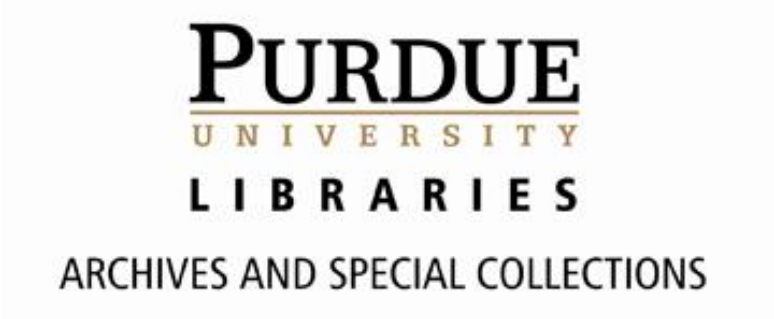
Paul Petty Interview

Conducted by Tracy Grimm and Rita Baines on August 27, 2013



The following interview was conducted with Paul Petty (PP) for the Purdue University Oral History Project. It took place on August 27, 2013, at Purdue University. The interviewer is Tracy Grimm (TG), Barron Hilton Archivist for Flight and Space Exploration along with Rita Baines (RB), Director of Development Communications Purdue School of Aeronautics and Astronautics.

TG: Welcome Mr. Petty. Thank you so much for coming here to talk with us today and Rita, thank you for joining us. Mr. Petty, I would like to start by asking a few questions about your childhood. Could you tell us where you were born and what it was like growing up?

PP: I was born on a farm in southern Indiana. I am a depression kid, I was born in 1927. The 1930s were, I don't know what you would say as a time, we never really ever wanted for anything, but we didn't have anything to spare either. Being on a farm was nice. We grew a lot of the food we ate. There were four of us, kids that is, all still alive. In essence, we had a good time.

TG: What city of town, where was it?

PP: It was Daviess County, north of Washington. The school I went to Elnora. Not a large school. Of course, you know, I did well in school. I was president of my class, which was not big, for four years running. There were 19 of us. Every one of the boys went to college. I left to go in the Navy, which sent me to schools. I was always, I wondered and I was scared how was a kid from a little Podunk school going to ever match up with these high school kids from Indianapolis, Cleveland, and what have you. Turned out it didn't make any difference.

TG: [Laughs]

RB: [Laughs]

PP: It was what you did, not where you went to school.

TG: Right, and how hard you worked probably.

PP: And how hard you worked at it. I went through high school. I never ever took a book home or did any homework at home. I could do it all during the day and got it all done. And during the war, the high school was shortened to mid-April so we could go work on the farms. That's what we did. But I got a good education, believe it or not. I had some great teachers. No regrets. It was a strict life. We worked, my brother and I had specific things that we had to do and nobody did them for you. You came home at ten o'clock at night on a cold windy day; your chores were still waiting for you. It was a good lesson. So, we learned how to do things. But I had no desire to stay on the farm.

TG: [Laughs]

RB: [Laughs]

PP: I knew that when I graduated that I was going to do something else. I was fortunate to get into the Navy Halloway program. I'll tell you an even funnier story, when my dad took me to sign up for the last time and I had to take a physical, I was below the weight limit, so I said to the Seaman who was running, the test "What do I do now?" He said, "You flunked 'cause you don't weigh enough. Tell your dad to take you down to the corner store and buy a bunch of

bananas." I said, "What the hell is that going to do for me?" He said, "For Christ's sake, eat 'em." So I went down to the store, my dad bought a bunch of bananas, I sat there and ate bananas, and then I went back to take the test and I passed. And that's how I got into the navy.

TG: [Laughs] Is that a true story?

PP: When he said that, I felt, "What the hell is he talking about?"

RB: So have you eaten bananas since then?

PP: Oh yeah. [Laughs] So I went into the Halloway program.

TG: Was that at Purdue, or did you go straight into the Navy?

PP: No, the program I was an eight year program. I don't think my father; he thought eight years was a long time for a high school graduate. What the program entailed, they would pay for four years of college, I would become a pilot and a Naval Officer. As it turned out, later on, they relaxed the requirements enough that you could fulfill your eight years by staying on naval reserve; you didn't have to stay on active duty. So, I was on active duty for five years then the last three as a reserve. While I was at Purdue, I flew out of Glenview Naval Air station 120 miles away. As you would expect, it was a little taxing. And I forget the name of that road, but there is a road north of town that is just straight as an arrow, and I was coming back one Sunday night on that road, by myself, [Inaudible], and went to sleep. So, I just kept going straight and ran over the guy in front of me. I hit him from behind. He was shook up, man. I was shook up. I survived, fixed the

car, and life went on. It was, of course as you know, a busy time. One weekend out of every month I had to go up, drive up Friday night, come back Sunday night. So the Navy sent me for my first semester to the University of the South. Which, from high school to the University of the South, was an experience. I mean, the instructors wore gowns; it was, absolutely, 100 percent, on the honor system. We took a test, they put the test on the board, had you the little booklets, fill them out, put up in my mail slot and then leave. Small school, there were, oh, 750 students, all male, and all male college. They also took seriously, educating us. Once a week, we had afternoon tea with an instructor. Many nights, we got an invitation to come to an instructor's home. My English instructor, I forget his name, but he was a character. Here we are, a bunch of 17 year olds from wherever, we started off every evening with a shot of Southern Comfort.

TG: [Laughs]

RB: [Laughs]

PP: All gentlemen drank Southern Comfort. We had some animated discussions, is that what you say?

