wayne O. Mattson and George M. House, Museum Curator, in 1998. Colonel Knight was in the area to be inducted into the International Space Hall of Fame, which is part of the New Museum of Space History.

All twelve Curation Papers are available at http://nmspacemuseum.org, the website of the New Mexico Museum of Space History.

Publisher’s note: All photographs in this issue are courtesy of NASA, unless otherwise noted.
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Colonel William J. ‘Pete’ Knight and an X-15
Pete Knight grew up in Noblesville, Indiana, and enlisted in the USAF in 1951. After receiving his commission through the aviation cadet program, he completed pilot training in 1953. Flying an F-89D for the 438th Fighter-Interceptor Squadron, he won the prestigious Allison Jet Trophy Race in September of 1954.

After completing his undergraduate education with a degree in aeronautical engineering from the Air Force Institute of Technology in 1958, he attended the USAF Test Pilot School at Edwards Air Force Base [AFB] where he graduated later that same year. He remained at Edwards where he served as project test pilot on the F-100, F-101, F-104 and, later, T-38 and F-5 test programs.

In 1960, he was one of six test pilots selected to fly the X-20 Dyna-Soar which was slated to become the first winged orbital space vehicle capable of lifting reentries and conventional landings. After the X-20 program was canceled in 1963, he completed the astronaut training curriculum at the new USAF Aerospace Research Pilot School at Edwards Air Force Base in 1964 and was selected to fly the X-15.

He had more than his share of eventful flights in the airplane. While climbing through 107,000 feet at Mach 4.17 on June 29, 1967, he suffered a total electrical failure and all onboard systems shutdown. After arching over at 173,000 feet, he calmly set up a visual approach and, resorting to old-fashioned "seat-of-the-pants" flying, he glided down to a safe emergency landing at Mud Lake, Nevada. For his remarkable feat of airmanship that day, he earned a Distinguished Flying Cross. Months later, on October 3, 1967, he accomplished a major milestone, as he piloted the modified X-15A-2 to a speed of 4,520 mph (Mach 6.7) - a speed which remains, to this day, the highest ever attained in an airplane.

During 16 flights in the rocket plane, Knight also became one of only five pilots to earn astronaut's wings by flying an airplane in space when he climbed to 280,500 feet on October 17, 1967. After nearly ten years of test flying at Edwards AFB, he went to Southeast Asia in 1968 where he completed a total of 253 combat sorties in the F-100.

Following his combat tour, he served as test director for the F-15 System Program Office at Wright-Patterson AFB, Ohio. In this capacity, he became the tenth pilot to fly the F-15 Eagle and completed some of the initial evaluations of the fighter. Following a subsequent assignment as Director of the Fighter Attack System Program Office, he returned to Edwards AFB as vice commander of the AFFTC in 1979.

During this, his final active duty assignment, he remained an active test pilot in the F-16 Combined Test Force. After 32 years of service and more than 6,000 hours in the cockpits of more than 100 different aircraft, he retired from the USAF in 1982. In 1984, he was elected to the city council of Palmdale, California, and, four years later became the city's first elected mayor. In 1992, he was elected to serve in the California State Assembly representing the 36th District and, since 1996 he has continued
to serve as a state senator representing California's 17th Senate District.

Among his many honors, Colonel Knight has been awarded the Legion of Merit with one Oak Leaf Cluster, the Distinguished Flying Cross with two Oak Leaf Clusters, the Air Medal with ten Oak Leaf Clusters, the Harmon International Trophy, the Octave Chanute Award, and the Air Force Association Citation of Honor. He has been inducted into the National Aviation Hall of Fame (1988), the Aerospace Walk of Honor (1990), and the International Space Hall of Fame (1998).

Written by Air Force Flight Test Center Chief Historian James Young, October 1999

(Courtesy of NASA X-15 Bios)
Colonel William J. “Pete” Knight
Interviewed by Wayne O. Mattson and George M. House,
October 17, 1998 at the Space Center in Alamogordo, New Mexico

HOUSE: Of course also we are also pleased to have Mrs. Knight and Pete here as well, [and] Pete Jr. And again, thank you all very much for being with us today. We are extremely pleased and honored to have you here, especially our soon-to-be International Space Hall of Fame inductee to add to our cadre of other honorable and distinguished individuals.

[We’re] certainly looking forward to today’s festivities, Colonel Knight. It is great to have you among our other distinguished inductees. To begin with, let me ask you a little bit about yourself, Colonel Knight. When and where were you born?

