

# SETP FOUNDATION ORAL HISTORY PROGRAM

## OH-1

### ROBERT A. “BOB” HOOVER

September 26, 2003

Dana Marcotte Kilanowski  
Interviewer

## INTRODUCTION

The following is an interview with world renowned test pilot Robert A. “Bob” Hoover for the Society of Experimental Test Pilots Foundation’s Oral History Program, made possible by the generous support of the Northrop Grumman Corporation and individual donors, for the Society of Experimental Test Pilots Foundation, Lancaster, California. In this interview, Bob Hoover will discuss his experiences as a U.S. Air Force test pilot following World War II, serving as backup pilot and high chase pilot on the Bell X-1 flight test team when Chuck Yeager broke the sound barrier in the Bell X-1 rocket plane on October 14, 1947, serving as a test pilot for North American Aviation and Rockwell International and his experiences as an acrobatic pilot from 1945 to the present. This interview takes place at the Westin Bonaventure Hotel in Los Angeles, California on September 26, 2003, during the Society of Experimental Test Pilots Annual Symposium and 100<sup>th</sup> Anniversary of Flight celebration. The interviewer is Dana Marcotte Kilanowski.



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## **BIOGRAPHY**

World renowned test pilot Robert A. “Bob” Hoover, having flown more than three hundred types of aircraft, is also widely recognized as the world’s greatest aerobatic pilot. Born in Tennessee in 1922, Hoover learned to fly at age 15. During World War II, he served in the 4<sup>th</sup> Fighter Squadron, 52<sup>nd</sup> Fighter Group as an Army Air Corps Spitfire fighter pilot and was shot down in 1944 on his 59<sup>th</sup> combat mission and held as a Prisoner of War by Germany for over fifteen months. In 1945, he escaped from the POW camp, trekked through Germany and hijacked a German plane to fly to safety in the Netherlands. As backup and high chase pilot for the Bell X-1 project to break the sound barrier, Bob Hoover trained alongside Chuck Yeager. In 1950, Hoover began a 36-year test pilot career with North American Aviation and Rockwell International, flight testing the Sabre series jets. He has been inducted into the National Aviation Hall Fame, Aerobatic Hall of Fame, Lancaster Aerospace Walk of Honor, Flight Test Historical Foundation Eagle, served as Captain of the 1966 U.S. Acrobatic Team at the international competition in Moscow, honored by the Smithsonian Air and Space Museum in 2016 and has the distinct honor of being the only person to have ever served two terms as the President of the Society of Experimental Test Pilots.

## INTERVIEW

**Kilanowski:** This is Dana Kilanowski for the Society of Experimental Test Pilots Oral History Program. This morning I'm interviewing Bob Hoover, a member of the team that broke the sound barrier and a North American test pilot for years, and the world's greatest aerobatic pilot.

Good morning, Bob. Could you please give me your full name, your date, and where you were born?

**Hoover:** Robert A. "Bob" Hoover, January the 24<sup>th</sup>, '22, in Nashville, Tennessee.

**Kilanowski:** And can you please tell me how you were selected for the X-1 Program?

**Hoover:** Well, they had a pyramid of individuals who were invited to fly it if they so desired or chose to do so, and I was one of those who volunteered for the program. And I'd had the kind of testing that everybody thought would be helpful to the program, because no one really knew what the unknown was like, and we had encountered a condition called compressibility, whereby the airflow breakdown on the airplane happens because a certain part of the airplane the flow is supersonic, and the other portion of that particular surface is not. And the airplanes would start buffeting or shaking and start to become uncontrollable when you would run into this condition of compressibility. I did some dive tests, prior to being selected as a candidate, on the P-47, and we had put a device on the horizontal stabilizer right ahead of the [unclear] point of the elevator that would permit you to pull a control in the cockpit that had been electrically actuated that would bring this thing up and then give you a separation of airflow over the elevator and permit you to recover from a dive.

Well, there were two people killed in this program toward the end of the war, before I arrived there, and when I took a look at the airplane that was next to be flown, they had been to about eight-tenths Mach number, and I decided that I didn't like this electric motor because I sensed that maybe that is what had failed and that prevented the fellows from getting out. So I asked Engineering if they would give me a telescoping to get the leverage in—it was just a little thing like this—and pull it all the way up. Now it had that much leverage on that flat plate in the back there that I wanted to deflect. And it worked like a charm. I could pull it back like this, and it was ratcheted so I could pull it up and pull it out of the ratchet, take it down or pull it back.

And on the final flight, Jim Fitzgerald [phonetic], who replaced me on the X-1 Program when I was broken up, he was my chase pilot. I started at about 42,000 feet on this final dive, and I got my speed as fast as we'd ever been at that time. It was .83 Mach number. And when I started my recovery, I started ratcheting this thing up like this getting it back, and it dug in—by "digging in," it means it wanted to recover—more quickly than I was pulling on the stick. Once I got it rotated and it dug in and it pulled so many Gs that it buckled the wings and the landing gear flew out and the doors were ripped off. And when I landed, I asked Fitz, I said, "Does the landing gear look okay?"