TG: Mm Hmm.

RB: After the Southern Comfort?

PP: [Laughs] *After* the Southern Comfort. It was a unique experience to go to the University of the South. Ann and I dropped by there, oh I don't know, a few years ago, and it is so changed. [Laughs] I was hoping it would be still like it was, but of

course it can't be. Then after my first semester, they sent me to the Speed Scientific School at the University of Louisville. I went two semesters there. They had a program that they call 'Selectly'. We were going to go in to pilot training. The first thing they wanted to do was to find out if we could ride an airplane without throwing up, you know. That's where I first soloed. My mother saved, the tradition was that when you soloed, if you soloed, then you cut the shirt tail off and everybody signed it, so I sent it home to my mother, when she passed on, low and behold, there was the shirt.

TG: Aww.

RB: Aww.

PP: So, Ann has it framed by my desk. They were just interested if you could manage to solo in ten hours, if you did that, it was a check point, and you went on. Then I went to Iowa pre-flight, and it was cold. That's what I most remember about it. I had an easier time than a lot of the students because I played on the basketball team. So, I played at Iowa. Once we got out of pre-flight I went to Corpus Christi Texas, for basic flight training. And then from there I went to Pensacola for advanced training, and I played on the Pensacola team. That was a real drain because we would fly somewhere, I never got any benefits, or any excuses because I was going somewhere on basketball. I'd get home at two o'clock in the morning and I still stood in line at 5:30.

RB: Kind of like going home and doing your chores at ten o'clock at night. [Laughs]

PP: Boy that's right. But I survived all that. I had my heart set on going into advanced training to fly Corsairs.

TG: Corsairs. About what year is this?

PP: Well, 1946 I was in Corpus, so Pensacola….I was at Pensacola in '46 and '47 winter and then I went to Jacksonville for advanced training. I got my wings in June of '48.

RB: How did you parents react to your decision not to go into farming? You were gone for quite a while doing all these different places. How did they respond to that?

PP: My mother was very, very supportive in not staying and working on the farm. My dad could have used the helped because at that point, we still didn't have all the equipment that he had later. To a large extent, they left it up to me. If that's what I wanted to do then "Ok". I got my wings in '48, served cruisers on the east coast, on the big carriers. Went to Baffin Bay, went inside the Arctic Circle. Flew over places where buildings on the map, not towns. Not much there. Weather was terrible, but we survived. The fatality rate for naval fighter pilots was five percent; you say "What's the chance I am going to make it 20 years?" But that wasn't really convinced me that I wanted to change careers. It was '48-'49, before the Korean War the defense department was cutting back. We hardly got enough gasoline to fly our mandatory four hours a month. There was no money. That's when the Navy decided that we would go into the reserve. They would let us change our contract. Which I did. There were, as I remember it, 52 schools that

were in the Navy program. Purdue being one. Being from Indiana, that was my first choice. My friends went to, my best friend, went to Ohio State. They were insistent that I come. I went over to Ohio State and looked into going there. They were just, I don't know, the atmosphere of an out of state student talking to the registrar at Ohio State was terrible. When I came back and talked to the people here at Purdue, they couldn't have been more friendly, more helpful, more understanding, when I said, "I have taken these courses already etc.," They would say, "Here are the courses you have to take." And I'd say, "But I have taken all these courses." No problem. Everything was so different. I came here and never looked back.

TG: Could you talk about your advisor? What you were telling me earlier?

PP: Oh ok, yeah. I'm still a little nervous about his name, but I think it was Paul Stanley. What they did for registration for each semester, in those days, is that you filled out your wish list of what you wanted to do. Then you'd have to go and sit down one-on-one with the advisor. He was tough. He said, "You are at Purdue, damn it you are here to learn. No basket weaving courses or carpentry shop." I had good grades. I ran about a 5.5 index. He would get me into all of these advanced classes because he thought that was the thing. And he was right, of course. When I got my BS degree, I lacked two math courses for a masters.

TG: So you had done quite a few advanced courses!

PP: I did a lot of advanced courses. And as I said, I took Rocket Engines from old man Zucrow himself.

RB: Wow

TG: What do you remember about him?

PP: He was not a great instructor, by the way. He would come in and start on the blackboard and write equations from side to side. We had to copy them down because there wasn't any book. This was above and beyond his book. And he'd make mistakes, in signs and what have you. So we caught on quickly, three of us got together and said ok, "This time it is your time to check all of his equations."

TG: [Laughs]

RB: [Laughs]

PP: And we had a lot of Air force students that were here, in those days, half the grad students were air force, at least in the aero school. So, it was tough. They didn't have near the course load that we did. I learned a lot taking tough courses. I took courses from Vinder. Vinder was the fluid mechanics guy. He was tough too. I forget the thermodynamics guy but I took, I don't know two or three extra thermodynamics. Then heat transfer. I became enamored with heat transfer. I thought that was pretty neat. Very analytical. Jakob was the visiting professor. He was a German Jew that got out. He actually was a full professor at IT, and some kind of professor at Purdue and so he would come down. He wrote two big textbooks that, at that time, were the standard of heat transfer. So, I liked that,

and I did well. When I finishing up, they call me into the office, and said, “We have a deal for you.” And I said, “Oh.” And they said, “You stay here, we will pay you,” I had already taken a job with Chance [Inaudible], he said, “we will pay you the same money, we will skip the master’s degree, we guarantee to give you a Ph.D. in three years, and you’ll run this grant program.” I don’t know who it was from, but it was a heat transfer kind of program. I was 24 going on 25 and I said, “I want to go to work.” They were not happy.