KNIGHT: Well, first of all, Wayne, I want to thank you for the honor you all bestowed on me to have me here at the Space Center to be inducted. It is really a privilege and I thank you for it. I was born a long time ago in Noblesville, Indiana, 192…

MATTSON: It has to be 13 days ago.

KNIGHT: (Laugh) 1929, November the 18\(^{th}\). I stayed in Indiana for some period of time. Then we moved to Ohio. We ended up in two or three towns in Ohio, and finally ending up in Mansfield, Ohio where I finished High School.

From High School I went on to college for a couple of years – two years at Butler, and a year at Purdue. Then [I] dropped out. The minute I dropped out I was drafted, and drafted into the Army.

At that time, once you had you received your draft notice you could join the service of your choice. So a bunch of us went down and joined the Air Force. We didn’t want to go to the Army. So we jumped on a train in Canton, Ohio, went to Lackland Air Force Base in Texas.

It took us two days to get down there on a train, and went through the Boot Camp, if you will. And when they interviewed me and found out that I had a few years of college, at that time you only needed two years of college to go into the cadet program, they wanted to know if I wanted to go into the cadets. I said, sure, why not! So I took the physical and took the exam and passed it all. They said, “We will call you.”

In the meantime we finished up there, and I went to - They sent me to radio school at Scott Field [Air Force Base], at [East] St Louis, [Illinois]. So I stayed at Scott Field, awaiting and all to go to the cadet program. Every now and then I would check and find out where the paperwork was. [They] finally decided that they had lost the paperwork. Everyone agreed they couldn’t find it, and I was nowhere to be found. So I took the exam again, and took the physical again, and started all over. Finally I was called up to go to cadets, to report to Greenville, Mississippi, civilian contract school.
HOUSE: What year was this, Colonel Knight?

KNIGHT: Aviation cadet. That was in 1952.

HOUSE: Before we go any further, Colonel Knight. Let us regress just a little bit. Who were your parents?

KNIGHT: My dad was William Thomas Knight, and my mother was Mary Emma Knight. That’s who they were.

HOUSE: What were their occupations? The reason I am asking this, do they have any particular influence on you picking you eventual career field?

KNIGHT: No, I don’t think so. Once I got in the Air Force it was pretty much what I could find out and what was available, and what I decided I’d like to do.

HOUSE: What prompted you to pick that particular field? As a young boy did you have that interest all along to fly?

KNIGHT: Well, I think everybody has an interest in flying, whether one continues in that area or not is a matter of circumstance and probably opportunity. Once I had joined the Air Force, and was qualified for the cadet program, then that’s what started the flying.

MATTSON: Beside which the life expectancy of a lieutenant in the infantry, at that time, was meager to none.

KNIGHT: That’s right! I never did like mud and the foxholes. And I had rather go fight the war and come to a clean bed.

HOUSE: So, after your initial training as a cadet - that took place, by the way, at the Naval Academy?

KNIGHT: No, no, Air Force.

HOUSE: Air Force Academy.

KNIGHT: No, no, Air Force. No Air Force Academy at that time.

HOUSE: I was wondering about that.

KNIGHT: The first class in the Air Force Academy was ’59. No, it was Greenville, Mississippi, for six months basic flying training, cadet training.

MATTSON: Flying a T-6.

KNIGHT: Flying a T-6. T-6 was the first airplane that I stepped into. I thought it was the biggest airplane that I had ever seen, in particular in the cockpit. So I finished six months there and then went to Goodfellow [Air Force Base], San Angelo, Texas, continued on in a T-6 into an instrument phase there in formation.

And then finished up at Goodfellow, and went to Victoria, Texas, Foster Field. We were the first class in there. [We] opened up the base. And we were flying T-33s, brand new T-33s. There were no
sidewalks it was mud walks. The base was still under construction. Most of our operations were held in the firehouse.

So it was still rather primitive. But we were the first class in there. Finished up T-33s, graduated, [and] got my wings and lieutenant’s bars all at the same time. And then [I] went to gunnery school in Kendal, flying F-80s, F-80-As and -Bs.

HOUSE: What year was this, Colonel Knight?

KNIGHT: It was in ’53. We were all slated to Korea. But about that time, about the time I finished gunnery school the war was over. So we were all shipped out to ADC. I finished gunnery school in the F-80. [I] then went to Moody [Air Force Base] to go through instrument school, preparation to go to ADC, Air Defense Command.