He was in a P-80 chasing me, and he said, “Everything looks good except your wings are wrinkled.”

I said, “Yes, I can see that.” [laughs] There were no incidents out of that other than the fact that the airplane was not repairable because it was overstressed.

I’m trying to think of some of the other programs I had. Oh, I was assigned to the ME-163 rocket flight. Gus Lundquist had already—Gus Lundquist was in flight test with Chuck and myself, and he had already flown the glide testing of the airplane—evaluation, I should say—and I was scheduled for the powered flights. This airplane was a German rocket fighter that had the capability of climbing 30,000 feet a minute, and they had had it up to .92 Mach number before hitting compressibility, so that was a lot faster than we’d ever been.

And I was working with the Germans. We had a cadre that we brought in from Germany, top engineering people that I spent an awful lot of time with because I was also evaluating and testing the Heinkel 162, which was a German jet fighter. Well, I learned as much as I could about what had been done in Germany, but when we got ready to do the powered part of the flight with the rocket motor, everybody in the Power Plant Division decided that the volatility of the fuel and the kind of losses that Germany had had in handling that fuel wasn’t worth the risk, and so they cancelled my flying it under power, and they probably did me a favor, because they did lose a lot of people.

**Kilanowski:** And how did Boyd come to you and assign you to being—

**Hoover:** Well, excuse me. There was another gentleman, Colonel Bill Council, who was there at the time I was selected, and he told me that, “You can do anything you want to do to get yourself prepared for this.” And I did my first centrifuge rides, and then when Chuck and I—when he came on board, then we had some real severe centrifuge testing to establish what our capability from a physiological viewpoint would be, how much we could handle. The airplane was good for 18, and 18 positives Gs, and that’s a lot more than we could handle physically.

Pete Everest came to me. He was in the back room and hadn’t flown jets yet, he’d just gotten in from combat, and he asked me if I would buzz the Springfield Airport and he would say that he’d been flying the airplane, and, of course, he wasn’t checked out in jets. [laughs] And I did. I said whenever I could come back from a test flight with enough fuel to do it, I will. So one day I had enough fuel, and I buzzed it upside down, and he told everybody it was him. The numbers were so small back in those years that you couldn’t have read it anyway, especially if you were upside down. [laughs]

Well, months went by, and Al Boyd was on board, and he called me in and he said, “Lieutenant, did you buzz the Springfield Airport?” on whatever date it was. I said, “Yes, sir, I did.”

He said, "Well, I know one thing about you. You're honest. There was only one jet that flew in the whole United States on that particular day." He said, "I know two things about you. You're also irresponsible, and I'm pulling you off of the number-one slot on the X-1 Program, and I'm going to put somebody else in there and you're going to work with him and cooperate with him and do anything you can to assist him."

I was absolutely devastated because I did not respect the people that were in this pyramid to get to the top, and I thought, "If I have to go and be the backup to one of those people that I don't have any appreciation for their skills," I thought, "oh, boy, that's going to be miserable to spend several months with somebody you don't really respect."

So weeks went by and he called me. Boyd called me in and he said, "I've selected Chuck Yeager. Do you know him?" Well, I could hardly keep the smile off my face. I said, "He's the greatest aviator I have ever known." And he said, "Well, that's who you're going to be working with." And I said, "You couldn't have made a better decision." And, boy, I came out of his office a happy person after being down in the dumps for so long.

Chuck is the best, and I respected and admired him, so it was a wonderful friendship. We were already good friends before that. We were drinking buddies and fighting buddies in the air, and he was the only person that I had ever encountered that I couldn't shoot down, you know, mock fights.

The first time we hassled we were from altitude down to the deck, and he didn't know me and I didn't know him. And he said, "Hey, fella," he said, "I think we better break it off or both of us are going to be killed."

And I said, "Fair enough," and so I pulled up and went over and landed, and he landed shortly after me. He saw where I parked, and he parked right next to me. He said, "Fella, you can sure fly the hell out of that airplane." And I said, "Well, look who's talking. I've never had anybody as skilled as you as an opponent ever before." So from that point on, we became good friends, and that was well before the X-1, before he got the X-1 Program.

**Kilanowski:** Well, it's been a beautiful friendship all these years. Can you tell me your duties that you had on the X-1 Program as backup pilot?

