



**PHILIP S. FOGG**  
(1903 – year unknown)

**INTERVIEWED BY**  
**GRAHAM BERRY**

**February 19, 1980**

**ARCHIVES**  
**CALIFORNIA INSTITUTE OF**  
**TECHNOLOGY**  
**Pasadena, California**



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### **Subject area**

Business economics; government

### **Abstract**

An interview February 19, 1980, with Philip S. Fogg, who was an assistant professor of business economics at Caltech from 1930 to 1938 and associate professor from 1938 to 1941. He also served as resident associate in Fleming House from 1931 to 1935 and as Caltech's registrar from 1935 to 1941.

He recalls meeting W. B. Munro, professor of history and government and member of Caltech's Executive Council, in 1930, who hired him to teach business skills to Caltech's engineering students. Became first resident of the newly opened Athenaeum, where he encountered visitor Albert Einstein. Recollections of R. A. Millikan, Fritz Zwicky, A. A. Noyes. Reminisces about his years as resident associate of Fleming House, and about replacing Harry Van Buskirk as registrar. Initiated visits to prospective students as part of Caltech's admissions process.

He took what turned out to be a permanent leave of absence in 1941—after helping former classmate Herbert Hoover, Jr., found Consolidated Engineering—when the company received a wartime Air Force contract. He later became its president, and name was changed to Consolidated Electrodynamics. His civic activism in Pasadena. Long friendship with Robert F. Bacher. Became advisor to the Atomic Energy Commission after WW II. Comments on his early days as a teacher at Caltech. Interest in astronomy. Recalls building, in summer 1930, a 6-inch mirror reflecting telescope whose mirror was aluminized by Caltech physicist John Strong; first reflecting mirror to have such a surface.

## **Administrative information**

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**CALIFORNIA INSTITUTE OF TECHNOLOGY ARCHIVES**

**ORAL HISTORY PROJECT**

**INTERVIEW WITH PHILIP S. FOGG**

**BY GRAHAM BERRY**

**PASADENA, CALIFORNIA**

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**Interview with Philip S. Fogg**  
**Pasadena, California**

**by Graham Berry**

**February 19, 1980**

**Begin Tape 1, Side 1**

FOGG: Just a quick summary of my background: I graduated from Stanford [BA, 1925], worked a couple of years in San Francisco, and went to Harvard Business School [MBA, 1929].

BERRY: Civil engineering?

FOGG: Civil engineering at Stanford, and when I graduated [from Harvard] I got a fine job in Wall Street in June 1929. I had the advantage of going through the big stock market break when I didn't have a dime to my name.

BERRY: You were graduated second in your class. And what was this company that you worked for? An investment trust?

FOGG: Yes, it was Tri-Continental Corporation. Incidentally, my father died when I was four years old, so my mother brought up her two boys alone. She was living in Santa Monica and my dear sweet brother, a little younger than I, was killed in an automobile accident in December 1929. I had to rush back to Santa Monica, and then it was perfectly obvious that I had to come home and look after her. She wasn't well enough to go to live in New York. She wouldn't do it anyway, so I had to resign from Tri-Continental early in the spring of 1930.

I came out here and I had a couple of friends in Pasadena, although I was living with my mother in Santa Monica, and the aunt of these friends of mine was Anna Bissell

McKay, the heir to the Bissell carpet-sweeping fortune. Great supporter of Caltech—I think the early people would remember that—and she gave a very beautiful dinner at the old Vista del Arroyo Hotel, along, I would say, maybe March of 1930, a black-tie dinner. Mostly Caltech people were there, including the trustees and other people, and by chance I was seated next to William Bennett Munro who, as you may recall, came out here under Dr. [Robert A.] Millikan’s persuasion after being head of the Department of Government at Harvard—a man who was very interested in young men and very kindly. He asked me what I was doing. I gave him my sad story, and finally, after the dinner was over, he asked me if I wouldn’t come up and see him at his office. I did so in a couple of days—he knew I didn’t have a job—and the substance of his conversation was, “How would you like to come up and join a two-man staff to try to teach engineers something about business?” He said, “Horace Gilbert came out a year ago and we would like to make this a two-man team.” Well, I said, “Dr. Munro, the last thing in the world I ever thought I would do was to teach anybody anything and I never did have a course in education.” He said, “Stop. That’s the best recommendation you can give me.” So, he said, “Why don’t you try it for a year, and if you don’t like it then you can go on to other pastures.” I said I would, and he said, “I know you haven’t got a job, but I’ll put you on the payroll on the first of June—a couple of months away—and you can spend the summer months trying to get some cases together on business engineering.”