Then [I] went to ADC - the first assignment was Sault Sainte Marie, Michigan, Ken Ross Air Force Base. Four winters there. Cold, awful cold! But we had a lot of fun there. Again we were opening up the base up there. And the Commander that we had at the time figured that everybody ought to fly everything on the base. And while were, ADC was still in its throes, maturing, so was the base, and we had a hodge-podge of airplanes.

I was fortunate enough to get checked out in every airplane we had, about eleven different airplanes. In effect I was flying them all at the same time. IP [Ed. note: ‘Instructor Pilot’] in about half of them.

HOUSE: That is a little different today I understand that you are not able to cross train, two at the most.

KNIGHT: Oh yeah. But we had a lot of fun there. I went from there I decided - while I was at Ken Ross I won the Allison Trophy Race in Dayton Ohio, at the National Air Show.

HOUSE: I was going to ask you about that. Can you tell us a little more about it?

KNIGHT: After that I figured I could fly an airplane, and was pretty good, and I heard about the test pilot school. I decided I wanted to go to the test pilot school. So I applied for the school, and they told me that, everybody I had talked to said, “The way things are going, you are going to need a degree in order to continue on in a test basis.” I said, “Okay, I will go AFIT [Ed. note: ‘Air Force Institute of Technology’] and get my degree first.” They said, “That’s fine.”

So, I applied and went to AFIT at Wright-Patterson [Air Force Base, Ohio]. In fact I was due to get out. My four years were up, three years I guess was up in ’56. I was due to go to AFIT, I had applied to go to AFIT, but I hadn’t gotten any call yet. If I didn’t go to school I wasn’t going to sign up. So it got down to about the last two weeks. So I jumped in an airplane and went down to AFIT at Wright-Pat, talked to the guy down there, and told him what my situation was.

He finally said he understood. And he said, “Oh no, there is no question about you going to the school, it is just a matter of where you are going, we haven’t decided yet.” I said, “Okay,” so
I went back and signed up, and a few weeks later I was going to AFIT, Wright-Pat, resident school.

HOUSE: What prompted you, by the way, Colonel Knight, to go into the field of test pilot? Did you always have an interest in that?

KNIGHT: No, no. It evolved from being in the flying business, flying fighters, flying aircraft. And there was someone who did the testing and developed these airplanes. And I decided that is what I would like to do.

HOUSE: That is certainly commendable. If it weren’t for individuals such as yourself to do that we would not be where we are today.

KNIGHT: Oh there is always, you can always find someone to do it. But in any event, went to school, and unfortunately I didn’t scream loud enough. Because I guess, the people who don’t scream go to the resident school at AFIT at Wright Pat.

That is a ‘21 class’ and they are all Air Force officers, and they’re all competitive and the school at the time was being accredited, and so it was tough. It was the worst two years I ever spent. If I had known I would have said, no, no, I want to go to one of those other schools, like my friend went to the University of Wyoming.

MATTSON: Who was that?

KNIGHT: Russ Rogers.

MATTSON: That’s where I went in AFIT.

KNIGHT: Oh yeah, others went other places to civilian schools. You know. And they were competing with the kids right out of high school with a different class of people.

MATTSON: The kids were more interested in partying.

KNIGHT: Yes, that is right! You know, so the curve was pretty good. But at AFIT, it was lousy! And, of course, the curriculum they had there - they had to have two or three years in order to take the two-year course. And then you had to have all of the electives out of the way. And so it was nothing but five-hour courses.

Anyway, I graduated, I was about to graduate from AFIT, and started to apply for the test pilot and they said, “You can’t go to two significant schools like that back to back.” And I said, “Wait a minute, you all told me to go get a degree and then I could go to the test pilot school.” So we fought for a while.

And it took me two or three trips to the Pentagon to convince them that yeah that was what they had said, and is what you ought to do. And there is no reason why
you shouldn’t. They are all consecutive, and they are all one dependent on the other, and so why not! So finally I did. I didn’t stay to graduate at the institute. Because the test pilot school had already started, so I just whistled on out there.

HOUSE: What kind of courses did you take?

KNIGHT: At AFIT? Just regular engineering courses, mathematics every semester, chemistry, physics, structures, aerodynamics, control systems, all kinds of things.