**Hoover:** Well, I had learned the airplane as well as Chuck because I was his backup, and if he'd become ill or incapacitated, I would have been able to take over for him. So I sat in all the meetings with Jack Ridley and all the others on the program, and I think I was prepared as much as anyone could be to go. I'm just tickled to death for Chuck that I didn't have to. Our friendship was that great. People have jokingly said that I was keeping my fingers crossed, but our friendship was stronger than that. When he was hurt that night, I didn't encourage him to not take the flight, though I wanted to because I was worried that he couldn't handle it. But I think he was so motivated to get there because this was the big flight, and he did a beautiful job.

**Kilanowski:** Can you describe that day, that morning, what it was like?

**Hoover:** Well, it was cold, really cold, and we both got in my car to keep warm. The wind was blowing and it was really down low in temperatures. Chuck and I visited, and we both sort of suspected that this could be the day.

I was high chase, and I would go up to 40,000 or above and the airplane would produce contrails. Moisture content from the heat would leave this big trail behind the airplane, and Chuck would use that as a target. So when he'd drop out, remember, he was almost blind in the mother ship because he was hung up in the bomb bay like this, and when he would get released and come out, he's got the bright lights and he looks up in the sky and finds this contrail. Now, he knows if he goes to that contrail, he's going to be at the right place at the right time in order to get back on the lakebed.

And he went by me at—I was at 42,000 feet, and I had one of those long-nosed P-80s with some very sophisticated cameras. And I watched him as soon as he started coming and he was headed for me. And I watched him, and his closing rate was just enormous, and I was at eight-tenths Mach number. Boy, was he whistling, and when he went by me and went on just like this, as if I were standing still, there's no question in my mind that this was the big day. That's what he said on the radio to Jack Ridley. He said, "Jack, we're going to have to get this Mach number fixed." He said, "It just jumped." That meant he went Mach 1. It was a very happy day for us.

And on the way down, I got back on his wing again on the recovery and flew formation with him all the way to the lakebed. I said, "Pard, you've got a steak dinner coming tonight at Pancho's." She had told us that whoever got there first, she was buying the steak dinners for that crew. And Chuck had this portrait made, or painting, of the X-1 and the P-80 tucked in underneath it, and the title is, "Pard, you'll get a steak dinner tonight at Pancho's."

We went over to celebrate. Lo and behold, somebody came in just as we were having a little fun and said, "This is top secret classified." I said, "It's too late. We've already been talking about it." And they said, "Well, from now on, don't open your mouth. This is it."

Of course, by then the horse was out of the barn. [laughs] But it was a wonderful day for all of us. We wanted success and we got it.

**Kilanowski:** Actually, that was such a technological breakthrough. Can you tell me what breaking the sound barrier meant to American aviation, to world aviation?

**Hoover:** It meant everything. I mean, doing it was the most important technical breakthrough that we'd had in aviation, because look what has happened. We've gone to space, and somebody had to survive going there. You had to have an airplane capable of sustaining, having the right structure to take whatever abuse the airplane might receive,

and none of us really knew. And since we'd lost others trying to get there, that added an element of risk.

But both Chuck and I—Jack Ridley was one of the influencing factors in my decision to want to be in that program, because Jack thought if an airplane were designed correctly—and he felt the X-1 was—that we'd slip right through it. And with the changes that Jack made to the airplane, Chuck was able to do that. But both Chuck and I felt that we could sustain anything that we would encounter from a physical viewpoint, but we had taken a lot of punishment to get that much confidence in ourselves as to what we could handle.

**Kilanowski:** Well, you went on to a very long distinguished career with North American Aviation. My husband flying an OV-10 in Vietnam and Jack Jackson, who I just interviewed, who's now a congressman, they survived in those OV-10s, I think because of you and your demands with North American to make the OV-10 the airplane that would bring our boys back to the airport. Can you discuss the OV-10 Program and—

**Hoover:** Well, I had been promoted out of Flight Test, but I could always stay in the cockpit. Lee Atwood was the head of the corporation, and he said that as long as I wished to fly, no matter what capacity I am in the company, that I could do so, and I was reporting to him in the corporate offices of the company.

And he called me in one day and he said, "We're having an NPE," and that means Navy Pilot Evaluation, "of a given airplane." And he said, "Would you go back and fly the airplane and make the decision for me as to whether that should take place at this point in time?"

So I immediately jumped on an airplane, packed my bag, and I went back to Columbus. They only had a few, a couple test beds flying. And before I got in the cockpit, I called the chief pilot, told him I was coming over and get all the flight test reports out on the desk, and I was going to spend the afternoon reading their reports. And I did that. Then I said, "Now that I've read the reports, I want to talk to you."

So I got the pilots who had flown the airplane, and I said, "In looking at those reports, there's squawks that were never taken care of." And they said, "That's right." And I said, "And you reported to chief engineer?" "Yes, sir." I said to the chief test pilot, I said, "I want you to show me what you've done with the airplane, and I'll ride in the back seat. And then the next flight, you can ride with me." And he said, "Fine."