BERRY: How old were you about that time?

FOGG: I was twenty-seven in the summer of 1930—not dry behind the ears yet, really. So I did that, and Dr. Munro said, “I’ll put you on the payroll on June 1st at \$150 a month and I’ll also make you an assistant professor,” which is quite something, because ordinarily one starts as an instructor and with luck is promoted to an assistant professorship after several years. Well, to shorten up my story on this part of it, I stayed at Caltech for eleven years. And I just loved teaching, primarily because I had the most fantastic students anybody could ask for. They were all hard-working people, had their fun tricks in their off-hours, but I learned quite early to define an assignment very carefully, otherwise most of the boys in my class would do twice as much as I’d asked

them to do. And that's quite something for a teacher, and perhaps that was one of the reasons I enjoyed it so much.

BERRY: About what size was the class?

FOGG: Oh, I'd have twenty to twenty-five students roughly, on the average—fortunately, not great big classes. I taught mostly accounting and cost controls, and money and banking and other business subjects, and tried to relate this to the engineers' future careers. My students were mostly juniors and seniors and a fair number of fifth-year students in engineering—I would tell the students toward the end of their class with me, “Now, many of you boys are going to go out and get in business for yourself. You're highly trained technically in the field of engineering and that will be what some of you do, and if you do, just take my advice. First thing you do is find yourself a good financial man who understands accounting and cash flow and control of costs and all of those things.” One of the very heartwarming things that's happened to me since—and here I've been out of there since 1941—I've had maybe a dozen or more of my old-time students call me up. Some of them came out to see me, and almost with no exception they told me what a great thing I'd done for them to tell them to get a financial man. So that's one of the sidelights of a happy life.

BERRY: Did you stay at the Athenaeum when you first went there?

FOGG: Yes. Oh! I forgot one thing. I told Dr. Munro I didn't have any place to live; I was living in Santa Monica. And he said, “Well, I'll get you into the Athenaeum.” Maybe I'd better tell you a little of that story; it's rather interesting. So I moved into the Athenaeum on the 1st of June, when I went on the payroll, and they weren't ready for any guests there yet. Our manager was a wonderful woman, Bessie Little. Dr. Munro gave her instructions to put some sheets on the bed and let me have a place to sleep, and I would eat my meals over at what was then known as the Old Dorm.

So, on the 1st, I moved in, and the first time I got up to shave and take a shower there wasn't any hot water. I called down to Bessie Little, she rushed up with a hot plate that would warm the water for the shaving part of it, but we didn't have any hot water for

two or three weeks. So I got very used to taking cold showers. And just an interesting sidelight: I have a great big scar on my thumb, which I can thank the Athenaeum for. In the shower they had porcelain knobs; one of those things split and cut right down, on a Saturday morning. I was bleeding like the dickens, no clothes on and just Bessie Little down in the office. Well, I managed to wrap a towel around it and get some clothes on and get down there. And by this time the towel was pretty bloody-looking, and I thought Bessie Little might faint, but she got in her little old Ford Roadster and got me down to the Huntington Hospital, and they sewed it up for me and I was all right.

So I got through the summer very nicely, and of course in the fall they opened up the Athenaeum for people to live there. I was the first person to live there, as I say, a “paying guest.” I don’t think it was very much in those days. So that’s the Athenaeum story. The first year, the only thing I did was to teach these courses I had put together and live at the Athenaeum, and I got to meet some of the very wonderful people, like Dr. Millikan and Dr. [Arthur Amos] Noyes and all the great people at Caltech.

BERRY: I was wondering about any impressions you might have of those people.

FOGG: Dr. Noyes was a very quiet, gentlemanly type; his health was not too good the first year I was here at Caltech. Dr. Millikan went way out of his way. He was very positive about things, and I’ll tell you later, when we talk about the registrar’s assignment, how he backed me up in something that nobody else thought was worth doing. And then the wonderful people on the staff: Charlie Lauritsen, Thomas Hunt Morgan, and all those great names used to sit around when the Athenaeum was finally opened—the big table in the middle—and only one man was kind of needling, and that was Fritz Zwicky.

If I can throw in a little story here: Many years later—I guess it was a couple of years before Fritz died [1974], three or four years ago maybe—I was going to the Athenaeum for a luncheon meeting with a couple of other members of the faculty I’d known. I was a little bit early, and in the lounge there was nobody there but Fritz Zwicky. So I went over to say hello to him, and he recognized my face. Many, many years had gone by, so I explained and so forth, and his face finally brightened up, and he

said, “Oh, Fogg, the bookkeeper.” Great compliment from Fritz Zwicky. That’s the last time I saw him, because he died maybe within a year.