HOUSE: Is that where you first learned about experimental planes? Did they teach - was that part of the curriculum -?

KNIGHT: No, no.

HOUSE: Or was that strictly something that you found out later at Edwards [AFB]?

KNIGHT: No. Well, certainly, we had heard about the X-series airplanes for years, ever since the X-1. And the X-1 was a flying laboratory, and a platform to investigate a specific phenomenon, and that worked out pretty well.

So, they began to build X series airplanes to investigate different phenomena associated with aerodynamics. So there was where all of those - were all significant airplanes and ones that everybody wanted to fly.

HOUSE: What year did you graduate from Test Pilot school then?

KNIGHT: ’58. I stayed right there at Edwards. Stayed at Edwards from ’58 to ’69.

HOUSE: Did any of your tours bring you over here to Holloman, by any chance?

KNIGHT: Well, I had flown over here a number of times. We came over and chased the MACE and the Matador.

HOUSE: Ah! What years were -?

KNIGHT: In the late 50s, early 60s. I don’t know what year. I know I had been over here a number of times.

HOUSE: Can you tell us a little more about the chasing of the MACES and the Matadors?

KNIGHT: Well, they were missiles and they were going to be launched from here. And they were Zell launched.

HOUSE: You mean zero-link launch.

KNIGHT: Yeah, zero-link launch; some of them just off the ground, some of them out of a shed. I remember in particular the ones out of the shed were a little bit different in the fact that, the idea was to come by and to pick up the missile as it was launched.
You see, the timing was rather critical. And you didn’t want to get ahead of that thing, because you never knew where it was going to go. And so, the surprising thing always was when you came by to pick it up you kept looking at the shed and it didn’t come out, and it didn’t come out, and you went by and you would say, I hope that thing doesn’t go now. So you got away from there as quick as possible.

HOUSE: Wayne was down there launching them about that time.

MATTSON: Did you ever encounter any of the MACEs with the 100 foot cable where it didn’t break away from the drone.

KNIGHT: I knew about it, but I didn’t encounter any of it.

HOUSE: What were you flying -T-33s at the time?

KNIGHT: No, no, F-100s.

HOUSE: F-100s?

KNIGHT: Yes.

HOUSE: So, at Edwards then, Colonel Knight, how did you first become involved with the X planes there, particularly the X-15?

KNIGHT: Well, I was at Edwards in ’58, and there were numerous programs going on at the time, and of course, I was in what we called Test Ops, Test Operations, and that was the pool of test pilots from which the commander assigned test pilots to various projects, whether it be the 104, 100, the 105, 106, T-38, 101, whatever it might be.

Whatever programs were coming up, [and] then the commander would assign a test pilot to that program. So I was on numerous programs for a couple of years. And finally we were involved in the X-20, the Dyna-Soar [Ed. note: ‘Dynamic Soarer’] program. And we needed pilots for that.

So I was picked as one of the four Air Force pilots to participate in the Dyna-Soar program. So we spent three years with the Dyna-Soar, and eventually the X-20, going back and forth to Seattle. We kept one or two pilots in Seattle all the time during the development phase.

HOUSE: Now the Dyna-Soar basically was a flying wing, flying wedge rather.

An X-20 Dyna-Soar

KNIGHT: It was a delta wing airplane. Anyway it was a small shuttle. It basically was a 10,000-pound airplane, and a 1,000 pound payload, 75 cubic feet with a 1,000 pound capability, with one pilot. Numerous configurations for the payload bay - we could put various spy instrumentation in the bay. Or we could configure the bay to carry four people in a full pressure suit for rescue operations from space.
So, it was a pretty impressive vehicle. It would have been launched off the Titan, top of the Titan 3C, orbited the Earth, re-entered, [and] landed at Edwards as a normal airplane.

HOUSE: So, how long were you involved with the Dyna-Soar?

KNIGHT: It was cancelled December the 10\textsuperscript{th}, 1963.

HOUSE: Why was it cancelled? Out of curiosity - had it just served its useful purpose?

KNIGHT: Right. A number of reasons why it was cancelled, I am sure. But at that time, Eisenhower had dedicated space for peaceful purposes, for one thing. And the Space Race was on as a result of the Russians, the dollars for the Space Program was critical, and the military did not have a mission in space.

The BSD people and the Aeronautical Systems Division people at Wright-Pat were, of course, airplane people. They said you have to have an airplane in order for you to make it a reasonable turn-around time to put a vehicle in orbit, land it, minor refurbishment, and to recycle it.

