BRADFORD PARKINSON

An Oral History
consducted by Alexander Fetter

STANFORD HISTORICAL SOCIETY ORAL HISTORY PROGRAM

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Bradford Parkinson
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Introduction

This oral history was conducted by the Stanford Historical Society Oral History Program, in collaboration with the Stanford University Archives. The program is under the direction of the Oral History Committee of the Stanford Historical Society.

The Stanford Historical Society Oral History Program furthers the Society’s mission “to foster and support the documentation, study, publication, dissemination, and preservation of the history of the Leland Stanford Junior University.” The program explores the institutional history of the University, with an emphasis on the transformative post-WWII period, through interviews with leading faculty, staff, alumni, trustees, and others. The interview recordings and transcripts provide valuable additions to the existing collection of written and photographic materials in the Stanford University Archives.

Oral history is not a final, verified, or complete narrative of events. It is a unique, reflective, spoken account, offered by the interviewee in response to questioning, and as such it may be deeply personal. Each oral history is a reflection of the past as the interviewee remembers and recounts it. But memory and meaning vary from person to person; others may recall events differently. Used as primary source material, any one oral history will be compared with and evaluated in light of other evidence, such as contemporary texts and other oral histories, in arriving at an interpretation of the past. Although the interviewees have a past or current connection with Stanford University, they are not speaking as representatives of the University.

Each transcript is edited by program staff and by the interviewee for grammar, syntax, and occasional inaccuracies and to aid in overall clarity and readability, while maintaining the substantive content of the interview as well as the interviewee’s voice. As a result of this editing process, the transcript does not match the recording verbatim. In the rare case that a substantive deletion has been made, this is indicated at the relevant place on the transcript. Any substantive additions are noted in brackets or by footnote.
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This oral history should be cited as “Bradford Parkinson, Stanford Historical Society Oral History Program Interviews (SC0932). Department of Special Collections & University Archives, Stanford University Libraries, Stanford, Calif.”
Abstract

The interview begins with a discussion of Bradford Parkinson’s childhood in Madison, WI, followed by an education in Minneapolis after a family move. He recalls the influence of his father and the self-discipline learned at the Naval Academy.

Parkinson tells of his move from the Navy to the Air Force, his time studying control theory and the maintenance of airborne electronics at MIT, where he forged a personal relationship with the inventor of inertial navigation system, Charles Stark “Doc” Draper. He talks about his decision to pursue doctoral studies at the University of Michigan, until a last minute “miracle” saw him heading for Stanford.

Parkinson discusses his next move, heading to Edwards, CA to work as an academic instructor at an Air Force test pilot school. He recounts his move to the Air Academy and his research into inertial guidance systems. He goes into great depth on his time developing the digital fire control systems and flying the planes in North Vietnam.

Parkinson then recalls his work at the Pentagon, working with Advanced Ballistic Reentry Systems in Los Angeles, and the joys of working again in research and development. He worked alongside the Army and the Navy on Operation 621B. Parkinson discusses the origins of GPS and his experience at the Department of Defense.

Parkinson describes the latter years of his career, teaching at Colorado State and then working in corporations such as Rockwell and Intermetrics. He details his return to Stanford, first as a consultant—alongside his work at Intermetrics—on Gravity Probe B, and then as head of the project. Parkinson discuss his years at Stanford and the changes that have taken place throughout the decades, including gender equality in academia and multi-disciplinary teaching. He recalls fondly taking over at the Trimble Navigation project in its time of need, overseeing the assembly of a new executive team and the soaring of the company’s stock prices.
As the interview draws to a close, Parkinson discusses his family and his passion for olive-growing.
**Bradford Parkinson**

**Biography**

Bradford Parkinson is the Edward C. Wells Professor in the School of Engineering, Emeritus, at Stanford University.

Professor Parkinson’s extensive research have been funded by FAA, NASA, and commercial companies. His groups are recognized as the world leaders in pioneering numerous innovative Global Positioning System (GPS) applications including the dynamic control of vehicles, the development and demonstration of the Wide Area Differential GPS concept for air traffic control, applications suitable for the blind landing of aircraft, robotic control of land vehicles, and use of GPS to perform closed-loop control of satellites in orbit. Professor Parkinson is also breaking new scientific ground in two other related directions. First, he is the program manager of the NASA-funded Gravity Probe B program, a test effort to validate Einstein’s General Theory of Relativity using orbiting gyroscopes. Second, he is managing the development of advanced technology for that mission, including precision metrology, control of spacecraft, and estimation of atmospheric effects.

Professor Parkinson has received many honors and awards, including being elected to the National Inventors Hall of Fame in 2004 and membership in the American Society of Mechanical Engineers (ASME). He became a Fellow in the Institute of Electrical and Electronics Engineer (IEEE) in 2004. Also in 2004, Professor Parkinson received the Gold Medal Award from the American Society of Mechanical Engineers. In 2006, he received the Goddard Astronautics Award from the American Institute of Aeronautics and Astronautics.

Professor Parkinson received a bachelor's degree from the US Naval Academy in 1957, a master degree from MIT in 1961 and a doctoral degree from Stanford in 1966.
Fetter: Today is Tuesday, May 12th. This is Alexander Fetter with the Oral History Program of the Stanford Historical Society. I am interviewing Bradford Parkinson in his office in Durand.

Good morning. I’m delighted to meet with you, to talk about your career. You’ve been widely recognized for your central and crucial role in the now ubiquitous GPS Navigation System. This was a military system as I understand it, but your vision was always to make it available to the general public. You joined the Stanford faculty in 1984. You were named Edward C. Wells Professor of Aeronautics and Astronautics in 1995 and became emeritus in 2001. During this time you continued to develop various applications of GPS and also served a crucial role in the NASA project Gravity Probe B that was eventually launched in 2004. The latter project sought to verify several crucial details of Albert Einstein’s general theory of relativity. I’d like to start with your early life. Where were you born?

Parkinson: [00:01:17] Madison, Wisconsin.

Fetter: Did you grow up there?
Parkinson: [00:01:21] We stayed there for about five years. My father was born in England and came to this country when he was only sixteen. He’d been out of school since he was thirteen. He always craved education, so what happened is he went back for a year to high school, got admitted to a university. Went a year to the University of Wisconsin, got admitted to MIT. He graduated from MIT, and he went back to Wisconsin--Madison. That’s the reason we were living there. We left there when I was about five or six and went to Minneapolis. I stayed in Minneapolis during all my education period.

Fetter: Tell me about your siblings.

Parkinson: [00:02:09] One sister who still lives in Minnesota, bless her heart. Long winters, wonderful people, hot summers, quite a few mosquitoes. I’m glad to visit and I’m glad to live in California now.

Fetter: You went to the Naval Academy in Annapolis and you graduated in 1957. Tell me a little bit more about your childhood experiences. Who were your mentors and inspirations?

Parkinson: [00:02:44] Yes. That’s an interesting question because my dad never particularly warmed up to the idea of the Naval Academy. We didn’t really have any military background, his family didn’t. On my mother’s side, however, I had an uncle who was Naval Academy class of 1937, and that was always held up to me that getting in there and surviving four years was a hard thing. I like hard things. We had a very revered Eagle Scout in my troop. We had lots of Eagles. I ended up an Eagle. His name was Rich Fontaine and went to the Naval Academy, Class 1951.
[00:03:22] Then there was also a gent in my high school, a very small military high school who went to the Naval Academy. It is not a military high school anymore, but it still survives. It was a very, very good private high school with lots of academic competition, which frankly I needed because I was lazy.

**Fetter:** I don’t think of you that way. [laughter]

**Parkinson:** [00:03:45] I was mentally lazy. I can recall my father being quite upset when I brought home an F in mathematics. The reason was I understood it all, and I was darned if I was going to do all those exercises. [laughter]

**Fetter:** You learn a lot just by doing.

**Parkinson:** [00:04:04] Yes. Right.

**Fetter:** Doing the exercises. They shouldn’t be just rote work.

**Parkinson:** [00:04:20] No. This was page after page of decimal multiplication.

**Fetter:** Oh, that’s awful. I hate that. [laughter]

**Parkinson:** [00:04:24] That’s right.

**Fetter:** Thank God for a hand calculator.

**Parkinson:** [00:04:28] Of course, for neither you nor I had that luxury in those days. At any rate, one thing led to another. I graduated from high school and did not yet have an appointment in the Naval Academy. My dad, recognizing that I had this fervor, ended up sending me to a prep school that specialized in the academics. It turned out by the next year I had an appointment from a senator and an appointment from a representative and an appointment from the Naval Reserve, all of which were competitive. There was an exam and
evidently I did quite well because I was number one on both lists and ended up going to the Naval Academy in June of 1953.

Fetter: When did you develop your interest in engineering and science?

Parkinson: [00:05:15] Always had it. Always had it. I would fiddle around.…

Fetter: Presuming your dad, too, it sounds like.

Parkinson: [00:05:22] Yes. He was an architect. He had an interest and a lot of curiosity. My dad stood for, in my opinion, three things. First was integrity. He was a man of enormous integrity. And the second is, he really believed in family. The third was education. I got a lot of encouragement on that … There was a couple buddies I hung out with, and we did some pretty interesting things. We got the hang of vacuum tubes—this was in high school—and found out how you design a pentode or a triode amplifier, and, of course, how you make rectifiers and all that. We’d build those things up from scratch.

[00:06:07] This was not a design that was in the book. Instead we had to figure out what the resistors and what the supply currents and voltages were going to be. That sort of thing. I’m surprised I didn’t kill myself because I once got into step-up transformers to see how much voltage I could get out.

Fetter: Oh, my gosh.

Parkinson: [00:06:26] I think when it got up to two thousand volts, I decided I probably had enough. Fortunately I didn’t touch it. [laughter]

Fetter: [laughter] Thank goodness.

Parkinson: [00:06:35] The curiosity… with engineering, frankly, the Naval Academy at that time was an engineering school. Yes. It was a Bachelor of Science in engineering. In a broad brush, it was electronics, electricity, motor
generators--huge ones that you actually plugged in and made work--steam,
steam boilers….

Fetter: Did you have to choose a specialization at Annapolis?