BERRY: Now, you taught the first year. You didn’t have any of these other assignments yet, like registrar or resident associate; those came later. Did you happen to run into [Albert] Einstein?

FOGG: Yes. It’s my recollection that Dr. Einstein came out to give some lectures and things.

BERRY: Spring of ’31.

FOGG: Spring of 1931, and his room, just by chance, was about three doors from mine. Of course, he would nod to me if I passed him in the hallway, but the thing I remember about Dr. Einstein—I don’t know whether very many people know this—he just loved to play his violin. Wasn’t so awfully good at playing, but it was apparently a great relaxation to him. I would hear him fiddling away.

BERRY: Would he do that in his room?

FOGG: Yes, right in his room there, I’d hear him fiddling away, sometimes in the afternoon or late afternoon. We used to worry terribly about Dr. Einstein, because he paid no attention to traffic or traffic signals when he was crossing a street, he just marched out there. And nobody ever hit him, but it worried the rest of us.

BERRY: What kind of music did he play? Classical?

FOGG: It was classical music. No popular music, all classical music, and I can understand how he got his relaxation from doing that. So the first year at Caltech went by very nicely. Shall we go on with the story?

BERRY: Yes.

FOGG: The student houses were under construction—the four student houses they started out with—and Dr. Millikan called me in, I guess along about May 1931, and asked me if I would be willing to become one of the resident associates in one of the four houses. And I was interested in doing so, for the simple reason that I didn't have to pay any room or board any more. I was still getting my \$150 a month, and not married at the time, of course. So that turned out to be a fantastic experience for me, because I had very nice quarters looking out on the inner quadrangle there.

BERRY: Which of the houses were you in?

FOGG: Fleming House.

BERRY: Were you the first resident associate then at Fleming?

FOGG: That's right, and the interesting thing is—and lots of people don't remember this—there were five student clubs, semi-resident clubs, at Caltech, and they made them all disband and move into the student houses.

BERRY: Like the Gnomes?

FOGG: Yes, the Gnomes was one of them. They put in my house the two smaller ones, which created a terrible problem as time went on, because the leaders of those two clubs were both vying for position in the student house. The other three houses had a beautiful situation, with no problem, because it was just one group. We had in the [senior] class at that time a fellow by the name of "Red" Watson—George Watson. George was one of the great football players that I ever saw play football, and Caltech didn't do too badly in those days. George was the president of one of these two clubs, and I forget the other fellow's name. George was a big, strong, handsome guy and a good student and wonderful athlete, and we kind of hit it off, and finally I called George up to my quarters one time; this must have been about four weeks after we'd gotten under way. I said, "George, this house has to settle down and have some peace and cooperation among people, and I'd like to have you help me get that done."

Now, I didn't know how he was going to do it—I thought by persuasion—but I found out in the course of a couple of weeks' time that he had had a big argument with the leader of the other club and knocked him out cold, right in the little patio out there, and that was the last bit of conflict we had. Of course, each year newer students would come in. But we got through that first year thanks to Red Watson, and I often thought if I'd ever mentioned this to Dr. Millikan, or if he ever heard of it, that would have been the end of me, too, at Caltech. But as it turned out, it was just the right thing to do.

BERRY: What's an example of what problems those two groups were creating? Were they fighting, actually?

FOGG: Yes. They wouldn't fight physically, but you'd go into dinner and there would be terrible arguments going on at the dinner table, and all those irritating things, and you didn't feel a sense of cooperation at all. But Red Watson cured that one. We got through the first year all right with no problem. Might tell you another sidelight—this just illustrates, maybe, how I went about managing these young fellows, who were not much younger than I.

BERRY: Were these all undergraduates? Were there some graduates among them?

FOGG: There were some graduates, but most all of them were undergraduates; this was before they had any graduate houses at all. There was a terribly strict rule that you could never take a girl up to your room. This was 1931.

BERRY: Anytime during the day?

FOGG: No. Or me either. I could meet them down in the lounge downstairs. If I were talking to the girl or taking her out to dinner she could wait there until I got ready and came down. We had a lovely party one time—dinner party, and some dancing there, and so forth—and of course I was expected to be at all those things, and finally the party broke up and everyone went home, and I went up to go to bed. There were some lights on where boys were getting ready to retire. Finally, everything was very quiet, and I

thought I heard a gal's voice. I looked across the quadrangle there, the inner court, and there was a light up there, and I also heard the man's name and I thought I recognized it as one of the boys— Maybe I shouldn't tell this story. I got up and got my clothes on, marched around there, and tapped on the door. It was Tommy Belzer. He came to the door finally—quite a long lag before he got to the door. I said, "Tommy, I can't get to sleep. Do you mind if I come in and chat with you; I saw your light on?"