So the Air Force fought among themselves, budget, and no mission in space. And it all added up to the fact that McNamara wasn’t too hot with any program. And the minute Kennedy was killed McNamara killed a number of programs.

HOUSE: So, basically, from the X-20 then you moved on to –

KNIGHT: Well, when the X-20 cancelled, the four of us, we had to find a job right quick. Two of them went back to school at USC. Jim Wood went back to Edwards and picked up a program. I wanted to continue in the space program in some way. So I went back to the ‘space school’ at Edwards, the Aerospace Research Pilot School was the new name of the old Test Pilot School. And it picked up a space mission.

And so that is why the program was really changed from Dyna-Soar to the X-20 to try and give it a research mission. But that didn’t sell either. And by the same token, the Air Force couldn’t get their ducks lined up, and they didn’t know what the best way was to go into space. There was the BSD, the Ballistic Systems Division. And Los Angeles said, “You know, no room for wings in space, not volumetrically efficient.” So they wanted a capsule, a ballistic reentry more than anything else.

And so the first half of the test pilot school now was aerodynamics and the second half was space. So I jumped into the space portion of the class, went six months and finished the space portion of the Test Pilot School. And then worked on a program after that for a few months, and then was assigned to X-15 program.
MATTSON: Who were the other three pilots?

KNIGHT: Jim Wood, Frank (?) Gordon, Gus Rogers, and myself … We did pick up Al Crews later, probably in the last year.

HOUSE: Had you seen the X-15 before? Or was that your first exposure?

KNIGHT: Oh no, everybody had seen it. I had chased quite a bit. It started flying in ’59. So I had chased it numerous times, I was one of the regular chase pilots on it.

HOUSE: I guess I ought to rephrase that. What I really meant to say was, in so far as seeing it, had you ever been exposed to actually being in the X-15 before then?

KNIGHT: No, I had not gotten in it I guess, but I had looked –

HOUSE: In so far as to how to fly it, and all of the curriculum involved in piloting it?

KNIGHT: Well, I was somewhat familiar with it.

HOUSE: Can you tell us a little about your initial exposure to it, Pete, in so far actually flying it? First off, was it any different? Obviously it was different from anything else you had ever flown before.

KNIGHT: Yes, it was a different [type of] airplane.

HOUSE: Converting from a rocket, I mean from a plane to an actual rocket powered plane. Almost a difference between night and day wasn’t it?

KNIGHT: A different kind of propulsion system, different kind of accelerations, yes, it was a different aircraft with a lot higher performance than anything else available within the jet engine community. The training necessary to fly the airplane is pretty standard from checking out in any airplane.
First of all, gotta be with all of the systems. So you go through a ground school with the various experts in each of the systems doing the briefings and the teaching you all about the various systems in the airplane. And then we had a simulator that was a procedural simulator primarily. So you would work on flight plans on the simulator.

And you would talk to the pilots who had flown it. So it was a regular training program. Then you made your first flight. The first flight was always a free one. In essence you could do some things that you wanted to do and become familiar with the airplane as opposed to doing a strictly research lesson.

MATTSON: The simulator? Is that the one that Jack O’Cessicky’s outfit had?

KNIGHT: No, NASA had this one. Jack and Bob Hoy and those people had the - They had worked on a Dyna-Soar simulator for a while. But I don’t think they ever had a very sophisticated X-15 simulator.

MATTSON: I remember seeing Boy Rush flying some profile he was going to simulate across the street from the engineering building.

KNIGHT: That could have been. But again that wasn’t the simulator that we used for the flight planning.

MATTSON: Okay.

HOUSE: Tell us a little bit about your first flight in the X-15, Colonel Knight, the experiences what did you - ?

KNIGHT: Well, it’s always exciting, the first flight, and everything was pretty much as expected except the launch. And nobody can prepare you for the launch. They can tell you what is but when you first hit that button and you drop away it’s like, you know, you are sitting in a chair and just falls right out of bottom. And so that’s a surprise, but it is momentary. And once the engine is lit and you are on your way it is pretty much instinct flying the airplane.

HOUSE: How many Gs did you experience?

KNIGHT: In acceleration it gets up to about 4 Gs at shut-down.

HOUSE: Had you experience that in the centrifuges in pilot training? - Or how many Gs before?