TG: What do you think are the most important lessons that you left Purdue with?

PP: Figure it out yourself, figure it out yourself. I remember having discussions on the thermodynamics test and the guy marked my answer down because I didn’t use the standard approach that was in the book. I said, “That’s not right. I figured out how to do it, I got the right answer. In a very logical way, so why shouldn’t I get 100 percent credit?” He finally gave in. I think I learned that you got to do it for yourself. I know my first semester when I took a chemistry lab. It was not very well monitored. I put down the answers and the guy next to me said those are wrong. I said, “Okay” and I changed my answers. He was wrong! [Laughs] I never did that again.

TG: That’s a good lesson too.

PP: Yeah! The aero school at that time had a lot of the work was done with and instructor handing you a manual saying, “Divide yourself up into groups, do the work, you got any questions, the laboratory is downstairs, you got any questions, I guarantee I will be in my office this period every day and you will get 100

percent priority." So, we had to sit down and work together and figure it out. And that's what exactly I had to do when I went to work, the same thing. Now it was, I knew I was older than most of the other guys but it was a good experience. Purdue did well by me, no matter what I said. I was in Tau Beta Pi the Engineering honorary. We formed an aeronautical engineering honorary which doesn't exist anymore. Tau Beta Pi still exits, they send me requests for money.

RB: So, you know they are still there!

PP: I assume they are still here. That was a big deal in those days. I had thought, since I had three years playing varsity basketball, even though we played, what's the next level below, I don't know. There are various classes of college basketball and we played the first one down.

RB: Like Division II kind of thing?

PP: Yeah. I don't know how or why, I just decided it had been a chore, when I was in the Navy, to play basketball all the time and to keep up with everything else. I said, "I'm going to college now, it's time to get serious." I decided to not even try to play basketball, whether I could've or not, I probably could have because in those days, Purdue had some lousy basketball. I just decided that was not, there are college athletes that get perfect grades and do the athletics, I knew I couldn't do that so I didn't. So, the other thing of course was the Navy paid everything. I went to school for free, which was nice. It was ridiculous when you think about it. I think I paid 19 dollars a month for a room it was made [Inaudible] It didn't cost us a lot to eat. I was a backup dish washer at one of the sorority houses.

RB: Well, that was probably a good thing.

PP: Oh, that was the best, highest paying job on campus. [Laughs]

RB: But the perks were even better. Being in a sorority house.

PP: Dishwashers didn't see many girls.

RB: Ohhhh ok.

PP: The house mother was nice as apple pie. We got two servings at dinner.

TG: That's nice!

PP: One at lunch. And we took home box cereal for breakfast. You couldn't make money anywhere that could have done that. But most of the time, mine was just on the weekend cause I was the sub. I had a pretty good time here. I had a car which was, of course helped me socially. I had a lot of friends. And of course, I was over 21, although we could go to Harrys Chocolate Shop, which was open then, it still is I see, we would go over to Lafayette sometimes. There was a great steak house right on Main Street. I forget the name of it.

RB: [Sorry Jokes?]

PP: Yeah, yeah. We would get together a group and go over. Have steaks and beer. It was not necessarily an oppressing time.

TG: So, I am going to shift to start asking you about your career.

PP: Ok

TG: When you graduated from Purdue, your first job was with…

PP: Chance Vaught?

TG: Could you talk about the projects you worked on there and how you became…

PP: Ok, I had higher paying offers, but they were the only ones that were going to allow me to be into an analytical job. I wanted to be doing analysis and stuff. Not just drawing lines on blueprints. I went there in February of ’53. By April they had won two massive jobs. Chance Volt was a division of United Technologies. The Crusader was to be the first supersonic fighter to be designed from scratch. The Regulus 2, which was a sub-launched missile, it was the back up for Polaris. If Polaris didn’t work or failed, what have you, Regulus 2 would have been its substitute. Polaris didn’t fail. Anyhow, the company had to suddenly triple in size. This created a lot of opportunities. So, instantly I became a sub-system engineer. I was responsible for designing, writing the specifications for things like, air conditioning for the pilot, ram air turbines. The Crusader didn’t have a battery so if the engine failed you had to flop out a little turbine on the side and it spun up and gave you power, hydraulics, and all that. What we called internal aerodynamics. The airflow inside the engine ducts. Getting air out to the wings for boundary layer control. We moved the air around inside the air bubble. I had responsibility above my experience level.

TG: So, in four months, basically, you just bumped up to-

PP: I just bumped up. I got a humongous increase in salary and responsibility. I enjoyed it. During the almost final design stage of the Crusader, we discovered we had to redesign the engine cooling, the whole engine cooling system. For six weeks, we worked 84 hours a week. Our computer was punch card IBMs. We would spend hours set up and running right. But it worked; we got there, instead of adding people, they said, “Work harder.”

RB: Boy that theme continues on even today. [Laughs]

PP: So, the Crusader was a success. Unfortunately, that kind of left me at the end of the Crusader development then I went to Edwards Air force Base for flight testing and all that. Looking for a job, you know another project. Chance Vaught and taken a subcontract from Boeing. This was like in ’57. To provide the pilot enclosures for the man in space program. Boeing had a big man in space program with the Air force. I went to Boeing, designed the pilot compartment for that effort.

TG: Was that the dinosaur?

PP: Yep. That was the dinosaur engine. That was the dinosaur program. It was an idea before its time. Air force eventually shut it down. It did wet my appetite for getting involved in space.