BERRY: Diplomatically.

FOGG: What could he say? So I got in there and we had a nice chat. He was just feeling terrible. I did that for fifteen or twenty minutes. Finally, I said, "Well, I'm getting pretty sleepy, Tommy," went to the door, and I said, "If you don't get that girl out of here fast, you're going to be in first-class trouble."

BERRY: Was she there?

FOGG: She was in the bathroom, or the closet, or something. She was closed in there all the time, and poor Tommy was dying a thousand deaths. Again, if Dr. Millikan had known I'd let that go by without further trouble for Mr. Tommy Belzer, I don't know what would have happened. But I'll tell you, he never did it again, and the word got around and then nobody did it.

BERRY: That was a nice way to do it. He probably would have been expelled.

FOGG: Sure, but he was a good boy, and he just made a slip there. And I just figured that he ought to have another chance, and things worked out fine with him. He went on to a fine career in later years. Those are some of the experiences at the student houses.

BERRY: How many were there in your house? About thirty to forty?

FOGG: I would say there were probably seventy or eighty, maybe, in the course of time; because, although the clubs like the Gnomes Club were put in there, the space in the other

rooms was filled out with non-club students. The houses were all completely filled. I'm just guessing, but it was more than thirty or forty.

BERRY: Did you have inter-house sports then?

FOGG: Yes, all kinds of competition, and some of them got pretty silly. You've read the stories about the tricks they played on each other, very ingenious.

BERRY: Did they have that inter-house dance then?

FOGG: Yes.

BERRY: Were they decorated, the houses, rather elaborately?

FOGG: Yes. It was a great experience for me, and the only way I got out of that was to get married. I was there from 1931 to 1935—four years—but I found the girl I'd been looking for all my life up in Portland, Oregon, and I figured I'd better sign her up. Half the eligible men in Portland were after her, too, but I had the advantage that I wasn't there really long enough for them to know me well, and so we got married in July 1935.

BERRY: Where did you meet her? At Caltech, by any chance?

FOGG: No, I just met her by chance. She and her mother came down on the boat, and brought their car, and went to see some friends over on the other side of Los Angeles who had a daughter who had been trying for years to get me married off. She'd invite me to parties. I'd made up my mind the next time she called me that I just was going to be awful busy, but she called me and explained. Well, she caught me flat-footed and I said yes before I should—intended to say no—but that's where I met Jean, my wife. She had come down with her mother. So we carried on from that time.

BERRY: All right. Now, when did you start being the registrar?

FOGG: The year I got married. Dr. Millikan had called me in again. The man who had been registrar there was Mr. [Harry C.] Van Buskirk; he was a teacher of mathematics or something. He had been there since 1910, when it was old Throop College, and of course this is 1935. He finally decided he was going to retire. Dr. Millikan explained to me that I would have, as the registrar, the necessity of looking after freshman admissions, too. So under the registrar we also had a freshman admissions committee as such, of which I was the chairman. He said very emphatically, "We'll lighten up on your teaching load." Keep in mind that in those days, with only one exception, all the administrative jobs at Caltech were done by members of the faculty. The only exception was Ned [Edward C.] Barrett who was the comptroller and chief financial officer; every other job was done by a member of the faculty. They didn't have any administrative people who were non-teachers.

So this was quite consistent when Dr. Millikan persuaded me to take on that assignment, and in doing that assignment I took about a year to get my bearings, to see what the traditions were, and the procedures. I don't believe in going in and upsetting a thing, as a newcomer, without taking the time to see what you think ought to be done; but some things bothered me immediately as I studied the thing. For one thing, in those days, Caltech gave four three-hour entrance examinations, which they themselves put on.

BERRY: Rigorous.

FOGG: Very rigorous problem. They use the standard testing system today. Mathematics, physics, chemistry, and English, I guess it was, or something. Those were graded, and the grades were combined on a slightly higher weight for mathematics and physics, and it came out with a number. Now, we were taking 160 freshmen in those days, so they arrayed these numbers from the top guy to the bottom, and they sent notices of admission to the top 160. Number 161 didn't get in unless somebody didn't show up or turned it down. Well, it seemed to me that there might be some problems in approaching the problem just that way, because I don't think there's necessarily a difference in the 155<sup>th</sup> guy and the 255<sup>th</sup> guy.