So we went out and he showed me what he had done and what could be done with the airplane, and I found the same squawks that they had. And I knew if they had the squawks—they were ex-Navy-trained. I started out with the Air Force, but when the company got into the Navy business, the Navy asked the company if they would let me be a Navy test pilot too. So they sent me to the Navy Test Pilot School.

Well, I came back in, I talked to the chief engineer and president of that division, and I said, "We're not ready for an NPE." I said, "The airplane's just not going to pass it.

Those pilots have had the same training we have, and if it's not acceptable to us, it's not going to be acceptable to them."

**Hoover:** "There's some features about it that I consider to be unsafe." So, boy, they got on the phone to Lee [Atwood], who was running the company, and they tried to downgrade my capabilities. And Lee Atwood, he said, "If he [Bob Hoover] says we're not having it, we're not having it. It's that simple, fellas. Just get with it and get the airplane fixed. You should have done it in the first place."

And when I got back, I told Lee, I said, "I was pretty embarrassed to have to tell them." Of course, they were hovering over me like you couldn't believe, and it was a heartbreaker for them because they had to spend a lot of time and money, and the whole program was delayed.

The company wanted to throw some big thing honoring me with all of the top employees in the company, the top management, and Lee Atwood planned the whole thing. He had Jimmy Doolittle. It was at the Palladium, and he had Jimmy Doolittle and some of the astronauts and Chuck. Chuck Yeager and Glennis were there.

This was all a surprise to me, and I just thought I was going to the top-management meeting. And they opened the curtain and here were all of my friends there behind the stage. And Lee got on the microphone and he said, "One of the greatest contributions to our company and for its financial status was Bob Hoover. He saved the OV-10 Program." And I was very proud to have him say that. But it was a wonderful night to have that great man do this out of the blue.

**Kilanowski:** But it's true, Bob. You saved the program and you saved a lot of pilots' lives.

What qualities do you think are needed to be a good test pilot?

**Hoover:** Well, enthusiasm I think, is primary, and your ability to make quick judgments. If you linger too long in an emergency situation, you may not make it. And I tell young test pilots who are quizzing me about the profession, I say, "You think of every possible emergencies, any possible emergency that you could have in an airplane, and run through your mind how you will handle that particular emergency." I have gone through more what-if's in my career of flying than you could ever imagine. I have beforehand thought what would I do?

I'll give you a for-example. I had thought in my early flying that if I had an engine failure on takeoff and nothing but trees in front of me, would it better to hit in the top of the trees if you could or cut your switch and go in between the trees. It made sense to me that I could go in between the trunks, and that force would decelerate me, break the wings off, and I'd come out unscathed on the other side.

I had my wife riding with me, I was taking her up for the first acrobatic flight, and I lost the engine, and I did just that and went through these trees. The engine, the propeller was stopped. We fell to the ground after we got through the trees, and I couldn't see her, and I said, "Are you hurt?" And some farmer yelled, "I hope you broke your neck." Only that isn't exactly what he said.

She (Colleen) raised up, and she was okay, so that I felt comfortable about it. The fuselage wasn't damaged, the landing gear wasn't damaged, and we just lost all four wings, but it was repairable. And I bought four new wings and put them on her, away we went. But I'd thought about that.

And there's another one, and I won't go any further, but there's dozens and dozens of them I could talk to you about. But I had thought, flying over the mountainous terrain, what would I do if an engine failed and the only place I could land would be on the side of a mountain that had a steep slope to it. And I figured the tree thing again. I also figured if it was above the tree line in elevation, that if I came in and went up the side of the cliff, if you will, and at the last minute dumped the landing gear and the flaps, and then stall it in, it means you wouldn't go forward too much, and you'd have the landing gear go down to cushion your landing, the impact. It just made sense to me that that would be the right thing to do. Now, that's up here in the memory bank. Each of these things were in the memory bank before the accident. I didn't even have to think. I knew exactly what I wanted to do.

So I was taking off from Brown Field in San Diego, and I had two other pilots with me. They worked for our company. And the man was sitting in the front, the lady was sitting in the back. And I got serviced before I took off another flight in the air show with the Mustang. I asked the young man that had been servicing the airplane, I said, "Would you make sure the truck is here, because I'm on a short fuze. I've got to go up the coastline here before dark." And I said, "Be waiting for me with the fuel truck." And he said, yes, he'd be there.

And I had also told the manager of the airport to make sure that somebody was there with the fuel truck and I wanted 100 octane fuel. "Yes, sir." Well, I went into the manager's office and signed all the papers I had to sign on my clearance, and I went back and got in the airplane, and these two folks, put them in, cranked up the engines, everything was fine, and I taxied out. There must have been by now fifty airplanes waiting to depart after the show was over. And as I taxied out to get in line, the first person in the line ready for takeoff said, "Mr. Hoover, you come in front of me. There's a taxiway there. You take off before me." And I said, "No, I'll just wait my time with the others."