TG: So that’s the first, sort of, encounter.

PP: That was my first inkling of working in the space program. I came back to Dallas. I designed a space simulator for Chance Vaught which they built, believe it or

not. I don't know if they needed it or not. I decided that I wanted to get involved with space hardware. I interviewed General Electric missiles in space and Jet Propulsion Lab. Both gave me, kind of, the same offers. Do you want to live on the east coast or the west coast? We chose the east coast. I went to work with GE space, even though on dinosaur I had top secret clearance. When I went to GE I was vetted and introduced to the black CI world. And never left. I'll tell you another funny story. Do we have time for a funny story?

TG: Oh yeah!

RB: [Laughs]

PP: I was testing an inlet duct for the engines.

TG: A what?

PP: Inlet duct.

TG: Ok, 'inlet'.

PP: There was a great test center in Dangerfield, Texas which was an old, during the war, they started to build a steel mill there. It had Messemer converters and all these great compressors that could put out this air that would be needed for the steel. But of course, they decided to not do the steel. So, then [Inaudiable] convinced them to turn it into a supersonic test center. All the air was there. So, I'm there testing it. Part of the time you didn't have anything to do. You had to wait for the technicians to get the instrumentation changed, get the test set up and everything. So, I am wondering around and there is a J-57 Pratt Whitney

engine inside an altitude chamber doing oxygen injection for altitude. Which we had been trying to get them to do for us to boost our fighters to a high altitude. And Pratt Whitney had steadfastly said, “They were not doing work in that area.” So, I came home and told my boss, “I know they are lying to us, I saw it!” He said, “Ok”. He made arrangements to go to Hartford the next day to embrace them with the fact that they were deceiving us. He came back a very different kind of attitude. He called me into his office, and he said, “You never saw it, you don’t know anything about it, erase it from your memory.” And that was of course, they were doing engines for the U-2.

RB: Did they accidently allow you to see it?

PP: Oh, you mean the engine? No, it was wide open! They were doing the test. They didn’t tell you it was for a U-2.

RB: But because of your back ground you knew what was going on so that’s how you challenged it.

PP: That’s how we challenged it.

RB: Ok, ok.

PP: That’s how we challenged it and got slapped down very hard. Fortunately, one of the guys in the group knew what was going on and said, “Let me take you to lunch”. He explained to me that there were things going on that I didn’t need to know. That the boss is right, just forget it.” So that was my first experience on a black program.

TG: Were you still at G.E. at that point?

PP: No, I was still at Chance Vaught.

TG: So then when you got to G.E.

PP: One of the reasons I wanted to go to G.E. is I had taken advanced courses at Vaught. I wanted to work on more advanced programs, I guess. I was the manager, became the manager of thermodynamics for their black organization for building satellites.

TG: Could you explain the term, 'black organization?'

PP: Okay, the name is SCI. It stands for Sensitive Compartmented Information. SCI. The key word was compartmented. The work was absolutely compartmented. Closed off to everybody else. Isolated. Information went in, nothing came out. If you went to a meeting and took notes, at the end of the meeting, someone gathered up your notes and stamped them "Classified." In all the years I worked, we never ever had a leak.

RB: That's impressive.

TG: These are hundreds of thousands of people.

PP: Yeah, thousands anyway. I had a thousand people working for me in Danbury. Not one of them ever leaked anything out. I don't know who started it but someone called them black programs, like black holes. Information just went in.

That's when we say black programs. The U-2 was the first black program. I broke the cocoon there.

RB: You broke the code and didn't know it!

PP: Yeah. I didn't know it.

TG: So, at G.E. was the Corona project….

PP: Well yeah, we worked on the Discover the first reconnaissance system was in two parts. Corona covered the cameras, and Discover covered the bringing the film back. So G.E. built the Discover.

TG: There was no digital transfer; the film actually had to come back to Earth.

PP: Absolutely. To get the high resolution, the Lunar probe was done by Kodak, and they digitally sent those signals back but the resolution was crummy. By using high resolution film, we could get good pictures. The Discover was an invention of Sinclair Scallop at the G.E. research lab and it was a marvelous design. Everybody….

TG: What was the key to it–

PP: The key was that the alignment of the center of gravity and the center of pressure was such that the vehicle always righted itself. No matter how it entered the atmosphere, it turned itself, got itself align correctly. It was a sphere cone shape and it just looked like a jar. He had done a lot of work on reentry bombs for the Air force but that was his, Sinclair Scallop, invention. What a nice guy.

TG: So, you worked on that part of the project.

PP: Yeah. I worked on the discover and then in, well we got the first film back in August of 1960, Eisenhower left of course, in January of ’61. And as soon as Eisenhower left, Eisenhower had edicted that no active military could get involved in the black programs.

RB: Why is that?

PP: He was irritated at DoD [Department of Defense], that’s true, but I don’t think that’s why he did it. He wanted, the second caveat that he put on the program, they must have plausible deniability. In case something went wrong, you had to have plausible deniability. That was the two caveats he put down on starting the black programs. He didn’t want active military people involved. As soon as he left, then the Air force sprung. The CI had done the program and the Air force wanted to take them over. That was the turf war. What the Air force did that decide their selling point was they needed space reconnaissance for tactical purposes? Whereas the CIA was doing strategic purposes. There first effort was the Gambit program and it was a tactical intelligence program, so called. I was the manager of thermodynamics then for that program doing that. Basically, the big problem was Kodak built the camera and we had to keep the camera within plus or minus one degree. Which was not exactly easy to do. We came up with a design that did that and it worked reasonably well. But then the electronics and everything else, that was where we cut our teeth on how to do the thermo-control of satellites. On the Gambit program.