KNIGHT: No need to experience those Gs in a centrifuge. They are not that difficult. I have done numerous centrifuge programs for other reasons and taken up to 15 Gs. That’s hard work. And that hurts.

MATTSON: Did you light your rocket engines before you dropped?
KNIGHT: No, no. After you get the engine up to what we would call a “pump idle,” a pumping idle condition. And the minute you launch you light the engine.

HOUSE: What year again was it, your first flight?

KNIGHT: I guess it was ’65, sometimes in that –

HOUSE: Anything unusual take place?

KNIGHT: Yes. You know, everybody, I think we could probably count on one hand the number of flights that we had that something didn’t go wrong. Every flight had an emergency of some sort. It was just the nature of the airplane. My first flight I had an APU shut down.

HOUSE: APU means the - ?

KNIGHT: Auxiliary Power Unit. They are little engines mounted right behind the cockpit. They provide our hydraulic and electrical power to support the airplane. You can’t get anything but mechanical out of a rocket engine. So we had these little steel units that we used. And I had one of them shut down.

You know, it was not critical it could still operate with just one, but that means you have lost and if you lose another one you are in trouble. So I had to restart that. But I think everybody had something happen on their first flight. I checked on Mike Adams, and his first flight he had a tank rupture and he had an early shutdown. He had to go into ‘teatherback,’ and so everybody had emergencies.

MATTSON: That was a drop over teatherback?

KNIGHT: No. It dropped over at Silver Lake, or some place. It was his first flight. It was his free (?)

HOUSE: Now tell us a little about your world-famous flight, Colonel Knight, where you actually set a new world speed record, now that we are all on this particular subject. What flight number was that for you?

Pete Knight in specialized flight suit

KNIGHT: I don’t know what flight number it was. They are all recorded, and you can look that up and see which one it was. The program that I was assigned to was the buildup - the speed buildup program on the X-15, to take it out to Mach 8. And the reason we wanted to go to Mach 8 was to develop a little scram jet engine and that was going to be carried on the lower ventral part of the airplane.
The little scram jet engine was a supersonic flow combustion engine that we were going to develop. And in order for it to function we needed a local Mach number of about 7. That meant we had to get that basic airplane out to about Mach 8. And that’s why the envelope expansion.

And in order to make the X-15 to go faster you had to add more fuel. And so we added the two tanks. The airplane experienced a pretty severe crash on Mud Lake. Jack McKay had rolled it over. When they modified it, refurbished the airplane, they extended it three feet and that provided the volume for the fuel for that little engine, for fuel tank.

The two big tanks that we carried externally were for added fuel to let the airplane to go faster, and as the airplane goes faster now we are going to be in the high heat regime for a longer period of time. That means that we are going to exceed the temperature limits on the airplane.

So we had to cover the airplane with the ablated material, an insulator, whatever you want to call it. We had molded high-density pieces of material that we glued on the leading edges of the wings, the horizontals, the verticals, and the leading edge of the canopy. And the rest of it was sprayed on up to thickness.

And then we painted it white to give it some structural integrity, because we had to work around that stuff. And if that material got into the LOX system and it was hit by a valve, it would detonate.

HOUSE: Liquid Oxygen?

KNIGHT: Yes - that would be catastrophic. So we had to put a number of filters throughout the system. Then [we] painted the material white to make sure it had some structural integrity. That material, as we found out as it would opaque, or char, or whatever it does it would come back and make the windows opaque. That means we couldn’t see out of the airplane, and you can’t land it if you can’t see it.

So what we did was that we covered the left window with an eyelid. So at launch you had the right window to look out of, go through the high-speed portion of the flight, [and then] decelerate back down below Mach 4, someplace. Then open the left window, the eyelid, and hope the lakebed is on the left, make a left turn and land.

So the tanks made a three-stage vehicle out of, the B-52 being the first stage, the tanks being the second stage, and then the internal fuel being the third stage. That is how we were going to get out to Mach 8. And the records I was setting were as the result of that build up process, the first record was 6.3, the second was 6.7. We would have gone on from there to next flight. But the next flight never took place, because they cancelled the scram jet engine program. Now there was no reason to go any faster.

HOUSE: Why did they do that, Colonel Knight? Why did they cancel the scram jet program?
KNIGHT: I have no idea, other than, probably, again, no mission, no requirement, and no money.

MATTSON: Was that the Marparts scram jet?