Parkinson: [00:07:03] There were none. Every graduate in 1957 of the Naval Academy
had taken exactly the same set of courses for four years. Totally prescribed,
except for your language.

Fetter: Did you have to do a foreign language?

Parkinson: [00:07:19] Yes. Yes. I took Spanish. I enjoyed it, actually, although for
engineers, and I suspect for physicists, you kind of want to derive everything,
you don’t want to memorize a whole bunch of junk, you know.

Fetter: Did you serve in a leadership role at Annapolis?

Parkinson: [00:09:10] Not particularly. No more than a first classman would. It was
interesting how things developed. This is bragging a bit. I think academically
I was probably in the top four or five. I hadn’t taken it very seriously. I
would much rather go out and have a good time than do that.

Fetter: How did your years at Annapolis affect your later career?

Parkinson: [00:09:36] Oh, enormously. Enormously.

Fetter: For you specifically?

Parkinson: [00:09:39] Oh, the self-discipline you learn. You learn everything from being
on time to doing what the proper things are for whatever your environment
is, you know. Here when I was an Air Force officer, my shoes were always
shined. Maybe they’re shined, but they’re not particularly shined anymore.
[laughter] You say, well, that’s stupid. Why do you have to do that? Because
that way you get accepted and can get other things done. I think it forced you to learn that whether you liked it or not.

**Fetter:** How did you make a transition to the Air Force? Because you became a colonel in the Air Force, and my impression is that’s unusual to go from the Navy to the Air Force.

**Parkinson:** In about 1949, the Congress recognized they had created a separate Air Force, but it did not have an academy. They proceeded to build one in Colorado Springs. They were not graduating any classes and they thought they needed a professional officer corps. From 1949 until probably 1959, a quarter of West Point and a quarter of Annapolis could volunteer to enter the Air Force. I had done a lot of research. I had an electrical engineering exchange professor who had been an Annapolis guy but had gone in the Air Force—he was out of the class of 1950—and he had subtly sold the idea that the Air Force would educate you more and then use the education. I bought the argument.

I almost didn’t get in the Air Force. They didn’t go by class standing. They drew numbers out of a hat and my number was horrible. You’re going to find this an amusing story. We sent plebes around, fourth classmates. The way the deal worked, you had to do a blind choice. If you picked Air Force and the 25 percent quota was done, you went to the end of the navy line in choice of ships, which meant you were going to get a barge out of Thule, Greenland or something equivalent. It was an iffy thing. I counted and realized that everyone else in the class were counting. They concluded that at about number two—this was a class of about eight hundred
and sixty—that somewhere around three hundred, anyone beyond that was in jeopardy. I was way down here with a number of around seven hundred. I said screw that.

[00:12:29] It can’t get any worse even if I’m seven hundred. I went in, put it in. List came up, I’m the last guy in my class. [laughter] All of a sudden, a classmate cried foul and said--I’m not going to go into the rules--but he got injected in and pushed me off the bottom of the list. This is all within a month of graduation. I don’t know where I’m going. Then another two guys found that their eyesight didn’t qualify them to be air pilots and didn’t want to go into ground… in the Air Force. My eyes didn’t allow me to fly either. They said, no, we want to go in the Navy. That pulled two of us up. It was literally in the last week that I knew I would go in the Air Force.

**Fetter:** You were already wearing glasses then?

**Parkinson:** [00:13:16] Yes. My glasses, I have like 20/30, 20/40, so it’s not real bad. But pilots were strictly 20/20 so there was no way that was going to happen. At any rate, I saw I couldn’t be a pilot. They said they would send me directly to MIT. I said, no, I don’t want to do that, I want to find out what the Air Force is all about. I went to a school to learn the maintenance of airborne electronics equipment, which was great. A lot of practical stuff in electronics.

**Fetter:** You obviously liked electronics because you were already working….

**Parkinson:** [00:13:55] Oh, I love electronics.

**Fetter:** You’d already worked on vacuum tubes which…

**Parkinson:** [00:13:58] That’s true.

**Fetter:** …nobody touches today. [laughter]
Parkinson: [00:13:59] No, they don’t, do they?

Fetter: Because I did some when I was in college. I graduated in 1958 and so they were still vacuum tubes in those days.

Parkinson: [00:14:07] Yes, you’re almost exactly my age then.

Fetter: Yes.

Parkinson: [00:14:10] Yes. That’s right. That’s right. It was a lot of fun. There was a lot of satisfaction. You put something in here and something comes out there bigger [Editor’s note: “Amplified”--Parkinson is talking about an amplifier]. I mean, wow!

Fetter: You did learn to fly, didn’t you? Was that with the Air Force or otherwise?

Parkinson: [00:14:26] That’s sort of another…. You’re going to get into a lot of shaggy stories here.

Fetter: No. I mean this is interesting. I was going to come to that later but this is appropriate.

Parkinson: [00:14:34] At the Naval Academy, second class year, they wanted to encourage guys to go into flying. They had these bi-wing seaplanes called N3Ns. We called them the yellow perils. Open cockpit. Communication was a tube in which it was just sound molecules from the front to the back. My mouthpiece was attached to the guy in the front. They got you up there with a pilot, but the pilot let you do all the flying. I loved that. That was just super. What they do as you’re flying, to figure out whether you’re really comfortable with it, they start pushing on the wheel… on the Control stick up front. I was on an attached stick. The Pilot could sense I was very comfortable. He pushed me over and I just sort of slowed it back. I didn’t know he was doing
that. He kept me up flying and were the last to land. He said, “Ah. Mr. Parkinson, you really ought to go in the air.”

[00:15:32] I said, “Sir, I can’t. My eyes aren’t good enough.”

He said, “Well, that’s very sad.”

Fast forward. I came here to Stanford--and I’m skipping a whole bunch of stuff--for a PhD. I was really constrained. I got two years and I got to get that PhD. It turned out at the end of about eighteen months I had my thesis all done. Matter of fact, I had two backup theses. I was running scared as hell. This was the first time I ever tried to really work, I think. It was tough. It was a lot of hard work. But it worked out.

At the end of that, a buddy of mine came up from the Air Force’s test pilot school. [00:16:18] He said, “You can come down here and be an academic instructor, run our whole simulation division. By the way, every afternoon you get to fly with the test pilots on all their missions.” I’d died and gone to heaven.

Fetter: Fantastic.

Parkinson: [00:16:34] It was.

Fetter: Was that at Colorado Springs?

Parkinson: [00:16:38] No. It was at Edwards. The Air Force’s flight test center.

Fetter: In California?

Parkinson: [00:16:42] Yes. Yes. That’s where Yeager (First man to break the ‘sound barrier”) did his thing. When I went there, as a matter of fact, Yeager was my boss. He was the commandant of the Test Pilot School. Any rate, I went up there. I also got a private license along the way. That’s me.

Parkinson: [00:17:02] Yes. We flied the F-104 and other high-performance jets.

Fetter: That’s great.

Parkinson: [00:17:06] Full disclosure, I was in the second seat, which meant that… these guys, they’d let me land and take off and all this stuff. I don’t know how the hell we ever did that. That was fun. That was the air thing.

Fetter: How did you end up going to MIT? You said you’d deferred for a year and then went to MIT?

Parkinson: [00:17:26] I deferred for two years. I went to MIT. Then, if you look back and start to pull threads on the idea of navigation and guidance and all like that, I had two full academic years of navigation at the Naval Academy. A keen appreciation for what it did and how you did it back then, you know, including star sights [using a Sextant], and the beginnings of Loran [Radio “Long Range Aid to Navigation”]. I ended up going to MIT, but at MIT I was in what they call Course 16. Are you an MIT guy?

Fetter: No.

Parkinson: [00:18:07] No. OK.

Fetter: Did you go directly to Stanford after that? Or did you do something else?

Parkinson: [00:20:28] No. No. Good question. I was two years at MIT, but almost a third of my work was associated with what they called the instrumentation lab. My major really is control theory. If you go down to what I am fundamentally, it’s a control theory guy. I knew Doc Draper [Charles Stark “Doc” Draper] who invented the inertial navigation systems personally. I had an interesting interaction with him later. He was all for self-contained
navigation systems. I understood all about how they made gyros, what the error analysis was, and everything like that.

[00:21:13] When I graduated, and I think you needed seventy…. no, I think you needed ninety of their crazy units. They’re not like our units. You needed ninety. I’m bragging a little bit. I graduated with two hundred and seventy.

Fetter: You broke the bank. [laughter]

Parkinson: Part of the reason was, I insisted, my advisor got madder than hell at me, but I insisted on going over and taking electrical engineering courses as well as aero-astro (aeronautics and astronautics) courses. He asked me why I had to bother to do that. MIT was what they call a formula school, which meant the number of chairs you have sitting in your classroom covers how many faculty you have. Very bad system in my opinion. Each department at that time--I think they’ve fixed this since then--tended to be very xenophobic about other departments. I did this anyway.

[00:22:11] Any rate, the point is when I left there, I went to Holloman at the Central Inertial Guidance Test Facility, which was testing all of the ballistic missile guidance, all the aircraft….

Fetter: Where was that?

Parkinson: Down in Alamogordo, New Mexico.

Fetter: OK.

Parkinson: That was a fundamental building block in my knowledge and understanding, not only of the practical things, but of testing inertial guidance systems. I ended up running their navigation test branch. When I left there I had… already had the navigation experience… with the navy. I
had all this inertial guidance stuff. I also had EE [electrical engineering]. I understood all RF [radio frequency] work, and I understood the new digital RF. It was just coming in; I had a professor at MIT that taught us. Really great course. Any rate, it turns out that tied in later. Here we’re bouncing around. Let’s stay on track.

Fetter: We’re talking about MIT.

Parkinson: [00:23:20] MIT, I graduated… la di dah… Then I went to Holloman and did that testing. My boss desperately wanted me to stay there for another year, and he was writing these glowing exaggerations about my performance….

Fetter: In New Mexico.

Parkinson: [00:23:40] Yes. He was a lieutenant colonel. He really wanted me to stay there. I was a captain at the time. He said, “I think you will get promoted well in advance to major, if you stay here one more year and get one more of my OERs.” Evaluation reports. I thought, yes, I understand, but I got to get on. I had a vision of what I want to do. I want to go. Then comes the interesting part. I was all lined up to go to Michigan.