TG: What were the major challenges?

PP: The major challenges were, of course the photographic satellites look at the Earth all the time they went around. The outside environment was changing in relationship with the Sun, and with space that's when we came up with the Beta program how to launch the satellites so that the satellite's plane had a certain angle with the solar Earth line. Then as they went around the outside environment didn't change as much. And it was easier. So, we had to come up with ways to how much solar energy to collect and how much to radiate back to space. On the Gambit we opened the door to the camera and all hell broke loose because we lost a lot of energy doing that. We got there.

TG: How did you work to solve these problems? Did you have a team?

PP: I had a just an outstanding talented team of about usually eight to ten people, engineers, working for me. It was not a strict hierarchal alignment. We were a team as you said. It was like, what's the problem and how are we going to solve it.

TG: Did you work under time constraints?

PP: Oh yeah.

TG: Were they in a hurry?

PP: Yeah, they were always in a hurry. Gambit was more or less a success. 60 percent of the film got exposed and recovered which wasn't bad for those days.

TG: So that was a first generation.

PP: That was the first generation, yeah, still back in the first generation. Corona was the strategic, Gambit was the tactical reconnaissance. When we started Gambit we had problems like, we would take a neat picture, but it was in the wrong place. It was a framing camera the Gambit, it had a ten mile wide, ten mile snapshot and there its whizzing by, how and the hell do you get it look at the right place at the right time. It was not easy. Slowly but surely, we figured out how to do that. One of the things was you never; we knew that the satellite, we planned everything where the satellite was, one rev before. Even at 82 nautical miles, to everyone's surprise, we had drag. The orbits changed, not much –

TG: But enough

PP: But enough.

TG: To mess up frame.

PP: Yep, mess up the pictures. It was an interesting time. We solved a lot of problems. Got a lot done. Then got ready for the next generation, generation II. The smartest man I ever knew was Bud Weelong. To counter the Air force's moves, he established a new director in the CIA of Science and Technology.

TG: So, he was in the CIA, Bud?

PP: Yeah, he was a CIA. Less Dirks was the deputy for research, a Rhode's Scholar. Also, a brilliant man. Less has passed on. They decided that the thing to do was combine the capabilities of the two satellites into one. We would have one

satellite that would be able do search and surveillance and still take high resolution pictures. In ’64 they kicked that program off. I was still at G.E. Won the contract to build the spacecraft for generation II for the Fulkrom (sp?). We worked at it; the reconnaissance programs were now set up to administered by X-COM. X-COM was the deputy secretary of defense, the DCI and the President’s advisor and science advisor. So, if the two protagonists couldn’t agree on something, then the President’s scientific advisor had a vote. It worked. The scientific advisor for the president’s office at that time was still Killian, the president of MIT. The panel that reviewed photographic satellites was headed up by Ed Land inventor of Polaroid. He was a dynamic person to say the least. So, we reviewed the Fulkrom program for Land’s panel, and Land had 13 or 14 national experts on his panel, guys that had national reputations, because this is a presidential panel.

TG: But it is all secret. Is that true?

PP: Oh yeah it is all black, all secret. [Laughs]

TG: [Laughs] Ok I just want to make sure, because it is hard to think about how these programs work.

PP: We met in Boston and McCone was the key-note speaker, he was the director of central intelligence. He told us that we were going to pitch to the next generation reconnaissance satellite. I handle the space craft and it went smoothly. We went through the day covering everything we could, how we were going to do this; we thought we had done a great job. You imagine all these people who came, who

worked their tail off to get there. The CIA had taken a wing of the Green Mountain Hotel.

RB: I was wondering, “How in the world do they keep things secret when they are having these conferences?”

PP: That’s the way they did it, they isolated you. We had dinner in Lexington at the Itech plant and went back to the motel and we were having a good ole’ time because we were celebrating the fact that we were going to build generation too. All of a sudden, the word came in, that Itech said, “No way. We do not believe that that is a viable solution. We do not think the film path can be done, and we will not take a contract to build the cameras for Fulkrom.” If you wanted to see a bunch of noisy half-drunk people sober up instantly, that did it. So, we said, “What the hell do we do now?”

RB: But they didn’t give a reason why they thought that?

PP: They gave lots of reasons. I have worried about it for 25, 50 years and I have no idea yet why they did it. The Air force instantly gave them a contract but I am not sure that was…. There was some truth to the fact that they had not figured out how to do the film path (?) We got together with our sponsors and said, “What do we do now?” And they said, “Go home.” So, believe it or not, we loaded up our cars and left, in the middle of the night.

TG: Oh, my goodness.

PP: What Les and one of the other section chiefs at the CIA did was called up Chester Newman's and Company at PerkinElmer and said, "We want you to take over Itech's role on Fulkrom. Chester was a very savvy CEO and he said, "Well if Kodak and Itech say it can't be done, we'll have to study it a little bit before we agree to do that." So they gave PerkinElmer three month studies, a million dollars a month for studying, then extended it for three more months, a million a month. They came up with an answer. PerkinElmer at that time, had more experience with complicated film paths than either Itech or Kodak. They used their background experience and came up with an answer. In October of 65, briefed the Land panel again and PerkinElmer stood up and said, "Not only can it be done, but here is how you do it." Itech also briefed them with a different approach on how to do the same job. The Xcom decided in February of '66, we changed the name of the program to Hexagon, and it was off in running. Requests for the proposal went out in May, answers in 90 months (Days?) and in October PerkinElmer got the contract to build the cameras for the Hexagon program. The booster was changed and the program was dramatically different than Fulkrom. So now I am adrift at GE,

TG: I was going to say, "Were you at Elmer Perkin yet?"