KNIGHT: Yes. We had a dummy engine underneath, just to develop the configuration of the X-15. And we had to provide them with data that we had with the dummy instrument and with the temperature and pressure throughout the little engine. We provide that data then to the engine manufacturer for his development.

HOUSE: You actually earned your astronaut wings, if you will, on that world speed mission? Is that the one, or was that a subsequent one?

KNIGHT: There were two different kinds of flights. One speed flight, and another one an altitude flight, and they were both different.

HOUSE: Your altitude obviously, was the one where you earned your astronaut wings. That was over 53 miles up then.

KNIGHT: 280,000 feet.

HOUSE: Can you tell us a little bit about that, Colonel Knight, your experiences, what you observed? In fact I understand NASA, at some point, didn’t even allow, not NASA, I am sorry, the Air Force didn’t allow some of you all as X-15 pilots to actually go that high, some were forbidden. Is that true?

KNIGHT: No, not that I know of. We all flew all three of the airplanes. And we used all three of the airplanes for different reasons. The number two airplane, the high-speed airplane, was not going to go to altitude anymore.

In fact, we had closed up the reaction control system on the airplane. The number three airplane was an airplane that had a sophisticated, newly developed control system in the airplane put in by Minneapolis Honeywell, called a Rate Command Self-Adaptive Control System.

So that was the airplane we used for high altitude work. Number one we used as a basic airplane for normal experiments, medium altitudes, medium speed, etc. But Joe Walker set a record in the airplane with the altitude of 354,000 feet. It was no - We figured could get the airplane to 500,000. But what you do is increase the risk then of the re-entry if there is any kind of failure as you exit, or as you are outside, or whatever, then re-entry may be difficult.

So we kind of limited the airplane to between 250,000 and 300,000. That gave us enough time to satisfy all of the experiments that we were doing. We had a little compartment in the back of the cockpit that doors opened up; experiments came out and did their thing. Then we would bring them back in, close the door, and re-enter. And we could give them about seven or eight minutes time in Outer Space, star-tracking, or whatever.

HOUSE: Obviously, you could see the curvature of the earth, etc.

KNIGHT: Oh yes. We didn’t have time to sightsee too much but, from, depending on from where we launched from I could see from San Francisco Bay all the way down to the tip of Baja
California. Yes, you can see the curvature and it’s black.

HOUSE: Any other unusual experiences during your flights that you can relate to us?

KNIGHT: No, no. They were fun flights. You would re-enter, glide back and land on the lakebed.

MATTSON: ‘Dead stick?’

KNIGHT: Always. Yes. But that was planned dead stick. It wasn’t an emergency.

HOUSE: How many flights did you have altogether then?

KNIGHT: Sixteen.

HOUSE: Can you relate to us what culminated from the majority of those flights, in so far as what the Air Force and NASA were able to learn from them, glean from them?

KNIGHT: Well, the airplane was a research vehicle, designed to investigate hypersonic velocities, and altitudes, above the atmosphere, to investigate the ability to re-enter with a winged vehicle, pilot controlled, to evaluate physiological stresses on the pilot. Most of the flights we were pretty well instrumented.

MATTSON: The airplane, you, or both?

KNIGHT: No, the pilot. Well, the airplane is always totally instrumented. But we were instrumented as well. So there was the physiological data that was gathered, there was structural data, there was materials data, stability and control data, probably the most successful research program that has ever been run. And data has been on most all programs since then. We developed pressure suits, various physiological support systems.

An X-15 under the wing of a B-52

HOUSE: A true testament to your expertise in so far laying the groundwork, if you will, for future space endeavors. If it weren’t for test pilots such as you none of that would have been proven. We wouldn’t be as far as we are today – again, a testament to your expertise there, Colonel Knight.

KNIGHT: It was fun and they paid me to do it.

HOUSE: Not too many people can say that. Well, what did you do on completion of the X-15?

KNIGHT: Well, you remember, at that time the Vietnam War was going pretty hot and heavy, and the Air Force had made a decision that nobody was going back for a second tour before everybody had gone at least one time. And most of the people in Test Ops had gone and come back, and there I was still there.
And I said, “Don’t you worry, as soon as the X-15 cancels, I will have orders in 24 hours.” Well, I missed it, it was 48. I had volunteered before. So I told TAC, “I am a volunteer and I’ll go in any airplane you want as long as I don’t have to go six months to learn how to fly it. Every airplane you are using over there I have flown, so you pick the airplane.”