Fetter: University of Michigan.

Parkinson: [00:24:11] University of Michigan. They had a dual major in instrumentation and control theory.

Fetter: This would have been for a PhD?

Parkinson: [00:24:18] For a PhD. This was in 1961. I’m fat and dumb and happy looking around for, you know, where you live up there in Michigan. This guy came through, another air force captain who’d been here [at Stanford]. The fear I had was you’d get into one of these dangling PhD programs where your
professor says, “Well, just a few more courses and a little more of this and a little more of that.” The result was that I don’t care how fast or good you were, you weren’t getting through. I knew I only had two years. This guy that came through said… and he’d come from Aero-Astro [Department of Aeronautics and Astronautics] here. He said you ought to look into that. They’ve got a guidance control major under Bob Cannon. And they have a well-defined set of requirements for a PhD.

[00:25:11] You still have to pass the department and university orals, and you have to write your dissertation, but the coursework, within limits, is prescribed. In other words, you take so many of this, so many of that, and so many of that. I could see a light at the end of the tunnel. I studied the problem for about a week and I called up the Air Force. They were the ones that arranged all this, the [Air Force] Institute of Technology, and I said, “Hold the phone. Cancel Michigan. I want to go to Stanford.” I hadn’t even applied to Stanford. Somehow a miracle happened, and in June I showed up here.

Fetter: You’d been to California already because you said you’d been at Edwards.

Parkinson: [00:25:54] Yes. Southern California. I studied who I wanted to try to entice to be my advisor. Bob Cannon does not agree with this story. I’m sitting in an office about like this [shortly after I arrived] in the old electronic systems or whatever it was. Do you remember?

Fetter: Those buildings that were back behind the physics department.

Parkinson: [00:26:17] Yes. That’s it.

Fetter: ESL.
Parkinson: [00:26:22] Yes. Yes, ESL. He’s got an office there. He shares with [Professor Gene] Franklin, or he shares an outer office with Franklin. I went in and I explained who I was, and that I was here to get a PhD and I really thought that he would have been a dandy advisor and all this. I’ll never forget. He sits back and he pulls out an index card. He’s sort of like me. He carries index cards. He starts reading all of his brilliant PhD students, and, you know, four years, five years, four years. He looks at me and he says, “What makes you think you can get through here in two years?”

I says, “This is all the time I got.”

He says, “Well, I’ll think it over.” He never picked me up. A fellow named Ben Lange. You know Ben?

Fetter: No.

Parkinson: [00:27:08] Oh, OK. He was a professor. Brilliant guy. He had physics background. He was my advisor. Any rate….

Fetter: What was your thesis on?

Parkinson: [00:27:21] The thesis was on a gyroscope. The problem with a free-rotor gyroscope, of which Gravity Probe B is an example. The problem was, if the rotor is just completely unrestrained, how do you read out which way its spin axis is? The answer at that time was that they would put a big bulge around the center so it had a preferred maximum axis. You probably learned all this in Goldstein, Euler’s equations back in your youth.

Fetter: I’ve taught them. We’ve actually written a book on theoretical mechanics, Walecka and I.

Parkinson: [00:28:08] Oh, really?
Fetter: Yes.

Parkinson: [00:28:09] Can I have a copy?

Fetter: Sure.

Parkinson: [00:28:12] I'll buy it from you.

Fetter: No, no. [laughter] I have some extras. I'll bring you one.

Parkinson: [00:28:16] Oh. I would enjoy that.

Fetter: Did you ever know Walecka? He was a great teacher.

Parkinson: [00:28:23] Yes. Yes, I did.

Fetter: It’s not a well-known book, but students who use it loved it.

Parkinson: [00:28:43] You’re going to understand this. You’re the person because if I spin up something like that, obviously at the point in which angular momentum is preserved and energy is minimized, you’re spinning about the maximum of inertia tensor. If you just leave it to its own devices, internal mechanical hysteresis is so slow in a free-rotor gyroscope, you’d be there forever. What they did back in those days is they applied an enormous magnetic field along the axis they wanted it to end up on, and then they’d put a little pattern on the end--you may have already seen all this--called a D pattern.

[00:29:31] Here’s the gyro. Then they would have a light sensor. They needed to have phase of the rotation, so they would have some kind of a mark around here. They would use that to take the differences of light pattern--in other words, they have a little sensing spot here--from this side to that side, and this side to that side, and they’d get two axes. The trouble is in the process of heating it, they so distorted the rotor that its error characteristics
were screwed up. What I invented, and demonstrated, was a technique where you could take a free-rotor gyro, throw the switch, and it would always spin up the right way. That was, I thought, kind of neat.

Fetter: That's neat. That's wonderful.

Parkinson: [00:30:19] It was called active damping of free-rotor gyros. I first invented this way of doing it. I went into my boss and showed him the equations. Lange, my advisor. I said, “I’m going to simulate it, because I’m pretty sure this is going to work real nice.” I simulated it and I came back in to him. Unfortunately, this was after only about three months. He thought this was going to take me a long time to do.

He said, “Oh. Well, that was quick. Tell you what.” He said, “I want you to build this now.”

[00:30:59] “Oh.” I get an air-bearing gyro and I had what I called a dentate pattern around the maximum axis…. First you had to figure out where the maximum axis is…lots of details. I got Dick Van Patten. You know Dick?

Fetter: No.

Parkinson: [00:31:16] OK. He was a research associate here, electrical engineer. He and I worked together and I showed him what we had to do, and he put some electronics together. Another two months and I've got that done. It gets it within about fifteen arc seconds of where it should be. I said, “I think I know a way to get it all the way down to the end. I mean within just an arc second or so.” That was a mistake because my advisor, Ben Lange, said, “Well, build that.”

Fetter: That’s another good project. [laughter]
**Parkinson:** [00:32:02] Fortunately I had Dick Van Patten. What happened was we demonstrated it. No, no. Back up. I'm in the office just like here sitting where you are. I stood up, walked over, shut the door, sat back down, looked at Ben, and I said, “Ben, I don’t know whether I can do this or not. But I'm marching in two years with a diploma. And I want to have an agreement with you. I'm going to go off and give this my best shot. But if I don't get this, I'm still marching. Do we have an agreement?” You don’t normally talk to a professor like this, but I was within probably four or five years his age.

**Fetter:** You had already done a lot.

**Parkinson:** [00:32:49] I thought I had. You know, he said OK. Fortunately we did. It turned out he knew he couldn’t dangle another carrot out in front. Yes. That was going to be the end of it. At any rate…. The point of the story is in 1966 I graduated, went on to test pilot school, and….

**Fetter:** When did you go to Vietnam, because you were there at some point?

**Parkinson:** [00:33:11] Yes. OK. That’s kind of an interesting story, I think. I don’t know. In 1966 I graduated [with a PhD from Stanford]. It turned out, the head of the aero-astro department [of the Air Force Academy] was here. Fellow by the name of Bate [Roger R. Bate]. Brilliant guy. West Pointer. The head of the Astro and Computer Science Department of the Air Force Academy. He was a full colonel already. At least ten years older than I was. He was getting a PhD. Apparently he had to get a year's extension. He decided I would be a pretty good faculty member so he recruited me.

[00:34:04] That story I told you about test pilot school, my original assignment was actually to go to the Air Academy as an instructor in
astronautics. I had to go to him and get it broken. In a promise I made, the condition…. He had a priority. If he said I was going to the Air Academy that’s where I was going, not the test pilot school. They’re both very high, but he already had dibs. At any rate, the promise he extracted from me is that the first next opportunity I would come to the Air Academy. I went to the test pilot school, was there for two years. I could have stayed there a long time, but I recognized it wasn’t furthering my career. I was just having a lot of fun. Then, as a matter of fact….  

**Fetter:** Where was the test pilot school?  
**Parkinson:** [00:34:54] It was at Edwards. They were training all the astronauts for the Air Force. There were air force astronauts back then.  
**Fetter:** Wow.  
**Parkinson:** [00:35:08] Fast forward. I was down at Johnson Space Flight Center in Houston, and Bob Crippen [Robert L Crippen], who you may have heard-- he’s one of the astronauts.  
**Fetter:** Yes.  
**Parkinson:** [00:35:24] OK. You see his name there (gesturing at a photo in the office). He [Crippen] suddenly came running in and he handed me that. It was very gratifying because we were teaching a lot of the astronauts (Photo signed by four Astronauts said “thanks to Brad for all he taught us about Space Mechanics and other stuff…). When the Air Force program was cancelled, they went over to NASA and became NASA astronauts. Let’s see here. Pick up the thread.  
**Fetter:** When did research become part of your main career?
OK. We’re getting closer. I went from the test pilot school to what they call a Command and Staff College. That’s a military one-year deal. At the end of that, I told Colonel Bate that I would come to the Air Academy. He picked me up. By that time, I’d already been early promoted several times and I was the deputy head of the department. I was a lieutenant colonel. We were doing research in inertial guidance systems. They built a beautiful lab there. I was teaching space mechanics, astrodynamics sort of stuff, control theory, computer science. I’d only been there about a month and a half and I had this crazy Naval Academy classmate… fellow name of Major Rick Wiles. Turned out he had a PhD from MIT in aeronautics. He had gotten hooked up with a program in the Air Force called the AC-130 gunship. They were trying to rapidly evolve it to a full digital fire control system. What happened is he came to me and he said, “We are in deep trouble. We need you on this program.” I said, “Wait a minute, Rick. I just showed up. I’m teaching. I’ve got all these commitments.” He said, “Don’t worry about it.” The head of the Air Force Academy’s Academic Program was--there was a dean--General Woodyard. “I’ve already talked to General Woodyard.” My response: “You’ve done what?” “Yes. I’ve already talked to General Woodyard. He’s fine with it.” I said, “You rascal. You could have talked to me first.” It turned out it was a fun, interesting thing to do. That’s where that [combat experience] comes in. We went, we developed the digital fire control system,
and got it in this huge plane that had big cannons in it. Its use was in interdicting traffic coming down out of North Vietnam through Laos. That was its big use. It was very successful.

Fetter: Were you over in Vietnam at that point?