So that's the point at which, after a year, I went to Dr. Millikan and explained my thinking to him and asked him if the Institute would finance a program of traveling around the United States, and possibly parts of Canada, to interview, let's say, the top 200 to start with. I guess we got about 350 applicants in those days, for 160 places. He backed me up and they got the money, and my wife and I did a great deal of traveling around to interview people—and [so did] other members of the committee, to the extent that they could take the time to do it. I discovered some strange and wonderful things. I was down in Dallas, Texas. Now, I was going to interview two people down there. One of them had ranked very low on the list, but since I was going to be there to talk to the teachers and the parents and so forth of the other boy, who had done very well, I figured I might as well go over and talk about this boy who didn't do so well. He did very well on his first two tests and very, very poorly on his two Saturday tests. I didn't get much out of the mother, who was very nice, but I was talking to one of the teachers—I talked to two or three of them—and the teacher said, "My goodness, didn't that boy tell you what happened?" I said, "No." She said, "Well, his father dropped dead on Friday night. He'd taken your two Friday examinations, but he figured he was so anxious to get to Caltech that he had to take the next two on Saturday or he couldn't get into Caltech." Now, how in the world would you ever have known that?

That was one of the key things that supported my position on the interviewing. Just by pure chance. The boy came to Caltech, and he was in the top third of the class or something like that. So we instituted it then, and they still do it, and it's just amazing. I could tell you a thousand stories. I always took my wife with me, because that made the boys a little more comfortable, their teachers a little more comfortable, particularly his parents, too.

BERRY: Who would you interview? The boy and the parents?

FOGG: Well, I would try to talk to teachers first, because I thought maybe I would get a better, unprejudiced point of view than I might otherwise. It's always interesting to meet parents, to see what kind of people they are. I'll tell you a story that illustrates this. We had an application from a boy, Avadekian, who lived up near Fresno. He was on the

way, he did pretty well on the examinations, and I finally found his address, which was a tiny little country home outside of town. Obviously people with no great resources, but those parents were fantastically wonderful people in their character, in their standards of things in life, and the teachers were so enthusiastic about Mr. Avadekian that we took him. He went on to do just a wonderful job at Caltech, and it would have been easy, without the interview, not to have admitted him.

BERRY: Did the boys come to Caltech for these tests?

FOGG: They were done in the local high schools, under the high school teachers.

BERRY: The Caltech tests, under the local teachers. Written?

FOGG: Yes, all written. Three-hour tests, four three-hour tests. That's six hours on Friday and six hours on Saturday.

BERRY: Well, now, the interviewing apparently admitted quite a few boys who otherwise might not have been admitted.

FOGG: Absolutely. It completely broke down that barrier, so that, I don't know, one time we took somebody who ranked 240<sup>th</sup>. Other than this boy in Dallas, Texas. Then of course I used to keep track of those boys who had been taken below the 160 figure, because I wanted to see how well they did. They did just as well, on the average of the group, as anybody else, and when I went to Dr. Millikan after years of experience of this and showed him the figures, he felt very good about it.

BERRY: It must have taken a good part of your time.

FOGG: It did. Took a lot of time.

BERRY: Did you go to Canada sometimes?

FOGG: I got to Vancouver once, but that's about the only time.

BERRY: There are so many students—now, at least—from foreign countries.

FOGG: That's right, and we didn't have any to speak of.

BERRY: You didn't in those days?

FOGG: No. The great bulk of them were from California. Some from the Middle West. I don't recall doing any interviewing, in the five years I was on that job, in let's say New York or Boston or any of those places. Of course, they had MIT—the engineers right there and everything. It was a great experience for me, and I had all kinds of problems as the registrar. I had a professor [Donald S. Clark] who was simply a wonderful man—he's since passed away. He taught one of the engineering subjects, but he was hipped on this curve. I've forgotten the name of the curve; it's like this [Bell Curve]. He had a class of fourteen students, and he turned in the thing absolutely on the curve. Fourteen students. You know, you've got so many D's, and so many C's and B's. There might have been as many D's as there are A's. So I called Don in and talked to him. I said, "Don, you know that doesn't make much sense. I'm an old statistician and I know it takes a very large number when you're talking about hidden characteristics for this curve to come anywhere near being right. How in the hell do you do it on fourteen students?" Excuse my language here. Well, I don't know whether I ever convinced him. He might have given a couple fewer D's and maybe one more, or two or three more, A's. But I used to have a lot of fun and I got along fine with everybody. Don always remained one of my good friends, in spite of my suggesting that things might be different. He had his own ways of doing things. Everybody liked him; I liked him. But I don't know where he got this fetish.