And then some of the others—I didn't want to offend anybody—and the other people were coming on the radio and saying, "Mr. Hoover, we don't mind waiting on you. Take the runway." So I could see I was holding them up because the first man didn't want to go, he really wanted me to go, and then the others were encouraging me to do so, so I did.

Now, when you get serviced with the wrong kind of fuel, if I'd stayed in that line, the engine would have quit before I got to the takeoff position because that's the way it works. There's some residual fuel in there, and when that's burned up, which is a matter of a minute or so, then that kerosene hits those cylinders and they aren't going to fire.

So I took off, and everything was fine but I was losing airspeed. I was on my best glide or climb speed, and the propellers are running, the engines are running, fuel pressure, oil pressure, everything was just where it should be, but I'm losing airspeed. So I dropped the nose, and I had no place to go but a deep ravine off to the north side of Brown Field in San Diego, and it goes all the way around about halfway down the field. I didn't have enough altitude to turn back, and the only way I could stay alive was to get back on airspeed and get into that ravine.

Now, here I am with land all above me, a dead end down here, and these two pilots with me. They said, "My god, there's no way we're going to make it." And I said, "Have a little faith. I think we're going to make it." And so I did just what I'd thought about on the mountains. I stayed right down in there, and when there was nothing but disaster waiting, I had the airspeed, so I just pulled it up like this, dropped the gear and flaps, hit the side of this incline, and I bet I didn't skid more than about 200 feet. I hit a rock pile and the airplane catapulted up and on to lesser of a slope. And what I was worried about was going back down into this canyon, this ravine. We got out, and I looked over the airplane and I said, "It can only be one thing. It's got to be the wrong fuel." So I went back and checked underneath and smelled it, and it was kerosene. So then I surveyed the airplane. Everybody was okay, except myself and the copilots, and the instrument panel came in on our legs, our shins. And the airplane was wrinkled from the nose all the way back through the baggage compartment, the engine was twisted, and the gear was collapsed.

I started thinking, "That young man who serviced this airplane must be worrying himself silly." Because I knew that he wouldn't have done anything like this purposely. But I got to worrying about his feelings. When I called the "Mayday" and I went out of sight, to everybody on the airport it looked like we'd clobbered. And within a short while, they had a helicopter out there, had airplanes circling first, then a helicopter, and they picked me up and took me over to the airport manager's office.

**Kilanowski:** You were talking about that you were trying to find the [unclear].

**Hoover:** The young man. The airport manager said, "Well, he's right outside." And I said, "Would you ask somebody to bring him in?" People were all crowded around me. And when he came in the door, I headed toward him, I shook hands with him. I said, "I know that you would never have done this intentionally. I know it was a mistake." And I put my arm around him. I said, "I want you to remember that everybody makes mistakes, and don't let this bother you. We weren't hurt, and we're okay, and that's all that really matters. We [can] always build a new airplane." But I said, "Don't let this bother you." I said, "We all make those mistakes, and don't you feel any conscience about this at all."

The truck wasn't even marked. It didn't have whether it was 100 octane or jet fuel, and he didn't know the difference, so he just brought the first truck that was sitting there where the other 100 octane trucks were. But I got written up on the compassion I had for this young man, but it was heartfelt, because if you'd caused an accident like that, just like how you would feel. It'd be a tough thing to live with. And I think I got him over his concern.

**Kilanowski:** That's wonderful. Well, I think, Bob, it's a tribute to your skill as a pilot, though, that you have survived so many air crashes, and I think your intuitiveness and your thinking through everything beforehand is probably what saved your life.

**Hoover:** Oh, I'm convinced it has, and probably, you know, what you have to think about is there's some circumstances, if the engine fails or you're on fire, there are times when you can't do anything about it. I've had to bail out a lot of times. I've been in, you know, real bad fires. For example, there was great controversy—for thirty-five years I started the races and was a safety pilot at Reno and at a lot of other places around the country, Cleveland, all over. And I've had to ask people—tell people to bail out, and they didn't know how much fire they had and they were about to blow up. They just knew they had an engine failure.

And the last one that I asked to bail out, he started up off the race course and I saw him pull up, and I dove right down on him, and as he pulled on up, he was doing everything right, and the airplane broke out into a fireball. I was pretty close to him by that time. He'd let off most of his speed to get altitude. And the fire went out, so I thought, well, he must have a fire suppression system in the engine ahead of the firewall. About that time, it burst into flames, and now it was really steady and trailing back 300 feet from underneath the airplane, which he couldn't see. All the fire was underneath the bottom of the airplane. I said, "Kevin, it's Bob Hoover."

A lot of people were saying, "You better get out! You better get out!" I said, "Kevin, it's Bob Hoover, and I'm right here on your wing telling you to get out right now."