PP: No, no. Well, I was working with him.

RB: You were consulting.

PP: Actually, we had a contract from the CIA to support PerkinElmer, to help them. I did the design for the thermal system on Hexagon for PerkinElmer. The Black

programs were, things were just different. You could talk; Les Dirks was in charge of choosing the right camera for Hexagon, for the camera selection, for the competition. I run into him in Los Angeles, and he says, “What are you doing this afternoon?” And I said, “Well I don’t know, what are you thinking about?” And he says, “I’ve got to fly to San Francisco, I want you to come with me, let’s talk.” So I am still at GE, he is deciding whether PerkinElmer or Itech is going to build the camera, and he wants to talk about it. You wouldn’t do that on an open program, no way. We rode up on the airplane and I told him Itech’s approach was flawed, seriously flawed. Which I had believed and still do, that it was. He took that all in. I had a great relationship with Les. We worked together then when X again started. CIA gave me a contract, as they say, to help PerkinElmer get orientated, in fact, told me kind of “no” in certain terms. That they thought that my best thing to do was to go to work at PerkinElmer. They also told PerkinElmer. And Nimitz used to tell me that this was the only good thing the CIA did for him was to hire me.

RB: So the CIA told him to do that?

PP: Yeah!

RB: Oh Ok!

TG: And who was the head of PerkinElmer, Nimitz, you said?

PP: Nimitz, Nimitz Jr. Lo and behold that you didn’t put the Jr. on the name.

RB: You’d be in trouble.

PP: Yeah. You'd be in trouble. But he was a great CEO. He had spent 20 years in the Navy, in submarines.

RB: So, he was underwater and you were in the air. [Laughs]

PP: Yeah. He knew how to run an organization.

RB: So, when did you start working for him?

PP: I went there in '68. Just as the new facility was opening. PerkinElmer had agreed that if they wanted a contract, they would build a new facility to do the Hexagon program. And they did. It was in [inaudible]. I arrived on the scene just as the facility was coming online. My first job was to hassle, or whatever you want to call it, to get the first flight article done and ready to go.

RB: What is a flight article, what does that mean?

PP: That was the first camera system for us.

RB: Like a prototype?

PP: No this was the real one.

RB: OK, first article, I'm with you now.

PP: To get it out and done, that was my job. I had talked it over with my wife and said, "It's a risky job, it could very well be a failure, and if so, I am down the tubes, but it could also be a success and if it's a success, then I am a hero." And it was a success. I went from that, and then in '75 they made me a corporate

vice-president also general manager of the Hexagon skiff, the whole facility. So, I wore the two hats for ten years.

RB: You know you mentioned your wife, and it's something that always intrigues me is, how do you work on these black programs and then go home and not be able to share anything?

PP: Well, I had a very advantageous situation. Ann had been cleared. She worked at GE and as an executive secretary, she had been cleared. She was not clear on Hexagon, so we could talk around that. She knew...

RB: She understood because of the clearance.

PP: But there were a lot of people that didn't know.

RB: How do you explain to your parents what you are working on? You can't.

PP: How do you explain to your kids?

RB: Exactly.

PP: Tell them stories or whatever.

RB: Daddy goes to work and Daddy comes back but don't ask me what he does.

PP: And of course, when the flying started on Hexagon, I spent a lot of time back and forth from Vandenberg to Sunnyvale where the satellite test center is.

TG: When did they start flying?

PP: They started in June of '71

TG: What was it like, in the newspaper article you had said something like thousands of people that worked on this program? What was it like to work the culture with in the walls where everyone knew they just couldn't talk about?

PP: Well, it's [inaudible] than you think because when Lockheed also built a new plant to do Hexagon and they provided an office space for us. We had like 100 people in the Lockheed plant in California. But when you met, I met, a Lockheed person that I work with every day out in the open air, we pretended that we didn't know each other.

RB: That is just so bizarre.

PP: We go to Vandenberg, I forget what, but under assumed roles. But there was only one motel, and they knew what the hell was going on. I remember specifically we went out for a launch and checked out of the hotel because we were going to launch today. I mean that was a kind of clue to them that everyone checks out. The launch is today. It got scrubbed. I think at that time Martin had a problem so the launch got scrubbed so let's go back to the motel and check back in. So, we go back to the hotel and "No problem, we have checked you all back in."

RB: Maybe you should have gotten the hotel people on clearance too. [Laughs]

PP: They knew, even though we had phony names and all that.

RB: Oh really? Wow!

TG: So, you couldn't travel with your name?

PP: No, I traveled with my name, but not my company name. PerkinElmer was not involved in Vandenberg. And only once, in all those years, did we go, we had reservations at a motel, there were two or three of us, we go to the motel, this was on the east coast, to sign in, and the owner comes out and says, “No way.” Here comes these well-dressed people carrying brief cases, he was convinced we were Mafia or something and no way would he let us stay in his motel. Only once did that happen.

RB: How do you think the black programs have been affected now, doing black programs now, with all the technology available and everything else?

PP: It’s changed dramatically in that; it’s just exploded with people. I think there is an old saying that the half-life of a bureaucratic program is 25 years. There are so many people involved now and they build big, huge facilities, and all of that that we didn’t have. In the 60s and 70s and even in the 80s, the black programs are run out of a hole in the wall in the Pentagon, now they have a campus complex out on route 28. It’s just different. Lots and lots and lots of people.