BERRY: He had his own standards, and they were very high.

FOGG: Very high. I didn't think this particular one was just right.

BERRY: Well now, several times throughout your conversation, one can see where you didn't trust statistics, as so many people do, because you had studied statistics, I guess, and knew they could mean different things.

FOGG: Oh, they certainly can. Absolutely. I think the one thing about my Caltech experience— Well, I'll back up a little bit. I was born with a liking for people, which turned out to be a blessing for me. The story about Tommy, the boy with the girl up there, I just put myself in his shoes; I wasn't going to crucify him for one misstep. And Don Clark—we always got along fine. I didn't tell him he had to change his system at all, just suggested it might be better not to do it that way.

BERRY: Well, you were registrar until when?

FOGG: I took a leave of absence at the end of the school year in 1941. I might explain that if you like.

BERRY: All right.

FOGG: Herbert Hoover, Jr., had been a high school classmate of mine in Palo Alto. We'd gone to Stanford together. Herb never belonged to a fraternity and neither did his brother Allan, because his father, Herbert Hoover, Sr., was dead set against fraternities, and I couldn't belong to a fraternity because I didn't have enough money. I lived with my mother and my brother in Palo Alto. So we were always great friends and did lots of things together, and I spent many a night up at that beautiful home of the Hoover family above Palo Alto near Stanford. Herb went off to Harvard Business School, which is why I decided I had to go, and then Herb stayed on a year, so he was there during my first year at the Harvard Business School, doing some lecturing on something.

Then he went with what was then known as T-A-T, the old Transcontinental Air Transport, which later became TWA. He had been a longtime nut on amateur radio transmission, and he laid out the first ground-to-air transmission system that any airline in the world ever saw. He was on the way to a great career, and he came down with TB. They put him in a sanitarium in North Carolina, where he was on his back for a year, and

I didn't think he was going to make it, but they brought all of his hi-fi stuff down there. What do they call it?

BERRY: Ham radio?

FOGG: Ham radio, that's the word I want. Then they told him he couldn't go back to this job, and he came out to Pasadena and lived not far from where we were then living. I was by then married. So I used to go down and see Herb very frequently; he was very depressed, because he never wanted to use any of his father's position in the world to help him get anywhere. So he decided to go into the geophysical business, and I was his treasurer, part-time, on top of everything else I was trying to do, but that wasn't a very tough job. The geophysical business turned out to be very successful, and then we moved the part of it that did the engineering research and the building of the geophysical equipment into another company, called Consolidated Engineering. Then the war picture looked much worse, so we got a very big contract with the air force to design and build the equipment to measure, continuously, vibration and strain on an aircraft in flight. With the war picture looking much worse, and we knew we were going to be in it, Herb asked me to ask Dr. Munro if I could have a leave of absence and run that end of the business.

Well, Dr. Munro was very understanding, and he said, "It looks like you'll make a contribution of some consequence to the war picture." By this time, I was [an associate] professor, at the magnificent salary of \$350 a month—\$4,200 a year—and I supplemented that with the little bit I got from Herb's treasurer's assignment and so forth. Ten years later, Dr. Munro called me up and said, "Philip"—he always called me Philip—"do you mind if I take your name out of the catalogue, because it's been there ten years as being on a leave, and I have a suspicion that you'll never come back to Caltech to teach." I said, "Take it out, Dr. Munro." By this time, I was running the show, and Mr. Hoover, Herb, sold out his interest in the part I was in [1945], and later it became known as Consolidated Electrodynamics.

BERRY: Now, you were interested in electronics, weren't you? Weren't you doing something with electronics at Caltech?

FOGG: No, I don't want to sail under false colors. First of all, if you're on the staff at Caltech, everyone who doesn't really know you calls you doctor. Fritz Zwicky never would. Second, my background was civil engineering, and the training that I had there in thinking straight and so forth made it very easy for me when I got to Harvard Business School, but I didn't know a vacuum tube from a resistor. Even when I was running my own show, I just got the smartest people I could find, and unfairly I got all the credit.

In later years, Dr. Charlie Lauritsen developed a thing to detect radiation that people could use, and he turned that over to me, and we got it to where we called it a Gamma-tec, but then, with the fear of attack from radiation, that went by the boards. But Charlie Lauritsen did that for me. I shouldn't have any credit for knowing anything about electronics.

BERRY: That was the Geiger counter that everybody could use.

FOGG: Yes.

BERRY: I guess you were president of the Pasadena Foundation?

FOGG: For Medical Research, for five years; president of the Chamber of Commerce; president of the Rotary Club.