Parkinson: [00:38:36] What happened is as soon as we got it so it flew in the United States, worked all right, the Air Staff, the Pentagon said, “All right. You guys are so damn smart. Now take it over and fly it in combat and let’s see how it works,” which was interesting, you know. I spent, I don’t know, twenty-six missions and I think, I don’t know, a hundred and fifty hours of combat.

Fetter: You were flying.

Parkinson: [00:39:02] I was the fire control officer in the back. They had thirteen people in this airplane.

Fetter: Wow. Did you come under active fire frequently?

Parkinson: [00:39:10] Every night.

Parkinson: [00:39:14] It was intense. They were trying to kill us.

Fetter: Yes.

Parkinson: [00:39:17] We were bad news and they knew it. The interesting thing was the first night I ever went out there was another guy, Major Ron Terry, who had done this quite a bit. You’re in your first combat mission, you wonder, “Eh, how am I going to react to that? Here’s the deal. Here we go.” He was really tense-jawed. I knew him very well and he’s normally an easygoing person. He was really tense. We had discovered a line of about eight trucks, and we could see them on our Infra Red (night) sensors. We knew their engines
were running. They were all stopped there. What the North had done, there are these high sandy hills around.

[00:40:01] They had dragged thirty-seven and fifty-seven millimeter, these are good size, anti-aircraft cannons--and surrounded these trucks with a ring of them… It was a trap. The sensible thing to do would have been to say, “Eh, they’re just fooling with us. Let’s go find something that’s less defended.” But because we were so new and untried, and the issue was whether they were going to make some more of these kinds of airplanes, Ron didn’t say a word. He just hung in. Fifty-seven going off and they were all, you know, timed fuses, it gets real exciting. The way they have these side guns mounted, they had this great big hole in the side of the airplane with…. The guns fired sideways, so you were going in a continuous circle.

[00:40:58] If you ever had a lack of contact with what reality really was, you need only step over and look at this big hole when you were… you know, you could drop down about ten thousand feet…

**Fetter:** Oh, my god.

**Parkinson:** [00:41:12] …take a couple miles drop. We hung in. We just walked right down that line and popped every one of those trucks.

**Fetter:** Wow.

**Parkinson:** [00:41:24] That was my introduction. Every night wasn’t quite that bad, but …. no, we were fired at every night.

**Fetter:** It said when you were at service colleges, was that the Air Force Academy? Is that what that means?

**Parkinson:** [00:41:33] No.

Parkinson: [00:41:37] Yes. That’s kind of a finishing school for field grade officers.

Fetter: Was it in Washington?

Parkinson: [00:41:45] No. That was in Montgomery, Alabama.

Fetter: OK. Wow. You’ve been all over the country.

Parkinson: [00:41:51] Oh, yes. Yes. At any rate, the second year it turned out I was promoted to be the acting head of the department at Air Force Academy. First year, the gunship thing, and I came back and everyone was elated that we had done that. The Air Force Academy got a lot of great press out of that because the Air Force really appreciated that. It wasn’t just me, by the way. I should make that clear. We also had an expert on infrared systems. At one time, this combat airplane was flying around with as many as four PhDs from the Air Academy in the back. We contemplated a little that it might get really exciting if we got shot down. [00:42:44] Worse we ever got was a couple holes in the wings, so it wasn’t a big deal. At any rate, [the second year] I was head of the department. A guy that outranked me was coming back, and that would have forced me to go down a step. In your career, that does not look good. It looks like you’ve been fired or something. I wasn’t. I went to the dean and I said, “It is that I have to leave.” He said, “No, no. You just got here. We’ve got you for four years.” I said, “No. I’ve got to leave. I’ve got to leave.” I said, “I’m on the list for the Senior Service School,” which is another finishing school. They sent me to Newport to the Naval War College and I spent a year there.

Fetter: Is that Rhode Island?
In Rhode Island. Yes. Then I was lined up to go to the Pentagon. There are all these little things that kind of happened at the last minute. I was lined up to go to the Pentagon to studies and analysis. There’s a General Glenn Kent who I really admired. All of a sudden I got called down to the Pentagon and there was [Col.] Bill Manlove. I should tell you that, within the Air Force, the people who had gone through Doc Draper’s [MIT] course were kind of known as the guidance mafia. They were officers ranging from captains to generals. It was not a clandestine organization that held meetings, but it was a group that kind of looked out for each other. This Bill Manlove was a Doc Draper graduate and he was in the Pentagon, and he had a section of assignments for personnel--engineering people.

He called me in and he said, “I have your assignment folder.” He pulled this out right here. He said, “I know if I send this to General Kent, he’s going to grab you and you won’t be able to get out of it. But what I’m going to do, if you want me to…” He said, “Do you like to build stuff? Or do you like to study stuff?” I said, “Well, I like to build stuff.” He said, “I’ll tell you what. I’ve got another assignment for you in Los Angeles.” He said, “I’m going to take this and I’m going to write on it to the general, ‘Do not recommend we take this guy.’ And he probably won’t even read it, he’ll just sign it. And then I’ll get you assigned out to Los Angeles because the job I have for you gets to spend a $100 million a year on anything you want--YOU--want to spend it on, assuming it has to do with
the reentry vehicles of ballistic missiles, and in particular, all the complex
guidance control problems.”

What ended up happening is it broke the assignment, and I ended
up at Los Angeles, and I am embarking on what one of my buddies called
“The Famous Hundred Days of Parkinson.” Oh, by now I’m a full colonel.
The remarkable thing is that I am now the ranking man in my whole naval
academy class, which I found amusing…. [laughter]

Fetter: Considering you almost didn’t get through into the Air Force.

Parkinson: [00:46:33] [laughter] Yes. The fact it wasn’t clear the navy loved me that
much. Yes. At any rate, so…. Then what happened?

Fetter: You went to Los Angeles.

Parkinson: [00:46:45] Oh. I’m in Los Angeles.

Fetter: Is that this thing called ABRE…?


Fetter: OK. Good.

Parkinson: [00:46:55] We were doing all of these things relating everywhere from the
physics of nosecones and how they ablate, to the stability and control, to
how you take a nosecone and actually steer it. Oh, this was joy. This was
research. This was development. This was building stuff. Then we had to
test.

Fetter: That’s fantastic.

Parkinson: [00:47:20] We had a flight program, and we were flying it. Except after a
hundred days, another… The fellow that headed the Advanced Planning
Office for Los Angeles Air Force Station was a brigadier general named Bill
Dunn. Connections? Naval Academy, Class of 1952. He and I got to talking in a cocktail party or somewhere and I opened my big mouth about what I’d done. You know, he wanted to know all this. He decided I was just the guy for this floundering space navigation satellite program.

Fetter: That’s when you went to the Pentagon?

Parkinson: [00:48:01] No. Never went to the Pentagon. It was done out of Los Angeles.

Fetter: This was when… 1972 to 1978?

Parkinson: [00:48:08] Yes.

Fetter: That sounds like a seminal period in your life and it led to all sorts of things.

Parkinson: [00:48:16] It led to more things.

Fetter: I’m very interested in hearing about what you did there, how you made it work because it’s really hard, and you obviously have amazing people skills as well as engineering skills.

Parkinson: [00:48:28] Thank you for that. I think I probably do have skills of knowing who good people are. I’m sort of a friendly guy, right?

Fetter: Yes.

Parkinson: [00:48:41] Wrong. I’m ruthless. I’m ruthless when it comes to people who are miscast, you know, and you’ve got to move them out. At any rate, this General called me in. Famous story, three-star general now. He’s sort of a heavy hitter. I’d already gotten wind that this [One-star General] Dunn had put me in to be selected for this dinky little program called 621B, of about thirteen officers at the time that was absolutely failing and floundering. Furthermore, I’m an inertial guy. This was radio Navigation. I mean my goodness. It’s not self-contained. Who could possibly like that? Any rate, I’m
sitting there with him and he said, “Well, maybe you’ve got wind of this. I’m thinking of transferring you over to 621B.” We had a little preliminary discussion and he said, “How do you feel about that?”

[00:49:36] I said, “Well, if you put me over there, am I the program manager? Am I the person in charge?”

He said, “I can’t guarantee that.”

I said, “Sir, in that case, I don’t volunteer.” This really shocked him. He didn’t expect that as an answer. I walked out of his office and he instantly reassigned me anyway. We had established a certain ground rule here on where I thought I was going. This guy [Lt. Gen. Schultz] was a hell of a curmudgeon, but he was really good. He’s the kind of guy that if the Air force said he had your six, he looked out for you, if you didn’t screw up. On the other hand, I….

Fetter: Was he in Washington, or was he in Los Angeles?

Parkinson: [00:50:21] No. He was in Los Angeles. He was the head of all the space satellite and missile development for the Air Force. All the ballistic missiles came under him, all the space systems. His job back then when a billion was worth something, he was probably running a $3 to $4 billion a year operation.

Fetter: You also ended up working with other services, didn’t you? The Army and the Navy?

Parkinson: [00:50:45] Yes.

Fetter: That’s the part that sounds really unusual and interesting.
Parkinson: [00:50:51] Yes. So I had this concept, 621B. It turned out it was fundamentally good. It was in a big argument with a navy program called Timation, because they weren’t going to fund two of them, the navy’s program was focused mostly on putting clocks in orbit. For your own edification, this gives you more than you ever wanted to know about it.

Fetter: OK.

Parkinson: [00:51:25] Have you seen that?

Fetter: No.

Parkinson: [00:51:27] OK. What I’ve done is just hand Sandy a write-up on the origins of GPS that I did.

Fetter: Very good. There’s a magazine called GPS World.

Parkinson: [00:51:43] Yes.

Fetter: Good for you. [laughter] I would never have seen it. [laughter]

Parkinson: [00:51:48] Yes. At any rate, so I’d inherited this program. Concept was pretty sound. It was based on some studies that the air force had done. They were running some tests at Holloman. To understand the significance of what that is, what that was all about, you have to understand there were three things about GPS that were pretty new. The first is the notion that you needed four satellites. If you think about it, mathematically, you say wait a minute. If I range to three, I can get three dimensions. Why do I have to have four? If I was doing roundtrip ranging, I would get a range. But if I’m passive, if I don’t have that, it’s like a one-way radar.