RB: Tell the story that you told me about the satellites you had going over Russia and what we learned from that.

PP: Well, the first mission for the U2s was to find out, Khrushchev had said that he had a bomb for every American city, was to check out all the air fields and aircraft factories so we could come up with a feeling of how many bombers did they really have that they could fly across the North Pole and bomb the US and the answer was, a half of a dozen. He greatly exaggerated. But we did find very

quickly that they were building a new launching center at [inaudible]. Didn't have a clue that it was being built until we got pictures of it. I say it was to see over the Iron Curtain and that's what it was. There was a big hullabaloo when George W. Bush cancelled the ABM Treaty, or opted out. We photographed it, that the Russians had cleared a big forest area north of Moscow, pretty soon they built roads to it. Then they built a concrete plant. They built this massive concrete structure which was obviously phase to raid radar, which was absolutely specifically forbidden in the treaty. If you wanted anti-ballistic missile defense, they had to be at the borders, you couldn't put them around Moscow or places like that. The presidents knew that the Russians were cheating.

RB: But you provide the evidence.

PP: Yeah. We provided the evidence. And that's what we used to say about, Regan said that his theme was trust but verified. And we said, he provides the trust, we do the verification.

RB: You said you firmly believe that your people knew more geography of Russia than they did of our own country. Oh yeah, I signed a statement every year from the dear old CIA that swore and affirmed that I would never allow it to be targeted on anybody or anyplace in the United States.

TG: Oh, the cameras.

PP: The cameras, yeah. I think we knew more about the sino-soviet bloc by far than we knew about the United States.

TG: That's interesting, today that's the hot topic, right? Surveillance domestic vs… things have changed.

RB: And he was doing it way back then. And you firmly believed that probably helped to end the cold war.

PP: Oh yes.

RB: You provided the evidence.

PP: Yeah by '85 on, it was obvious that the Russians were just falling apart and things were not happening. We had pushed them to the point of no return.

RB: Do you think the new drone activity would replace some of your satellites or do you think they are two separate things?

PP: I think they are separate things. Drones are nice for quick looks. In the mid-east wars- the Israel wars and what have you. You used the U2s and the SR-71s because you could do it know where a satellite you have to wait. They were nice auxiliaries to the satellites. It just covered everything. One of the mission statements for Hexagon was that no photograph of an urban area of the Sino-Soviet Bloc would be more than six months old. six months. And no photograph of a non-urban area would be more than a year old. 14 million nautical miles squared. Why did we have a lot of film, we had a lot of area to cover. Believe it or not it was fun. We knew we were doing something important.

RB: Now where does this film exist now?

PP: The National Photographic Interpretation Center in Washington, D.C. It's in the old Navy yard. That's where it is analyzed and stored in wooden canisters, indexed. A lot of it now has been digitized, I'm sure those cans are still there.

TG: We are getting close to our lunch time.

PP: Oh Ok.

RB: When did you actually retire though?

PP: I retired in '86.

RB: Was it from Perkin, or did you move?

PP: It was from PerkinElmer. Then I went to Washington then as the supply system engineering technical assistance to the CIA program.

RB: What was that again? The…

PP: SETAs System Engineering Technical Assistance. And I did that for 10 years.

TG: I wanted to ask you, from these programs there were advances in technology that were used in civilian application that you worked on, like the Hubble. If you could say a few words about that, but also, it seems to me that you were doing things for the first time that became applicable to other areas. Could you talk a bit about…

PP: The technology that we developed polishing flimsy mirrors; we developed PerkinElmer in '84 or '85. 80% of all integrated circuits made in this country were

made on PerkinElmer equipment. That equipment was a direct result of work that we had done on black programs.

TG: Really? Can you give us some example of what those circuits are in?

PP: Everywhere. As things advanced using the microcline equipment got bypassed and other people built it, particularly the Japanese. So, microcline was a direct result of the work we did. For the Air force's Albuquerque, they picked up our work and how to polish and particularly coat the optical surfaces. That's still military. What went into the civilian world was mostly the ability to make the integrated circuits. We also worked with, we were the center of Computer technology at PerkinElmer, we got into trouble, then they took that computer expertise and made that into computer aided chemistry. In the olden days, you took analytical instrument and you took a spectrograph of a sample and some Ph.D. sat down and looked at those lines figure everything out and it would take him a week to analyze the sample. We did that with computers, sorry to the Ph. Ds. A technician could do a better job in a couple of hours than what he could do in a week. That was a great boom to making analytical instruments. There were three parts of PerkinElmer, the analytical instruments, the microcline, and the Hexagon, the government black programs. Nimitz made one fatal mistake and that was he did not provide, for succession, how the company could survive when he left.

RB: That was the demise.

PP: That was the demise. The marketing guys took it over. All the board of directors were the same age as Nimitz and so they all left at the same time. New group of people came in and took it over and didn't know what the hell they were doing. Went down the tubes quickly. Broke it all up, sold all the parts. United Technologies [inaudible] they now own the Hexagon plant in Danbury. I had a good career. I could have made a lot more money on other things. Designing cameras for space vs. building buildings, there was no comparison. I got to do what I really wanted to do and that's probably rare these days.

RB: How to migrate from your love of heat transfer technology to the building of the cameras? Did that kind of just evolved?

PP: No, that evolved because one of the big stumbling blocks in building the cameras was heat transfer.

RB: Ok, so there you had it. Ok.