BERRY: It says here you were civically active. You certainly were. That was while you were at Caltech?

FOGG: No, this was afterward, when my own company came to be, at one point in time, the largest private employer in the city of Pasadena—Consolidated Electrodynamics. Of course now we're outclassed by all kinds of big companies that have come later.

BERRY: Is that company sort of an outgrowth of Caltech in a way?

FOGG: No. It was completely an outgrowth of Herb Hoover's geophysical business.

BERRY: You were one of the original group who founded Lear Siegler?

FOGG: That's right.

BERRY: You're chief executive officer and retired president of Consolidated Electroynamics, that's what you are now. A long-time friend of Dr. Bacher?

FOGG: Oh yes, that's an interesting little sidelight. It's interesting to me how the wheel of fortune turns around in your life sometimes. I was born in Battle Creek, Michigan; my mother moved to Ann Arbor to get us in [the Ann Arbor High School].

### **Begin Tape 1, Side 2**

FOGG: And I got into a Boy Scout troop and Bob Bacher was in my Boy Scout troop in Ann Arbor, Michigan, where I went to high school. Bob's a couple of years younger than I, but we were good friends there in the old Boy Scout troop. My mother moved to Palo Alto to send her two boys to Stanford, and Bob went on to a great record at the University of Michigan. Well, I arrived in my assignment, as I've said, at Caltech in 1930, and I found in the *Bulletin* that a National Research Council Fellow was there for the year 1930-1931 by the name of Dr. Robert F. Bacher. So I immediately looked him up and we renewed our old friendship. This was before I was married, obviously, and the one nice thing about that is that Jean Bacher would invite me over fairly frequently to have a nice homemade dinner. Then Bob finished up that year as a National Research Council Fellow and went on to other things.

And the wheel of fortune turned around again. I was asked to be a special advisor to the Atomic Energy Commission in 1946-1948. That advisory [job] had to do with the big laboratory outside of Chicago and also, with the Radiation Laboratory near Berkeley, because those operations had been operated by military personnel—not the technical work, but the administrative part—and they wanted to shift over to civilian management. They picked a man to be head of each and so I took on that assignment as best I could. By that time I was running my own company, but I would take about a week out of the month to be back there, and—this is another story; I could talk forever about that—Bob

Bacher was on the Atomic Energy Commission, and Dave [David E.] Lilienthal was the head of it. I'd meet with Lilienthal in Washington periodically and report, and that's where I saw Bob again. Shortly after that, it must have been a couple of years, he came out to Caltech [as chairman of the Division of Physics, Mathematics, and Astronomy—ed.], and I got him on my board of directors. I'd already gotten Fred [Frederick C.] Lindvall [chairman of the Division of Civil and Mechanical Engineering and Aeronautics—ed.] on my board of directors, so I had some good technical support. We laugh about this, how the wheel of fortune turns around—a couple of little kids out of the Boy Scout troop in Ann Arbor, Michigan. But that was a lot of fun.

BERRY: You've covered a lot of territory. Now, the business courses were the ones you taught.

FOGG: Yes, with the emphasis on the impact on engineers.

BERRY: You must have designed the courses yourself?

FOGG: I had to, yes. I'll throw in one final little story. I had a group, by chance, of fifth-year engineers in a course, the first one I had to meet with. These are fifth-year engineers and they're not many years younger than I. Scared half to death, I walked in there. I'd worked two weeks on this one-hour course, and I had books and papers, and I got through the whole thing in thirty minutes. Nothing more to say on what the assignment was or anything about it. Hadn't developed the skill that comes later on, when you go in and teach a class for an hour with five words written on a piece of paper because you've got the background to do it. Here I am, stuttering around, and I finally said—I had to get out of this some way or the other—I said, "Fellows, I'm going to let you off early today because this is going to be a rather tough course, and I want you to ease your way into it, and it'll get awful tough before you get through." So I dismissed the class. The next class was a little bit easier, and then, as I say, teaching gets to be easier.

The trouble, though, with being a teacher a long time is, if you're not careful, it gets to be a routine thing for you and you lose your inspiration on new things. Now, that isn't true with Caltech teachers, but in ordinary colleges, like Stanford, that's very easy. I

had an economics teacher up there who was the most boring guy I ever heard—covered all the ground, never got any inspiration. On the other hand, I took a course—believe this or not—on Greek and Roman art and archaeology, because I heard the professor was a wonderful man. Well, he never would take the roll. Course was tough, you had to do a lot of things, but I just was so thrilled about it. The biggest thrill I ever got was forty years later I got to see the Acropolis in Greece.