He got rid of the canopy, and I don't know exactly what happened, but I think the parachute caught on something or it blossomed open and jerked him right off the wing into the tail, and it broke him up seriously. The parachute finally opened up, it was streaming, and it opened up. I started circling him, and he was hanging limp in the parachute harness, and I felt that he hadn't survived because he struck that tail. And I was just as close as from here to across the room when he hit it, and I thought, "Boy, he's finished." I mean, he was still going pretty fast when he hit the tail.

When he hit the ground, it was in rough terrain. Immediately I called in, and I had a friend flying a NOTAR helicopter, a test pilot, and another friend of mine was with him. I said, "Here's his location, and I'm circling but I see no movement."

Well, there were no roads, and he couldn't land there where the man had ended up, so he landed as close as he could, and this friend of mine got out on foot, made his way over there. On his touchdown from the parachute, he hit on a burm and slid down, and he had

a broken neck and a broken ankle. My friend folded the parachute up, put it underneath his head, and he came to. And finally they got somebody up there with a stretcher and got him out.

He's fully recovered, flying. I saw him at Reno a couple of weeks ago, and he's an airline pilot now. But he fully recovered. He had to wear one of those braces where his head pushed up like that, and the docs would run the screws every day to get it tighter. And he fully recovered, which was a miracle.

But there was great concern among the rest of the race pilots, so they had a safety meeting immediately after. I conducted those safety briefings for thirty years. And they said, "What would you do under those circumstances?" And I said, "I've already done it." I said, "If you're on fire, you want to get upside down. Release everything, roll it upside down and push the stick forward. It'll throw you right out and you'll be clear of the tail. If you go over the side, right side up, if you've got any velocity at all, you aren't going to have enough time to drop and be clear of the horizontal and the vertical [tail surfaces]."

Well, there was one pilot in that group, in that meeting, and he was a former test pilot, and I will not mention his name, but he insisted that it was ridiculous to think about bailing out upside down. And I just stood up and said, "Well, I've done it both ways, and I've hit the tail and I've missed the tail, and I can tell you there's no question in my mind how I'm going to get out if I have control of the airplane." So those kind of things enter your mind. Have you thought about it? If you have, then your chances of making quick decisions.

I once had an emergency in the F-100, the prototype, the first time we'd ever had compressor stalls that amounted to anything. The compressor stalls would mean that the engine would just stall and the temperature would go up and you couldn't get the throttle any further up and you were limited in thrust and sometimes practically none. But it wasn't an explosive thing and we'd never encountered an explosive thing.

But the J-57 and the F-100, that was the first flying that that engine had ever done. And I was running this test program, and I was at about 42,000 feet, and we'd never fired the cannons on the airplane. We always had to worry about what that will do to the amount of oxygen that the air has when it hits the face of the engine. In the case of the F-86, we sent ten airplanes over with larger cannons than we'd ever had before, and they were getting flameouts because the exhaust gases from the ammo would go in the inlet and snuff out the air capability of the engine, and that was part of this flight test that I was on right at the time. I was heading up towards Inyokern when I had this explosion, and a fireball came out of the nose and right back over the cockpit, and it started doing a "boom, boom," pumping back and forth, and every time there was a fireball. So I called on the radio and I said, "I'm going to have to shut the engine down because I think we've got a fuel leak in the fuselage, and when the air becomes combustionable with the fuel, it's igniting." And they said, "You realize you're going to have to bail out." And I said, "Not if I've got a perfectly good airplane."

So I shut the engine down. I let them hear it. I pressed the mic switch, and I said, "This is what it sounds like." And they agreed I should shut the engine down, which I did. Then through all this conversation, the high angle of attack, wing loading of the airplane was such that you could probably possibly get away with it, and I didn't believe that, but the reason everybody thought so, Dick Johnson, who was a very close personal friend of mine, had tested the 102 and lost the engine on takeoff at the old base at Edwards, and they had to chop him out of the cockpit.

And I went over to see him that night in the hospital. I talked to him about the accident. He'd slapped down because of the angle of attack when the gear was up, and when he slapped down, the slapdown effect, you couldn't land flat like this. And when he slapped down, that's what broke his back. It was such an impact load. Nevertheless, that had led everyone to believe that you couldn't handle a high wing loading. And I said, "Well, the airplane's flying perfectly fine."

But back to thinking things out before they happen, I was setting up a nice circular pattern for the dry lakebed, and everything looked good, and they said, "We got the fire trucks on their way out, and the ambulance." And I said, "Forget it. It's a piece of cake. Airplane's flying fine." And they said, "Well, have you hit the Ram Air Turbine (RAT)?" And I said, "No. Where is it?" And they said, "It's on the right-hand side." I looked down, and that was the first thing I'd done. It was because I'd thought about it, and it was just automatic. "Bang!"