[00:52:46] I need to have time here because I’ve got to take the time, divide it by the speed of light and get me back to…. or multiply by the speed of light
and get me back to range. The concept that had been pointed out in an earlier study classified by the air force--and that goes into what actually happened--was if you go to four satellites, the fourth piece of redundancy with the right geometry, the user can back in to the only time adjustment which causes all four of those ranges to be simultaneously.

**Fetter:** To sync. Synchronize.

**Parkinson:** [00:53:28] Synchronized. You can do it mathematically. There’s four simultaneous non-linear equations that are very, very simple. You don’t solve it that way, but that’s the underlying math. The first thing was that four satellite concept. That was strictly an air force… an advocated air force deal. The reason I bring that up, if there is a fundamental controversy in my background, it is that the Timation Program claims they invented the whole thing. If you haven’t stumbled on that….

**Fetter:** Is that the navy?

**Parkinson:** [00:54:06] The navy. Naval Research Lab. They’ve been very shrill. I ignored them. Who the hell cares? That was my attitude. Who the hell cares? That concept was definitely not theirs. Their concept was, each user had an atomic clock. The Navy concept only needed two satellites because it was basically two-dimensional. The guy that did that, a fellow by the name of Easton [Roger Easton], actually wrote a patent. I know what his concept was. He wrote it down and got it patented. The irony is he got that patented… oh, something like eight years after this classified study had been done that included his concept which was rejected. If there is a controversy on GPS, it’s that.
The second innovation for GPS is the kind of signal we use. We use code division multiple access, CDMA. I think you may know what that is. It is that I have a series of ones and zeros. It’s a digital code. I transmit that. The user has a replica of that code and he slides it around till he gets correlation peak. Very easy to understand, and for you in particular. He slides it around till he gets it a correlation peak. When you apply that code, you spread the energy out. It’s also called spread spectrum as opposed to a tone system which is not spread.

It turns out, by spreading it, the energy density in the frequency bands of interest, are way below ambient noise. This little device (holding up an iPhone) that has a GPS chip in it is digging signals that are something like twenty dB below the ambient noise.

**Fetter:** Wow.

**Parkinson:** Which I think is pretty phenomenal; particularly given the fact they even got the antenna in there. The advantage of that was all satellites transmit on the same frequency. As the signal comes down, I digitize it. Then I go sort of offline. Not really, but then I look around, but I’m looking around now for all of the satellites I’m trying to range to. It turns out you usually use more than four. This phone is probably listening to at least eight or ten. As a result, the bias between the channels is locked in. As soon as I digitize it, it’s all there. I don’t have to worry about a different frequency to hear this satellite and that satellite, and then worry about the picosecond correlation between those two, this varying with temperature and resistors and….

**Fetter:** Were all the Doppler shifts just easy to fix?
Parkinson: [00:57:25] Reasonably easy. You’re right. The Doppler shift would slightly alter the spectrum, but not outside the bandwidth I’m listening to. That’s a very good question. Most people don’t recognize that even with a time synchronization, they’re all sliding around. That’s accommodated. You have a second or third order loop in which you have to inject both the Doppler and the phase position.


Parkinson: [00:57:56] Yes.

The third thing was the clock. The Air Force had already acknowledged they needed an atomic clock, but they didn’t have one. This little program didn’t have enough money to fund one. The Navy did. In August of 1973, I went up…. Oh. There’s one other thing you have to know that’s written up in there. That is that sometime in the spring of 1973, there was a new number three guy in the Department of Defense, Mel Currie, who was coming in. This is the guy that oversees all the research and development for the whole Department of Defense. He is literally six pay grades above me probably. He was moving in with the new Nixon Administration…. I think he had previously worked for Hughes.

[00:59:04] He was a vice president or president or something. He was moving from L.A. to D.C. He wanted to come back on the weekends. On the other hand, to be official travel, he had to do something official. He would come over to our space division. The way that normally goes is the three-star general greets him, and la di dah, and then they give him a dog and pony show on something. I think one afternoon my general, Kenny Schultz, ran
out of extended dog and pony shows, and here comes Dr. Currie again for maybe the third weekend in a row, and he said, “Uh, OK. Let’s set him up with Parkinson. He talks a lot. Send him down there and he’ll get an in-depth briefing on 621B.”

[01:00:01] We’re sitting in an office just this size. Me, you know, with all these pay grades below, this very senior guy, and I’ve got a viewgraph machine, and I’ve got a stack of technical viewgraphs, and I spent like three hours with this guy. That kind of face time, you just don’t get that. Nobody gets that. Except I lucked in and got this. At the end of that, and with whatever other inputs he’d got, he decided this was his favorite program in the whole Department of Defense.

**Fetter:** Wow. Fantastic.

**Parkinson:** [01:00:38] Not too shabby. I’d like to say it was me, but I think the concept, once you understood it, it tended to sell itself. Now we can go back to the train of thought. Now we’re up to August. I’ve got the 621B concept, which is a cautious one. It’s the four satellites, but we don’t think we’re ready for the clock, so we will broadcast a signal up that comes back down, and the clock synchronization is still on the ground. You don’t want to do that operation, because then you’re vulnerable to disruption of the uplink. The way GPS satellites are today, you could wipe out the ground station. Satellites will continue to work just fine. They will gradually become ignorant of time with, you know, the long-term drifts. Orbit mechanics, they’ll do pretty good in all that, but it will just slowly drift off. Still be completely useful.
We decided we weren’t ready for that. We decided to use four satellites, we’d do one geographical sector at a time. At the end of that meeting, and you got all these generals and senior defense officials, and I’m a brash colonel up there flipping around asking for the OK to field an experimental system. They voted it down! Currie then said, “Brad, I want to see you in my office right after this meeting.” I thought, wow. That was a very short tenure as a program manager. [laughter] I went to his office and he said, “Look. I want you to open your thinking.” I’d already given him some hints that I was a little dissatisfied with the Air Force proposal that I had inherited.

He said, “I want you to just open up your thinking. See what you can use from the Navy. I am going to designate this a joint program.” Now we get back to what happened. I ended up with an army deputy, a navy deputy, Marine Corps deputy, defense mapping-agency deputy, and I put them all to work. I didn’t let them just sit around and be a liaison officer; I made them do stuff. What happened next was I called that meeting in the Pentagon. This was like mid-August. I did not want to have a meeting in Los Angeles because too many people were too committed to the original concept and I knew I was going to have an argument with anything that we tried to do.

I took a bunch of these bright, young Air Force officers that I had hired, all had master’s degrees, some had PhDs, and we went to a small office in the Pentagon on Labor Day weekend— I did that deliberately so there wouldn’t be any distractions—and wandered the darkened halls of the
Pentagon. As we say, perhaps the only light came from the end of the tunnel. We got together at the end of three days, had a great deputy, Steve Gilbert, and a great guy to invent satellites, Gaylord Green, and a great guy in system engineering Mel Birnbaum. We noodled on what the alternatives were (based on the six year old broad-brush study), and at the end of seven days, we had a broad description of what we wanted to do. We captured that in a seven-page document called the Decision Coordinating Paper.

[01:04:20] Then the fun began… the way you win is you wear everyone else down. The laws of bureaucracy are such that no one can say yes, everyone can say no. What you’re trying to do is get the no’s to neutral, and some of the neutrals to yes, and then you gain approval. It’s finally thumbs up but you get really beat-up in the process. It was about three or four times a month I was back in the Pentagon from Los Angeles getting beat up. They love to beat up their colonel, program managers, and ask me all these questions. You have to be careful. I'm sitting in a meeting and there’s some navy guy, and he says, “Well, this system isn’t going to work at all. It’s not going to be credible.” He says, “You got three dimensions. You get out there in the ocean and a ship is suddenly shown to be a hundred feet above sea level. Your credibility has gone to zero.”

I blurted out, “Who would be stupid enough to do it that way? If you know your altitude, you plug that in and then solve for the best position.” Bad answer, Brad. Very, very bad answer. [laughter] You should have thought that over. I survived that. It was that kind of thing. You know, you don’t want to accumulate more enemies than you need up there.
Fetter: Is this just general kind of hazing?

Parkinson: [01:05:53] It’s power.

Fetter: OK.

Parkinson: [01:05:57] If you look at the kind of people that naturally gravitate to that environment, even if they didn’t start off that way they become power people. I will guarantee you, you’re not like that.

Fetter: No, but I’ve never been interested in that kind of thing. [laughter]


Fetter: I like working with the students and helping them to develop.


Fetter: Yes.

Parkinson: [01:06:22] And finding what works. In many ways, you know, working with my young air force officers was like working with students. And doing what we’re doing was very much like applied research because it was all new. It was brutal. In December 1973, Dr. Currie chaired the meeting again, and it was thumbs up, go for it. I think we had a budget of… I think it was like $125 million for like four years. We had to develop and field four satellites, ten kinds of user equipment, a whole ground system….

Fetter: Did you have to develop the atomic clocks?

Parkinson: [01:07:09] Ah, what a good question. Part of the compromise to get the navy to come in, I said we’re going to use the navy’s clocks. The navy said they hadn’t made one that worked yet. I said, “We’re going to put your clock on our satellite, so you’re part of the program. Get aboard.” If you dug into it, their history at building…. The atomic clocks had been invented obviously
many years before. Making them small, there was a German company that
was doing it, but they weren’t…. We were putting these satellites in the upper
Van Allen belt.

Fetter: Were they cesium clocks?

Parkinson: [01:07:53] The small ones were rubidium. If you go buy one now it will have
an accuracy of one part in 10 to the twelfth, eleventh maybe. Cesiums were
parts in 10 to the 13th. Cesiums were bigger. More uncertainty on whether
they could survive. The reason that that is so critical is that upper Van Allen
belt is just blazing with radiation.

Fetter: Is it charged particles?

Parkinson: [01:08:24] It’s everything. It’s charged particles though. The radiation
environment, and the fact that these particles would come in and hit
something, and then you get secondary radiation. It was a tough
environment. NRL, the Navy Research Lab, had been unable to put a clock
up that lasted more than six months. I said, “Well, we need an insurance
policy.” By that time, we had Rockwell on contract. We got Rockwell on
contract to build our satellites six months after I got the go ahead more or
less. I said, “As part of your program I want you to get me a backup clock
because if I don’t have a clock, we don’t have a program.”