So they said, “Well, how about the 100?” And I said, “That’s fine.” So I went to Luke, got eleven rides in the 100, got recurrent in the weapons, deliveries, guns, bombs, rockets. Then I went to Vietnam. I spent a year over there and flew 253 missions.

MATTSON: Were you flying strictly fighters? Or were you piloting Evac outfits?

KNIGHT: No, just straight [F-]100 fighters…. I came back and went to Wright-Pat. Jim Wood was already there. And I had been following Woody around about my whole career, about two years behind him. So he was in the F-15. So he asked if I wouldn’t come back and join him in the Test Directorate of the F-15.

And the plan was then for me to take over the Test Directorate, and Woody would go to Edwards and become the Test Director at Edwards. So I came back and end up the Test Director on the F-15 throughout the whole development of that airplane through first flight.

HOUSE: Did you ever get a chance to pilot the F-15?

KNIGHT: Oh yes. I was number 10, was it 10? - To check out in the F-15.

HOUSE: I guess I have to ask this question, Colonel Knight, if you had, in conclusion, if you had to do it all over again, would you do things the same, or what would you do differently, or would you do anything differently?

KNIGHT: It was all very satisfying. I don’t know what else I would do differently. It was all a lot of fun and very satisfying.

MATTSON: If I remember correctly, after you set the speed record in the X-15 you were on, I think it was “I’ve Got A Secret” with some guy who did it on land and someone did it water, [or was it ] “What’s My Line?”

KNIGHT: Was it “What’s My Line”? Yes. It was with Lee Taylor - and myself. Funny thing about it was Lee Taylor came in and had a cast on his leg, and Greg came in a shirt and a pair of pants, and I came in a uniform. They had a hell of a time. They all got off on a kicker. I must have rescued one of them, or whatever as a military. They never did get who we were. I was on another – “To Tell the Truth.”
KNIGHT: From Wright-Pat I went to ICAF [Ed. note: ‘Industrial College of the Armed Forces’]. I spent a year in Washington going to ICAF, and came to Wright-Pat as F-15 Co-Director, and finally ended up as Fire Attacks Co-Director. And then Phil Connelly called me one day and said, “How would you like to come to Edwards and be the Vice Commander?” So we moved to Edwards.

HOUSE: Well, Colonel Knight, I just have been given the signal to conclude this segment. Of course, we certainly amenable to conducting this interview further at a different time. We hope to do that. We could literally spend all day here. I know I have been hitting just the tip of the iceberg on a lot of what you did.

But certainly look forward to subsequently getting into more of your research and space related endeavors in greater details, but for the time being, we are certainly pleased and honored you have shared your recollections for posterity with us. Wayne, anything else?

MATTSON: I would like to ask about the museum out there. They are sharing of the Air Force Museum, Flight Test Center Museum Foundation. Physically, where is the museum?

KNIGHT: I was, not the chairman anymore. Once I got involved in politics full time I kind of had to drop a few things. The museum physically is on Edwards Air Force Base. It’s on Rosemont Boulevard.

I don’t know whether you remember or not but coming out Rosemont Boulevard toward Rosemont, you come to the Golf Course. They’ve got an area there. They’ve got airplanes. They’ve got about ten airplanes out there now somewhere in there.

They just finished putting up a building. They got the money for the building and in the process of finishing off the inside of the building. Then the museum will move from the Commissary (PX) area to the new building.

MATTSON: Do they still have the P-59 in front of headquarters?

KNIGHT: P-59 is still on the pedestal in front of headquarters. And there are other airplanes around the base on pedestals.

MATTSON: They still have the NF-104 in front of the test pilot school?

KNIGHT: Yes. That was another rocket-powered airplane.

HOUSE: Again, looking forward to getting into more of your endeavors, Colonel Knight. In the meantime, thank you very much. Colonel William “Pete” Knight. Thank you very much also, Mrs. Knight and Pete [Jr.] for being with us today as well. Again forward to later on when you become one of our newest International Space Hall of Fame Inductees. We are honored.

KNIGHT: Thank you very much.

HOUSE: Thank you, Sir.

Transcribed on February 11, 2004, by Howard Hallmark.
B-52 with X-15 prior to Colonel Knight’s record-breaking flight, October 17, 1967.

X-15A2, First Flight with Dummy Ramjet Attached May 8, 1967
Colonel William J. ‘Pete’ Knight (USAF, Ret.)