And I turned for the landing and everything was looking good, and I was holding about 280 knots across the edge of the lakebed there and planning on shallowing it out and bleeding the speed off before touchdown on the dry lakebed. And all of a sudden, I had no authority on pulling the nose up, and it was taking some effect but not much, and at the time I contacted the lakebed, I was doing 240 knots, and when I gained my senses—I was knocked out for just a few seconds—and I woke up and I'm 90 degrees bank angle and 200 feet in the air, and the only control I had was the rudder. So I stood on the left rudder, and I went from about here before I hit, and then it spun around and around like this.

And I didn't become conscious again until they chopped the canopy open, and I looked down and the whole instrument panel was down on my legs. And they said, "We'll get you out as quick as we can." And I said, "No, I've got a broken back." And they said, "How do you know?" And I said, "I visited Dick Johnson in the hospital, and he told me what it felt like." Felt like you have an orange in you wherever the fracture takes place, and that's nature's way of protecting your spinal cord. And I said, "I don't want anybody to touch me until you get a doctor here, and I want you to get a crane and hoist me out of here and then put me on a stretcher."

They did, took me up and x-rayed me, and the doc said, "Oh, you've just got a sprained back." I said, "Doctor, I have a broken back. I've just talked to a man, a dear friend of mine, and I know what it feels like because he explained it to me." And he said, "Well,

you could get up and walk out of here, as far as I'm concerned." I said, "I'm not going to walk anywhere. I'm not going to sit up. I'm not going to do anything. The company will send an airplane up to pick me up and put me in the airplane on a stretcher, turn an ambulance down at Los Angeles, and I want to get a good look-over."

So, checked into this Good Samaritan Hospital and they x-rayed me, not fore and aft, it didn't even show the fracture, but they x-rayed this way and the fracture was at a diagonal. And if I had moved, I would have been a paraplegic because my fracture was way up here. So those are the kind of things you learn and you remember, and it can save your life.

[interruption]

**Kilanowski:** We're over our time, because I don't want to—

Oh, okay. I just had two more questions to ask you. One was reflecting on the century of flight, but I wanted to ask you first is, overall, I mean, you've had such a long distinguished career in aviation, what do you think your greatest contribution has been to aviation and in the field of flight testing?

**Hoover:** I'm not sure that—I guess some of the airplanes I saved, we learned a lot from it. One was the irreversible flight control system. That failure was one where we'd done away—we just had boosted controls, and then if the boost failed, if that hydraulic system failed, if you were above 210 or -15 knots in an F-86, the stick would almost freeze on you because you didn't have enough physical capability to control it. You'd have to slow down to 210. As a matter of fact, on takeoff we lost one right out of LAX there one day, a test pilot friend of mine, and he was killed, as a matter of fact, because he couldn't stop the roll. It started to roll on him and he went right in with it. I know of others who have punched out on takeoff when you weren't supposed to get a full-chute deployment. The airplane, the seat wasn't even designed for that. But we did have one test pilot that managed to get out okay. As a matter of fact, he never got separated from the seat. He hit, parachute blossomed, and he never got out of the seat.

But this airplane that I was testing had what is called an irreversible artificial feel system. Because we couldn't pull enough Gs at high speeds, the Air Force felt we needed something greater, and we certainly did. The airplane I was flying, it had dual hydraulic systems for your flight controls and one for your landing gear and flaps. I took off from LAX and I got airborne, hit the landing gear, and the nose just pitched up to the vertical, and I had the stick forward, all the pressure I could get on it, and nothing was happening, and I was just along for the ride. I had a mechanical rudder, and the airplane rolled off and started to do a spin, and then I had rudder and I booted the rudder, it was kind of tricky, and made it out, no control. I missed the ground, oh, maybe 100 feet. I called a "Mayday" because there were airliners taking off of the other runway, and I said, "I've got a 'Mayday.' Close the field."

And the airplane pitched up again and dropped off, and this time I got out about 150 feet above the ground, and then the next turn, I almost hit the hangar. I just barely got over the top of our flight-test hangar on the south side of the airport, and everybody was yelling, "Bail out!" Well, my goodness, there's no way I could bail out at that low an altitude and that much populated area around me. So I started getting real clever. I decided—and this is kind of technical, but the reason you have a tail on an airplane is to handle the transitions of lift, and there is a point, like with the flying wing, where you can fly without a tail. When you have equal loads on the top surfaces and the bottom surfaces, then you could eliminate the tail. It's ineffective. It's not doing anything for you. And I thought if I could find that condition, and I decided I could play with the throttle and the dive brakes and the rudder, and every time the thing would drop, I'd start working on it, going to get it back up, do this and do this, and finally I got that point. And they said, "What are your intentions?" They were now really pleading with me, because I had a low altitude, and I was over the water where I could have bailed out. And I said, "My intentions are to save this airplane because they've got six thousand of them already under contract that'll be coming off this production line. If we don't find out what's wrong with this, we're going to have a heck of a time. And if I get out of it, we'll never know."