[01:09:11] It turned out Rockwell had a guy who spoke German, Hugo
Fruehauf. He was their chief system engineer. There was a company in
Germany that built this little [Rubidium Clock] device. They were going to
set up a subsidiary in Newport Beach. The reason that was important is it
was right near where we were building our satellite. The head of the company
was a very bright guy but he did not speak English, but we had the Rockwell
guy who was a German speaker. They got together and they enlisted another
branch of Rockwell International, Autonetics [electronics manufacturer] right
up the street, and they collaborated. On the first three satellites, there was an
empty place for the navy clock. It wasn’t ready. On the fourth satellite, they
got their Cesium clock on it.

[01:10:05] The Navy clock’s physics package was probably OK, the power
supply got fried. The irony is that collaboration with the navy led me to go
from the very conservative clock on the ground to clock in the sky, and plan
on using their clock do it, except it didn’t. It was not the navy clock that
worked on the first four satellites. It was only the air force’s version. If you
read the NRL literature, they were the clock guys. And they were. Thank
God they enticed me to do that. The truth is they weren’t ready. Their
Cesium guy, they had a Cesium contractor [Bob Kern]. Brilliant guy.

[01:10:50] I really enjoyed him, but he was kind of a laboratory
guy that
didn’t… I mean I don’t know if you saw the antics when Gravity Probe B
was being built around here, but my god, it was just a total impedance
mismatch between Stanford and NASA in terms of the way you do business.

[laughter] Any rate, it worked. The point is we proceeded with a program.
There were a lot of engineering difficulties. I still had to go back to
Washington two or three times a month. Had to run the program. I tended
and worked with all the subcontractors.

[01:11:35] Normally a program like that for the Air Force would hire a
coordinating contractor who ran the user equipment, the satellites, the
ground system, and this entity would be between the air force and these three elements. We didn’t do it that way. We were the coordinators. It implies a depth of accountability and technical knowledge that is very unusual and had never been done in the air force. That boss that I told you I really liked?

**Fetter:** Currie?

**Parkinson:** [01:12:14] No. General Schultz. He came within a hair’s breadth of firing me, because I came in and explained how we were going to do this. He had run ballistic missile programs, and that was not how they did it. I remember this small review meeting with General Schultz, like two or three of my guys, I was up briefing, and he’s sitting there. He always smoked in those meetings. You could tell he was relaxed because he’d be sitting back and smoking these cigarettes. I got to this chart that talked about how we were going to organize this. You could tell something was wrong. He put his cigarette down, started to slide forward in his chair. He’s sliding forward in his chair and I’m thinking, oh, my god. I’m reading him. I’m reading his body language.

[laughter]

[01:13:04] I was thinking, ooh, ooh, ooh, we are in serious trouble. What are we going to do? It turned out I had a backup chart that explained at the interfaces between the satellites and the user equipment, and the satellites and the ground equipment, was mostly simply the RF and the specifications of what the RF was all about. I told the General, “That’s the key. And we can’t let go of that. And by holding onto that, we are the coordinating contractors and it will be right.” He sat there and he looked at that for a minute. Slid back, picked up his cigarette. I thought, ah. It was interesting. I
got out of that meeting and I went to my guys and I said, “Did you know what just happened?” They didn’t read it at all. They didn’t realize what was happening. Woo!

Fetter: When were the first satellites put up?

Parkinson: [01:13:57] First satellite was put up in February of 1978. I was the program…. I was the launch commander down here at… down here at Vandenberg that time. That was a funny story. Vandenberg, at that time, had the habit that if you brought your satellite up there, they trained another whole group to do a whole bunch of final tests on your satellite before it was allowed to launch. I said, “Number one, I’m not training your group to do nothing. I’m not going to tell you how to do it. And you’re not going to touch my satellite. We’re going to come down here, run a few checks, mount it on a booster, and launch it.”

They said, “No, no, no. We can’t go along with that.”

[01:14:41] I said, “Well, that’s what we’re going to do.” It was a colonel…. The leader for the Vandenberg position is another Colonel. Turns out, coincidently, it’s another Naval Academy guy who I knew very well and liked a lot. I said, “We’re not doing it that way. First of all, you’re going to put in a six month delay on my program, you’re going to end up having a bunch of people that don’t understand a damn thing about this satellite. Getting in there and messing around, no, you’re not going to do that.” His chain of command that goes up to three star, and I got the chain of command. Next thing you know, there are two colonels in front of General Schultz, the three stars.
I said, “General, I don’t want them touching my satellite. We know what that satellite’s all about.”

The colonel said, “Well, then it’s your responsibility.”

I said, “Baby, it’s been my responsibility all along.” [laughter] Any rate, fun story. We did it my way, got it off and it worked fine.

**Fetter:** I know you called GPS the ninth utility. What do you mean by that?

**Parkinson:** Utilities have a…. I don’t know whether I can name eight, but utilities have a characteristic that is universally used for common good, and tend to be taken for granted--water, lights, sewer, transportation. You can compose your own list. Nine is kind of a fun number. The idea is that GPS is taken for granted. It is so ubiquitous. Matter of fact, it gets blamed. If your car is giving you wrong directions, it isn’t GPS, that’s Navigation and Mapping software.

**Fetter:** That’s somebody programmed it.

**Parkinson:** Yes. That’s somebody’s street maps or something. Everyone takes it for granted. It’s getting scary. We charter various sailboats down in the Caribbean a lot. Or have. We haven’t done it in last, you know, couple years. I’m always the skipper. I'll get out there and I’m checking the pilotage against landmarks, and I'm checking the depth meter, and doing DR, dead reckoning. My kids all say, “You got GPS. What are you doing that for?” I don’t trust that system. [laughter]

**Fetter:** Then in… after 1978, you were in Colorado School of Mines in Colorado State University. Then you were at Rockwell. You were at something called Intermetrics?
Parkinson: [01:17:18] Yes.

Fetter: These were companies you were with? Do you have time to do this?

Parkinson: [01:17:21] Yes. Yes, that was a good time to do this.

Fetter: At least a short… briefly about it.

Parkinson: [01:17:26] OK. A lot of people wanted me to go to work with some of these aerospace companies. I was very uncomfortable with going to an aerospace company that I had any contractual relationship with. To me, there was something that smelled in the ethics of it. I figured if I got away for a while and had a break, and then I can consider other opportunities.

Fetter: Not everybody has those scruples.


Fetter: It’s a good thing.

Parkinson: [01:17:55] Yes. It was my dad. It didn’t smack of high integrity to me. I kind of needed a break. What happened is they wanted to send me to the Pentagon. I retired with a reason. There was a four-star back there who… apparently I had attracted his attention. He called me up personally and in essence said, “Next list you’ll be a general. And I want to put you… I want to move you to the Pentagon to be the Air Force’s colonel for the Secretary of Defense.” That is what they call in the military parlance a cherry position and unless you step on your knickers, you’re moving.

[01:18:45] I said, “Sir, I understand it, but I’ve been in the Pentagon so many times for the last six years, it’s just not me. I like to build stuff.” What happened is I went to the Colorado State University. I was a professor teaching control theory, my love. Then a bunch of people started to nose
around and want me to go to work for them. I finally went down to Rockwell. I accepted a position that wasn’t on my GPS program. Instead I was on the NASA program that was building space shuttles. After I’d been there just a little over a year, I ended up being approached by this company, Intermetrics, software system engineering company. They said come, be executive VP. We’ll give you seven of our divisions. You’ll have full general manager responsibility, and my wife, Ginny, was from Winchester, Massachusetts. This company was in Cambridge right next door. [01:19:50] We went back there, and lived in Lexington. Spent four years there, and it was a great four years. Learned a lot about how small companies worked. We took them public, and I was the number two guy behind the president in the road shows. Learned a lot about how investment banking works, to my dismay. Then at the end, about 1982, I got a call from [Professor] Bob Cannon. When I left Stanford, by that time Cannon and Lange said, “We don’t want you to leave Stanford. We want you to stay here and be a professor.” I said, “Wait a minute. I’m an air force officer. I can’t stay here and be a professor.” They said, “Well, we really would like you to do that.” [01:20:42] I said, “Doesn’t work,” and I went off. But sixteen years later, in 1982, Cannon called and said, “We got this project here called Gravity Probe B, and we have this zany looking physicist by the name of Francis Everitt.”

Fetter: [laughter] He looks like everybody’s idea of a mad genius.
Parkinson: [01:21:06] Yes. I worked with him a lot and I really admire and respect him. I know the physics community doesn’t universally do that. I got to tell you, he is a fabulous talent. Any rate, he came out and we talked. They decided they wanted me to consult with him. I went to my Intermetrics boss and said, “Well, Stanford wants me to help them out here. How do you feel about my doing that?”

He said, “Well, do you think you can do that and not screw up your current job?”

I said, “Well, I think so, you know.” I did that and started coming out here, oh, periodically. Then they’d call me up, check things out. Finally, about late 1983, or thereabouts I guess, they said, “How would you feel about coming out here and being a research professor and running Gravity Probe B?”

[01:22:08] I was kind of ready for a change. My wife wasn’t. She loved being near her parents and everything. One thing led to another and I said yes, and came out and started marching down Gravity Probe B. Although I was a research professor from the beginning I always taught classes. I was not uncomfortable with being a research professor. Then, oh, fast forward about, oh, four years or so, I guess. I got a call from Colorado. I think Colorado has one of the largest aerospace departments in the United States. They were looking…. 

Fetter: This is in Boulder?

Parkinson: [01:22:50] Boulder. Yes. They wanted me to be their department head. I went back to Boulder and interviewed and talked, and la di dah, they gave me a firm offer. I hadn’t talked to Cannon or anyone. You know, I thought that
would kind of be bad manners. I’m sitting in my office one day and the secretary comes in and hands me an envelope. I open up the envelope and it says, “Congratulations on being a tenured Stanford professor.” I never applied for it. I never even knew there was an opening. I think Cannon must have gone to someone and said, “Look, we might lose this guy if you don’t…” Yet, I’m not motivated by the tenure system. I’m just not. But I became a tenured professor at Stanford. I’m very happy and proud and….