PP: Somewhere someplace I was recognized as a pioneer of space reconnaissance. That was because of the work I did on a thermal control. How do you put a camera out in space that is designed to operate at 70 plus or minus one degree and do it? No, heat transfer, thermodynamics was my core although I was an aeronautical engineer. That was my core expertise.

RB: I see the connection now.

PP: The Hubble was something we did on the side. What made it easy for us to do the Hubble was because we had this fantastic facility and all this fantastic

equipment. By 1977 we weren't using it full time. People told us "You're crazy" [inaudible] NASA, CIA and the National Reconnaissance office will ever agree to do NASA programs in this facility. But we asked. They said "Yeah it makes sense" and they let us do it.

TG: That's wonderful. The Hubble telescope has affected so many people. Just opened our eyes to the Universe.

PP: and we made one glaring mistake, which was corrected. As part of the get-in story, we told NASA we will develop the inner interferometric equipment on our own dime. And bring it to the program and you won't have to pay for it. They said, "Oh that's great" So here they are getting something for free right. So, we did build it, we did test it. As far as we knew it was good. But what happened was, we transferred a very special piece of equipment from a research lab on to a program without going through all the quality control steps one should have gone through. It's easy to say now, "How in the hell could you have let that happen?" We didn't think about it, I guess. Didn't realize there was a problem and it turned out that there was a problem and the mirror wouldn't focus because we had rolled the edges. Some people inside the company felt that something was wrong because when we tried to align the secondary and the primary, they didn't work right. So now the question was, NASA had already told the world that the primary mirror was the best mirror ever made. And that was true. Happened to be to the wrong figure. Now, are we going to go and fix it, or just keep going and hope that the new guys are wrong and the old guys were right. There were two sides to the

equations. Two groups of talented people, one saying it was ok, one saying you better check it. To check it we would have to strip the coating off the mirror and put it back in the chambers and measure it using a different way, different technique. It would have set the program back six months. So, NASA in their infinite wisdom told us to shut up and get on with it. We did and when it flew [Phone Rings] it couldn't focus. To say it didn't focus, it didn't have the focus that it should of have. Spectrograph people didn't care. If you are going to run spectrograph all you are going to do is collect energy, you don't need pictures or anything, you just collect the energy. They were happy, they got a lot of observing time. [Phone Rings] They made the corrections, focused the mirror and it worked and the pictures have been great ever since. It was supposed to last 15 years, to '05 was the end date and we are now 8 years beyond that. Still going.

RB: Were there any plans?

PP: Nope, they have decided that they will not, the gyros are the weak link in the chain, and if they go, they go.

TG: Is there any question that I haven't asked you that you wished I had asked, that Rita and I had asked you. And then we will thank you very much and wrap it up.

PP: Ok, I guess the question that I often got asked was, "Why do you do this?" Hide your capabilities under a bushel or basket like it says in the Bible. Had you gone out and worked in the open world you could have done so many bigger, better, greater things. I don't really have an answer except, I knew I was doing what I

loved to do and I didn't care if I could have made more money. I got paid reasonably well, you visited our home, did you, or didn't you?

RB: No. We met at the little community center.

PP: Oh ok, Jill came to the house. We have a nice life, enough money to get by, yeah, I could have done more money and what have you, and I saw people do it. I probably thought about for 2 minutes and this wasn't for me. I had that rare career where my work was what I loved to do.

RB: So, then it wasn't work. [Laughs]

PP: Yeah. Then it wasn't work. Lots of people told me during my lifetime that I was very intelligent. I just let it roll off my back.

RB: That wasn't who you were.

PP: I took a standardized test at dear old Purdue one time in the Mechanical Engineering department. It was a department test. I was the only person in the whole group that solved the problem. I forget the instructor, he was impressed. They through the [inaudible] out. Gave me credit for it so I made over a 100 on the test. He told me more than once, and other people that I was a smart person. Nimitz always said that I was the smartest person that he had and that was the only favor that the CIA ever did to anyone.

RB: [Laughs]

TG: [Laughs]

PP: And that's what encouraged me to come there.

TG: We are so grateful for you sharing your story with us.

RB: Yes, absolutely.

PP: But you know in my class here, I was 3rd, I was not the first person.

RB: The class at Purdue?

PP: The class at Purdue.

RB: Even 3rd, that's pretty good!

TG: That's fabulous!

PP: Verne [inaudible] and Dave Boudich were really smarter. But neither of them had the career like I had. Dave went to work for NASA, bogged down. Verne went to Pratt Whitney's nuclear lab. And I, sure they did great work but...

RB: Yours was rewarding.

TG: And exciting, and secret.

PP: Very secret, yeah.

RB: Before we end, how many other black programs that you still have to keep secure? Are there others that you could still talk about later?

PP: Somebody told me that when they cleaned my file that I had 25 accesses. Some of them important, some not. Some will never be cleared. For instance, on

Hexagon on how well we did on making maps is still classified. Probably won't ever be clear. The really sensitive work was what the CIA did was work that impacted other countries. If they were putting installations in other countries, then those are very closely held. I had, took a lot of polygraphs.

TG: [Laughs] Well, we won't make you take one today!

PP: That used to be my party line, you can ask any question you want and if I know the answer, I'll tell you and if I don't know the answer, I'll make something up.

TG: [Laughs]

RB: [Laughs]

PP: Probably could have gotten away with it very easily. I was a hands-on engineering manager. I understood what was going on.

TG: Well thank you very much!

End of Interview

MSO1i201314005_01_petty