BERRY: And you remembered the class.

FOGG: Everything about it. I also had an astronomy teacher the same way. So much so that in 1930, when I was down with my mother in the summertime, I decided to build a telescope. Out of a book. I got it done and it was the greatest thing in the world.

BERRY: What size?

FOGG: Six-inch mirror, reflecting telescope.

BERRY: I built one myself.

FOGG: Did you really? Wasn't it a thrill when you first took a good look out of it?

BERRY: Oh, fantastic!

FOGG: Can I tell you a little astronomy story? Of course, in those days nobody ever heard of an aluminized mirror. They were all silver mirrors deposited by a chemical process, and this was one dirty job, because it was quite easy to come out with a mirror whose silver surface wasn't that good.

BERRY: Did you do that yourself?

FOGG: Oh, yes. Got it all from a book. But we had on the physics staff at Caltech a Dr. John Strong—I don't know if you ever heard his name or not. He went on to be the head

of the Department of Physics at Johns Hopkins, long since retired. Big lanky guy from Kansas, but just awful smart. We used to play golf a lot, and I went down to pick him up one afternoon right after lunch to go out and play some golf down at Brookside. He said, “Well, hang in there a minute, I’m just finishing up an experiment.” And he explained to me that he thought he had developed a method of evaporating metals onto an extremely clean surface. I said, “My God, John, can you put silver on?” Well, he said, “Sure, I can put anything on.” I said, “Let me get that mirror of mine and clean it off and see if you can put silver on it.” Excuse me, aluminum, not silver. Aluminum.

So, meanwhile, Dr. [Edwin] Hubble had taken an interest in me because he’d heard I’d built a telescope, and he invited me up to Mount Wilson with him two or three times. So I got acquainted with the people up there, and I’d sit up there all night with him. It was a pretty boring thing on the top of the 100-inch. All you’re doing is taking pictures, trying to keep the thing exactly where it ought to be; but he was very kind and it was the biggest thrill I ever had in my life. So I got to know the technical people, and the people who had the problem of putting this silver surface on that big 100-inch mirror or any others they had—they had a 60-inch, too. With that background, then, I finally got John Strong to take an afternoon off on my problem with my 6-inch mirror. Well, he said, “Phil, first of all we have to have that absolutely clean, and we’ll clean it by bombarding it with something, wash it off.”

BERRY: You’d had it aluminized or silvered and he wanted to take it all off?

FOGG: I hadn’t had it aluminized yet. There was just the silver surface, which was not the best in the world. So he cleaned that thing off, and then he put his little pieces of aluminum up there, and I wish you could have seen what came out of that high-vacuum jar. The most beautiful thing that anybody ever saw. Having gone through it, I said, “John, let me run over and talk with”—I can’t remember the man’s name, who was the chief technical man at Mount Wilson. He had an office at Caltech on these problems of putting silver on. Anyhow, it’s now about four in the afternoon. So I take my little old mirror, and he’d been very nice to me, because I’d built this 6-inch and put a silver surface on it and all that stuff, so we’ll call him Charles—I’ll think of it in a little bit.

“Charles,” I walked in and I said, “I’ve finally got myself a good silver job.” I plunked it down in front of him and I thought his eyes were going to pop right out of his head: “I’ve never seen anything like that, so beautiful!” Finally I had to confess what I’d done was what Dr. John Strong had done for me, and that led to the development of aluminizing even the 200-inch. Many years later, I got a letter from John Strong at Johns Hopkins, and he said, “Phil, we’re having a little technical museum put together here. Would you let me have that mirror that had the first aluminum surface in the world?”

BERRY: Was that the first one?

FOGG: Oh, yes. Nobody had even thought of this, because John Strong had developed the procedure. This would have gotten done in due course, but I think that my desire to try this on my mirror had put him onto doing it with aluminum. The initial coefficient of the reflectivity isn’t quite the same as if you’ve got a perfect silver surface, but my gosh, it lasts for a long, long time.

BERRY: I guess the silver darkens, doesn’t it?

FOGG: Yes. So I’ve got my little old mirror sitting there in the Johns Hopkins museum now.

BERRY: I was wondering if you still had that telescope?

FOGG: Well, the weather got so terrible that you couldn’t see much around here with a telescope; it was just terrible. I didn’t mean to bore you with a long personal story.

BERRY: It was fascinating. It’s hard not to get interested in astronomy around Caltech.

FOGG: Well, I just had this inspiration from this wonderful teacher at Stanford. You know, you can sit down and remember the teachers who were really outstandingly great; others are just so-so.