Fetter: It’s a great institution, and it’s…


Fetter: It’s so much more impressive than when, I mean, back when I came in 1965. Berkeley was much more the center of the physics universe in San Francisco than Stanford. Stanford has really moved a whole degree ahead. I spent two years at Berkeley as a postdoc.


Fetter: Yes. I’d….


Fetter: I spent two years at Oxford, between 1958 and 1960. I basically did all my graduate courses, even though I got a second bachelor’s degree from Oxford. When I went to Harvard, I was basically able to jump in and do research. My thesis advisor, he was very wise, and he said, “If you get this postdoc fellowship at Berkeley, you should take it, but you shouldn’t write anything about your research until you’ve spent another year thinking about it and working on it.” He said you wouldn’t benefit by spending another year at Harvard. Berkeley was perfect for me. I had a great time. I’d have loved to
stay there, but Berkeley didn’t offer me a job and Stanford did. When I came, you had to be promoted or leave in three years.

Parkinson: [01:25:02] Three years.

Fetter: Yes. I still have the letter from Leonard Schiff where he said, “Although tenure is not ruled out, it’s extremely unlikely and should in no way be anticipated.” [laughter]

Parkinson: [01:25:13] Is that right?

Fetter: Yes. With the princely salary of something like $8,000 a year. [laughter]

Parkinson: [01:25:20] Oh, my god. [laughter] Oh, my god. Yes, you have…. You’ve been a witness to the changes big time.

Fetter: There’s an interesting three hour discussion that I and Sid Drell and Mac Beasley [Malcolm R. Beasley] did about the history of Physics and SLAC.

Parkinson: [01:25:43] Oh, I bet that is interesting.

Fetter: It’s on Stanford iTunes. I can get you the link if you want.

Parkinson: [01:25:52] If you don’t mind. I would enjoy it.

Fetter: I was amazed. Sid Drell had folders with all the letters from Wallace Sterling. The fact that Wallace Sterling, the president of the university, was directly involved in this feud, and he kept writing letters to the physics department saying, “You don’t seem to have done anything in the last year. Why are you guys stalling?” [laughter]

Parkinson: [01:26:16] Yes. [talking over each other]

Fetter: Anyway, and Mac Beasley and I were very much involved. We’re the people who sort of brought Physics and SLAC and Applied Physics all together on the same page. It took about three years of hard work. It was fascinating.
Parkinson: [01:26:31] Are they together now?

Fetter: Yes. We have now a whole bunch of joint appointments between SLAC and Physics. A large part of it was this KIPAC, Kavli Institute for Particle Astrophysics and Cosmology. They brought in Roger Blandford…

Parkinson: [01:26:50] Yes, I know Roger.

Fetter: …from Caltech. People said you’ll never get him to leave Caltech. I think the idea of setting up this big program, and he came as the head of it. It’s been very successful. That and the fact that SLAC has diversified into photonics because they had these LCLS which is effectively an x-ray laser--it’s coherent x-rays--as a free electron laser, which, as you may know, John Madey invented in some sense…

Parkinson: [01:27:19] Oh, yes. I know. He still…. I got an email from him, oh, a month or two ago asking for some support on some project.

Fetter: Was doing research at Stanford different from doing research in the military?

Parkinson: [01:27:37] Oh, it’s much more…. Yes. In the military it was not “publish or perish” at all. Our research was always applied, always applied to specific systems that the DOD wanted to procure. Obviously, when I came here, it was unfettered. If I could find money, I could do anything I wanted. Gravity Probe B, in that sense, was… you know, the….

Fetter: Infinite source of questions.

Parkinson: [01:28:14] An infinite source of thesis topics, of course, and an infinite source of support money. I forget how many the count is, but Francis keeps it. I think there were ninety PhD theses. Some of them…. In our department, the
Aero-Astro ones, I think there were six or seven that got the department award as the best thesis of the year.

**Fetter:** It was a well-managed program. It just took long. [laughter]

**Parkinson:** [01:28:42] Yes.

**Fetter:** It was a very ambitious program. It’s one of the few of Fairbank’s programs that really finally came to fruition.

**Parkinson:** [01:28:50] I was going to say, so selling me on coming here, Francis and Bill flew back to Boston. We sat down. Bill explained to me in 1982 that launch was only four or five years away. [laughter] Launch finally occurred in 2004 – 22 years later.

**Fetter:** I taught general relativity in the early 1980s because nobody else was around… or probably the late 1970s. I went back to Schiff’s early papers from 1959 and other stuff, and at some point he had a claim that this would fly within five years. [laughter]

**Parkinson:** [01:29:20] Yes. Oh, yes.

**Fetter:** They all were wildly optimistic. [laughter]

**Parkinson:** [01:29:24] Five years…. The complexity…. See, you’re in a position to really understand the complexity of Gravity Probe B. I think the NASA chief scientist…. Frank McDonald, I think? I think he had it right. He said, “This is the most complex thing that NASA has ever attempted.” He was including the Apollo, from a standpoint of technology we did not have. There’s a lot of heroes floating around, you know. John Lipa. He was… oh. He was hell of a curmudgeon. I don’t know if he still is. Very difficult for me to manage John Lipa. By and large, I didn’t because he didn’t need it. You know, Mac
Keiser…. We had a lot of great guys. Then, of course, John Turneaure. What a rock. I’m surprised that you never made him a professor, an honest to god, full up professor.

**Fetter:** I don’t remember it coming up. I was chair from 1985 to 1990. I don’t know whether anybody pushed for that. I mean it wouldn’t have been…. I don’t know. I don’t know. It’s rare for somebody to make a transition, but Marty Fejer did in Applied Physics. He was the person who worked on something called lithium niobate, which is very important in fiber optic crystals. At some point, it was just embarrassing for him not to be a regular professor. They did the same things at SLAC with Helen Quinn. It just got too embarrassing to have her around as a senior staff.

**Parkinson:** [01:31:18] It’s funny, isn’t it?

**Fetter:** That was particularly delayed. Helen gave a great talk last fall. We have an Emeriti Council organize each quarter a talk by an emeriti faculty. She gave a fantastic talk. I said she’s been president of the American Physical Society and she’s very distinguished. Most people would never know anything about her, but she gave a great talk about growing up in Australia and coming to the Stanford and going to SLAC. The difficulties of being a mother in those days when the departments were all male mostly. [laughter] It’s interesting.

**Parkinson:** [01:31:59] Our department’s changing. I’m glad to see it. We’re getting a bunch of women. I don’t know. How are you doing on Physics? Are you getting some?

**Fetter:** They have probably about 20 percent women. There must be six or eight, maybe ten between Physics and Applied Physics and SLAC.
Parkinson: [01:32:17] Obviously I wouldn't subscribe to something that said that was the criterion, but any kind of an equal nod, it’s helpful. I think we've got some real….

Fetter: We’ve had a couple of cases where the dean’s office says if you have a two-career couple, the dean’s office can be very helpful at finding… whether it’s the male or the female spouse is the sort of dangling piece, and they’ve been very helpful in making it work in both cases.

Parkinson: [01:32:45] Oh. That’s great.

Fetter: We have a husband and wife who are Russian, Andrei Linde and Renata Kallosh, and they’re fantastic. Andrei was one of the inventors of the inflationary universe. He’s a very nice guy. You probably never heard of him.

Parkinson: [01:33:01] No. I don’t know him.

Fetter: He’s neat. He’s funny. Tell me briefly about Trimble Navigation, because I gather you took a year off to do that.

Parkinson: [01:33:11] Yes. When I came here, 1983 or 1984, I went on the board. I’d met this guy in an airplane coincidentally, Charlie Trimble. Charlie’s fairly unique. Got a bachelor’s and master’s from Caltech, but he’s legally totally blind. He can see out of the perimeter of his eyes. He’s taught himself how to read with magnifying glasses. He got his degree at Caltech by using binoculars in the classroom. He was scheduled to go back for a PhD. He’s working summers at Hewlett-Packard. Hewlett-Packard says we got this Loran receiver, would you like to set up a company around it, because we’re going to spin it. We’ll sell it to you for twenty grand or something. Charlie did that, in around 1980, I think. In 1982 I was in an airplane.
The guy next to me, we got to talking. I said, “Well, you don’t know who I am. I’m Brad Parkinson,” and la di dah.

He said, “Oh, I know who you are.”

“Really?” [laughter]

He said, “Yes. Yes. You’re a GPS guy.”

I said, “That’s true.” We got to talking. He took me on his board. When I got here, I was on the board and for… I don’t know, sixteen years. Charlie grew the company to about 200 million. Then he kind of lost the magic sauce because he didn’t realize you have to hit your quarterly profit projection, and your R&D reinvestment has to be limited, and you have to include things like marketing and sales. He had those things, but it was out of balance, and the board had been counseling him. He is a brilliant, wonderful guy.

The board finally decided, nope, we got to replace him. We had a non-Charlie meeting one Saturday, and got to the point we decided we had to replace him. The stock price was in the tank. We’re sitting around this table… there are six of us sitting around this table right over here. Everyone agrees to that. Then they said, “Well, that leaves an open question. If we fired him, who’s replacing him?” They knew I had a similar problem at Intermetrics that I had to clean some things up. It was good people, totally miscast. It’s a brutal, brutal prospect, Sandy. It’s just terrible. Finally looked around the table and they said, “We elect you.”

I said, “Wait a minute. I’m going on sabbatical. I already got plans. I’m not doing that. I’m going on…. …” They got out and started, you know, putting options on the table. After a while I said, “Well, OK.” I said, “I’m
going to be your interim, but I am the CEO and it’s going to be… there’s going to have to be some blood on the floor.” I think of Charlie’s first reports, I fired seven in the first week. At the end of six months, the stock had grown from seven to twenty-eight dollars.

Fetter: Wow.

Parkinson: [01:36:42] Not only that, I found a replacement. [laughter]

Fetter: Even better. Then you came….

Parkinson: [01:36:50] Even better.

Fetter: Did you get your sabbatical?

Parkinson: [01:36:53] No.

Fetter: You came back to Stanford then.

Parkinson: [01:36:55] I came back to Stanford. Yes. I didn’t…. That was my sabbatical effectively.

Fetter: Did you have good interactions with the administration at Stanford in general?