So I headed for the dry lakebed, and they had chase pilots. There was one right with me for that flight, and he got off as soon as I got away from the airport a little bit and he stayed with me for partway up to the desert, and another one picked me up there. And I had this thing on a perfect equilibrium. It was going along, holding itself steady. I hit rough air going over the mountains and I went through the whole turmoil all over again, got it back in balance once more on the other side of the mountains. And I decided I could shoot about a 35-mile approach. If I could just get it set up and keeping what I had, I'd be able to make it on the lakebed. You had 11 miles' runway, so-called runway, just the lakebed itself.

And by this time, I had two other chase pilots with me, and all the way over, they were begging me to get out. I don't know if you've ever heard the name Joe Lynch, but he was one of our test pilots, as good as they were ever. Joe said, "Bob, do you realize we pleaded with you to get out, and I don't think there's any way in the world you're going to make it." I said, "Joe, you may be right." He said, "The wheels have never been spun up beyond 110 knots, and you're doing 240 knots." I said, "Yes, I know, Joe. I can't change anything or I'll lose my longitudinal control." And I thought, "Boy, it's going to be a crunch when I touch down on that lakebed."

Believe it or not, with those 35-degree swept wings, they picked up ground effect, and I must tell you it was the smoothest landing I've ever ridden through, and I rode a full 11 miles up to base operations. And Jack Ridley was on the test program on the X-1 with Chuck and myself. He came out—he had this Oklahoma drawl—he said, "Bob, I've been listening to the hairiest flight I've ever heard." He said, "My gosh, I'm glad you made it." I said, "Well, Jack, climb up on the wing. I want you to feel the stick." And I was bleeding through here where I'd pushed on that stick initially, and this one knee was banged from where I'd gotten my knee behind it trying to get it shaken loose.

It wouldn't have made any difference. The whole tail was free-floating, and I didn't fully realize it. Of course, when you're about to bust your back end, you're thinking about survival more than anything else.

But he grabbed that stick and he said, "My god, Bob, it's in concrete." [laughs] But it did save the program. We found out what was wrong. It was stray voltage that was common to both systems, and we redesigned that and we did build six thousand more.

Now, the completion of that story is I was giving briefings on the airplanes wherever they were all over the world, and everybody heard about that, that story got around, and I said, "Look. This was a prototype. I was being paid to save the airplane so we could find out what's wrong. It takes a long time to grow another pilot, but we can make airplanes in a short period of time. It's in production. If you ever have a problem like that and you have the capability of getting out, do so. Don't worry about saving the airplane."

Well, Joe McConnell, our leading ace in Korea, came back after shooting down more airplanes than anybody else over there, sixteen. He was flying at F-86H, and it wasn't stray voltage, but a bolt had not been secured properly, and he came out and let his tail go free-floating, just as mine had been. And he had heard the details as I've just explained to you, and so he tried to find that point, and he had it. And when he got ready to cross the edge of the lakebed and everybody was begging him to get out, just as they had me, got across the lakebed and he lost his balance point. [demonstrates] Straight in, killed him. It was a sad day for all of us because here this great man was just trying to save an airplane, and there are times when you can't save them. You just have to go ahead and say, "This is it. I've got to get out right now." And that was a sad day for us. But that's one of those kinds of things that maybe you have made a contribution.

**Kilanowski:** From 1903 to 2003, I mean, it's amazing what aviation has done and where it's going.

**Hoover:** I listened to that briefing that Burt Rutan gave this morning, and when he first talked to me about that program, I was so excited. Look what he's done in such a short time, and just think what another fifty years or a hundred years will develop. But isn't that wonderful that he's done what he's done with that capability?

**Kilanowski:** Well, look at in your lifetime, from the first time you started flying propeller-driven aircraft.

**Hoover:** Well, I've seen a lot of advancement, and I'm very lucky to have lived in that time frame. Having flown so many different airplanes, it was probably one of the greatest things in my career, because there are very few people who have that privilege. Paul Mantz, Frank Tallman had all of those airplanes, all the way back to the biplanes and they gave me an opportunity to fly all of those airplanes. Then I flew the World War I airplanes, and then at Wright Field, when I returned from overseas, they had a lot of airplanes that never went into production. They were experimental airplanes, and those were available. Flying all the captured German and Japanese airplanes and then

everything from my P-59 on up through the F-16 and F-18, F-15, I've lived during a wonderful time when I've actually flown each of those airplanes. I just can't help but think I have to be the luckiest aviator that ever got in the air.

**Kilanowski:** Thank you.

[End of interview]