Parkinson: [01:37:05] Oh, I think so.

Fetter: Yes. I just wondered.

Parkinson: [01:37:07] I think so. I know Hennessey. I know…. Probably the only one, Jim Gibbons, he was a little problem. Plummer, I got along great with Plummer.

Fetter: I had a wonderful interview with Bill Kays who was dean for 1970s. He was a Stanford student years ago.

Parkinson: [01:37:51] I’m blanking.

Fetter: He was a thermal guy.
Fetter: I interviewed him a year ago and he was... he's ninety-three and he was very proud that he just got his new license renewed. Driver's license.

Parkinson: [01:38:06] Darn straight.

Fetter: He was great. He’s fun. His answers were very brief. He was to the point. It was fun. I enjoyed talking to him.

Parkinson: [01:38:20] I’m rambling a little bit. I hope you don’t mind.

Fetter: No, it’s fine. Let’s see about other things. How is Stanford different from other universities, other peer institutions? Do you have any thoughts about that?

Parkinson: [01:38:34] Yes. The one I know the best is MIT, because not only was I there as a student, I served on their advisory committee, or committees I guess, for probably seven or eight years. The power of Stanford over MIT at that time--can’t tell you now because I haven’t sampled it--was the fluidity between departments. It’s something that has tended to naturally occur I guess at Stanford. Engineering is particularly like that. I mean our controls course here was alternately taught by Mechanical, Aero-Astro, and Electrical. Gene Franklin was one of my thesis readers. [01:39:29] He’s in Electrical, of course. I think that has been a strength that has played into the way society and technology are going in which multi-disciplinary things are at the forefront and any advance is a cooperation of many technologies and disciplines. It’s not like the disciplines are getting smeared. I always felt that HEPL was a prime example of that, particularly Gravity Probe B.

Fetter: Yes.
Parkinson: [01:40:03] My god. We had people from six or seven departments working together.

Fetter: No. I agree with you completely. I was first director of this Laboratory for Advanced Materials, which was the first time that there was close contact between Material Science in the Engineering School and Physics and Applied Physics. They’re all put together in the same building. The students don’t deal with departments. They just deal with whoever’s doing stuff that’s exciting.

Parkinson: [01:40:29] And ideas.

Fetter: It’s been amazing. It’s been fabulous. I think the whole structure that it’s under the dean of research. About ten years before, we’d tried to set something up and it dissolved eventually because neither Jim Gibbons [dean of engineering] nor Ewart Thomas [dean of humanities and sciences] was willing to give up responsibility. The brilliant thing about the way it works under the dean of research is if a faculty member’s unhappy, they can’t go to their own dean. They’ve got to deal with the dean of research who is ultimately running the labs. The dean of research has a very different attitude than the department… than a dean of a school.


Fetter: It’s been great, I think. It’s one of the wonderful things about Stanford.

Parkinson: [01:41:12] To me, that is the biggest thing. Of course, Stanford is blessed. They’re not real estate constrained. Particularly also in the last twenty years or so, their graduates have started to come into their own in terms of contributing, giving back. Jim Spilker, a friend of mine….
Fetter: Yes. I was going to ask you about him because I was told that you knew him.

Parkinson: [01:41:37] Oh, extremely well. Yes. I gave his budding company its first contract on GPS. First contract ever. It was a $25,000 contract to study the signal structure. The signal structure of GPS is very much a product of a number of people. Certainly Jim was a major contributor to all that. I would say the lead contributor. Of course, he went on and made his fortune, built his company up and then sold it. It was gratifying to be there on that court and watch that building get his name put on it. I know he enjoys that sort of thing particularly, and…. 

Fetter: I’m glad it’s no longer the Nano Building, because there never was a Nano Building, it’s really a Photonics Building.


Fetter: It’s just…. I guess Jim Plummer thought Nano was sexy.

Parkinson: [01:42:30] I don’t know. [laughter]

Fetter: It’s complicated.

Parkinson: [01:42:33] Naming things like naming babies, right?

Fetter: Yes. Tell me about your family. How many children do you have?

Parkinson: [01:42:40] I have six.

Fetter: Oh, my. Good for you.

Parkinson: [01:42:42] I have five by my first marriage, and one by my second. Three of them are up here, in this area. One is a teacher at a very unique school. She is my eldest. Very unique Mountain View school that’s part of their public high school system. Just the eleventh and twelfth graders. It’s focused on arts and things like that. You got to, you know, work to get into it. Then my number
two son is up here. He’s a contracting kind of person. My number four son is up here. He’s in sales for a software company. Then down in our area [San Luis Obispo], my number two son is a lawyer.

[01:43:37] Number three son is the sheriff of the county. My number five son, who is just expecting a grandson, is a project manager at a company that builds pumps and stuff for the gas industry. My wife of--I don’t know--thirty-six, thirty-seven years is from Winchester. I met her, as long as you’re going on the record, I met her at a formal banquet in Washington D.C. where I had flown from L.A. There were twelve of us at a table at an AIAA banquet. It was coeducational. You know, seating alternating with male and female. I was sitting next to Sheila Widnall [professor at MIT] who became the Secretary of the Air Force and John Miller, the head of this company who I later worked for it turned out. I started counting. I’m really good at twos.

[01:44:38] Boy, girl, boy, girl. There’s got to be an extra girl here. At the time, I was in the process of a divorce. Finally looked across the table and saw a gal that was laughing a lot. That’s her. She’s got to be the one. When it came time to start dancing…. They’d done the awards stuff and all. I was in full formal dress for the Air Force. Quite a resplendent Christmas tree, I guess. I was sitting there, and Sheila and John are schmoozing me, you know. All of a sudden, I saw this [extra] girl get up to leave. I hopped to my feet and ran around the table and got in her face, and I said, “Were you leaving?”

[01:45:19] She said, “Yes. I thought I would leave.”

I said, “Well, I was hoping before you leave I could have one dance.”
She looked at me and she said, “Oh, OK.” [laughter]

Fetter: Good for you. It never pays to be a shrinking violet. [laughter]

Parkinson: [01:45:37] One thing led to another. She’s a great joy. Great joy.

Fetter: That’s great. Tell me about your life in San Luis Obispo. What do you do?

Fetter: Do you have a boat there?

Parkinson: [01:45:50] No. We actually had a sailboat. When we were at Boston, we had a forty-foot yawl. A wonderful, wonderful boat that we would dual hand just the two of us. In SLO, we live out in the middle of a vineyard, an area of about forty acres. Had twelve lots stamped out of it. It’s surrounded by these vineyards. I grow olive trees. CC&Rs [Conditions, Covenants and Restrictions] say I can’t grow wine, which is just as well. I’m not interested. There are eleven, about to be twelve, tasting rooms within five miles of my house, if you like wine. Are you a wine drinker?

Fetter: Yes.

Parkinson: [01:46:28] Oh. You’ll have to come down and visit.

Fetter: It’d be fun.

Parkinson: [01:46:34] No one’s ever gotten through more than four in an afternoon.

[laughter]

Fetter: No, no. [laughter]

Parkinson: [01:46:39] If they get that far. I spent a lot of time on the road. I’ve been chair of the JPL [Jet Propulsion Laboratory] Advisory Council for the last ten or twelve years under Charles Elachi I keep giving him a hint that he can fire me. I think he would have let me go maybe a year ago, but he said, “Brad, I
don’t want to train anyone else. And I’m probably going to be leaving in a
couple years. So why don’t you hang on until I leave?”
I said, “OK.”

Advisory Board, which is a government advisory panel formerly set up under
a presidential decision memorandum that reports directly to the deputy
secretaries of all the major departments--Transportation, Defense, Homeland
Security, la di dah. We give them advice on the….

Fetter: On technical issues?

Parkinson: [01:47:53] Technical issues. Well, and managerial issues. We try to defend
position, navigation and time. We occasionally get in trouble because some
of the staffers don’t understand we are an independent committee. I had a
tradition. Under Dan Goldin, I was six years the head of the NASA Advisory
Council. Dan was kind of a wild guy, but a really good guy. He really wanted
to do the best for NASA. Occasionally our council would decide he was off
track a little bit. It was fine to tell him he was off track, you just didn’t do it
in a public meeting. I’d go back in his office and say, “Dan, I think you better
rethink this one.” That would work fine.

Fetter: It’s part of your people skills.

Parkinson: [01:48:53] Yes, or….

Fetter: You obviously read people.

Parkinson: [01:48:58] Accumulation of scars. I wouldn’t…. I don’t know if that’s a
strength or not. If it is, it’s an acquired one.
Then we do hiking. Matter of fact, I spent the last two days hanging bottles in my olive trees. We squeeze the olives for oil. It turns out there’s something called the olive fly. Are you aware of this?

**Fetter:** No, but I can imagine.

**Parkinson:** [01:49:30] It just puts a little teeny hole. That little teeny egg develops into a little teeny larva that gets bigger and completely destroys your crop.

**Fetter:** Mike Thompson, is the representative from Napa in Washington in Congress. We’ve met him several times, and he’s always worried about these various kinds of flies that affect the vineyards in the Napa Valley and the Sonoma Valley.

**Parkinson:** [01:50:06] Oh, yes. Oh, yes.

[01:50:12] Doesn’t it make you worry that society is fragile right now? I mean…

**Fetter:** Yes.

**Parkinson:** [01:50:16] …so many things….

**Fetter:** Things get flown around the world. That’s the scary thing.

**Parkinson:** [01:50:20] Yes. Yes.

**Fetter:** There’s too much air travel and…. I mean these diseases get carried around, and all these things get carried around, and then they end up causing problems with crops and health and God knows.

**Parkinson:** [01:50:33] Fisheries.

**Fetter:** Yes. These… some kind of non-native species that were supposedly getting into Lake Michigan, which is terrifying.

**Parkinson:** [01:50:41] Yes.
Fetter: These mussels.

Parkinson: [01:50:44] These mussels and these…. Then they’ve got these cannibalistic frogs down in… and boa constrictors.


Parkinson: [01:50:58] Humans inadvertently, or advertently, seems like we just pollute everything.

Fetter: This has been great. I’ve enjoyed this. I don’t have any more questions, but I’d just say I have appreciated that.


[End of Interview with Bradford Parkinson]
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