# SETP FOUNDATION ORAL HISTORY PROGRAM

## OH-6

## BRIG GENERAL ROBERT L. CARDENAS, USAF (Retired)
## Sept 26, 2003

**Dana Marcotte Kilanowski**
**Interviewer**

## INTRODUCTION

The following is an interview with Brigadier General Robert L. Cardenas, world renowned Test Pilot, Air Combat Leader in both Bombers and Fighters and former Commander of the Air Force Special Operation Force, 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 Pilot Foundation, Lancaster, California. In this interview, General Cardenas will discuss his experiences as the U. S. Air Force's X-1 Supersonic Program Operations Officer and B-29 Command Pilot, in which he launched Chuck Yeager into the realm of supersonic flight, when Yeager broke the sound barrier on October 14, 1947 and his experiences as Air Force Chief Test Pilot on Northrop's YB-49 Flying Wing, the crash of the YB-49, killing Captain Glen Edwards and his crew, flying the YB-49 down Pennsylvania Avenue during President Harry Truman's Presidential Air Show and the factors which led to the canceling of the YB-49 program.

# BIOGRAPHY

Brigadier General Robert L. "Bob" Cardenas, USAF (Retired) is a Test Pilot, Air Combat Leader in both Bombers and Fighters as well as Commander of the Air Force Special Operation Force. He has flown over 60 different aircraft in his career.

General Cardenas was commissioned a 2nd Lt in 1941 and was sent to 29 Palms, CA to establish an Army Air Corps Glider School. During World War II, he flew combat missions in the B-24 Liberators over Germany. He was shot down on his 20th mission, but evaded capture by escaping into Switzerland and then into France prior to D Day. He became a test pilot in 1945 upon his graduation from the Flight Performance School at Vandalia, Ohio flight testing the German jet fighter ME-262 and the Arado 234 bomber.

In 1947, Colonel Albert Boyd selected Major Cardenas as the Operations Officer and B-29 command launch pilot for the X-1 supersonic project at Muroc Air Base in California. On October 14, 1947, Cardenas launched Captain Chuck Yeager into the realm of supersonic flight.

In 1948, Cardenas was assigned as Officer in Charge of Flight Test Division projects at Muroc AFB and as Chief Air Force Test Pilot on the Northrop YB-49 flying wing project until he received orders to complete his Aeronautical Engineering degree at USC. Following the June 1948 crash of the YB-49 and loss of test pilots Captain Glen Edwards, Major Danny Forbes, Lt. Edward Swindell, Charles LaFountain and Clare Lesser, he was ordered to Muroc to complete the Stability & Control Phase in the remaining YB-49. In November 1948 he gave a final briefing to a Board of General Officers at Patterson AFB on the results of the YB-49 flight test program. In January 1949 he was ordered to fly the YB-49 from Muroc AB to Andrews AFB in Washington for President Truman's Air Show. The transcontinental non-stop flight set a record time of 4 hours and 5 minutes.

During the Korean War, Cardenas flight tested new jet fighters and bombers at Wright Field and Edwards AFB. Upon completion of Air War College, he was selected as Commander of the 51st Fighter Interceptor Wing at Naha AB on Okinawa. He was then assigned to the Pentagon as Chief of the Aircraft and Missiles Program Division. From the Pentagon, he was assigned as Chief of the Special Operations Division at US Strike Command Headquarters in Tampa, Florida. In 1962 he led a joint Army & Air Force Special Force into the Kashmir, India, thereby preventing an incursion of Chinese troops through the Himalayas linking into East Pakistan.

Cardenas was then selected to serve as Commander of the 18th Tactical Fighter Wing at Kadena AFB, Okinawa. After the Gulf of Tonkin Crisis, he flew F-105 missions from Korat, Thailand over North Vietnam. He returned to the US to command the 835th Air Division at McConnell AFB, training F-105 crews for combat in Vietnam.

Cardenas was promoted to Brigadier General in 1968 and placed in Command of the Air Force Special Operations Force at Eglin and Hurlburt AFB, Florida. He went on to be

assigned in Europe as Vice Commander of the 16th Air Force at Torrejon AFB, Spain, where he had the dubious honor of negotiating with Muammar Gaddafi the withdrawal of US forces from Wheelus AFB in Libya.

As the US Deputy Chief of Staff to Live Oak, a NATO group in Belgium, his responsibility to SACEUR was to maintain open corridors to Berlin by calling the Soviets bluff to block travel to Berlin by land, air or rail. Prior to his retirement in June 1973, General Cardenas served as the Chief of JL Division of the Joint Strategic Target Planning Staff (JSTPS) where he was responsible for the development of the Joint Strategic Target List of the US Nuclear War Plan (SIOP).

Upon retirement from the Air Force, Cardenas worked as an Executive in private industry from 1973 to 1983. In 1983, he was appointed to the White House as the California Coordinator for President Reagan's Southwest Border Economic Action Group. He resigned in 1985 and accepted an appointment by Governor Dukemejian as Chairman of the Juvenile Justice and Delinquency Prevention Advisory Group as well as a member of the California Council of Criminal Justice.

In 1987 the Governor appointed Cardenas to the California Veterans Board where he was later elected Chairman of the Board where he oversaw policymaking for the California Department of Veterans Affairs. He left in 1993 to serve as Chairman of the San Diego United Veterans Council and as a Director and Chairman of the Board of the Veterans Memorial Center and Museum in Balboa Park. He also served as a member of the San Diego Mayor's Veteran Advisory Board, and as Chairman and Trustee of the Flight Test Historical Foundation at Edwards AFB. He was appointed by Veterans Affairs Secretary Anthony Principi to the VA Memorials and Cemetery Committee in Washington during the George W. Bush Administration and was instrumental in the building of the Miramar National Cemetery in San Diego.

Cardenas has been awarded the Distinguished Service Medal, Legion of Merit with Oak Leaf Cluster, Distinguished Flying Cross, Purple Heart, Meritorious Service Medal, Air Medal with four Oak Leaf Clusters, Joint Service Commendation Medal, Air Force Commendation Medal with Oak Leaf Cluster and the Presidential Citation. Foreign decorations include the Spanish Grand Legion of Aeronautical Merit with Sash & Dagger. Additional Honors include induction into the Air Commando Hall of Fame, selected as an "Eagle" by the Flight Test Historical Foundation, University of New Mexico College of Engineering honors for professional contributions and leadership, USAF Test Pilot School "Distinguished Alumnus", inducted into the Aerospace Walk of Honor in Lancaster, CA, Sigma Chi's "Significant Sigma Chi Hall of Fame", enshrined in the Wall of Honor at the Smithsonian National Air and Space Museum and inducted into the National Aviation Hall of Fame in 2015.

# INTERVIEW

**Kilanowski:** This is Dana Marcotte Kilanowski for the Society of Experimental Test Pilots Foundation Oral History Program during SETP's 100th Celebration of Flight Symposium at the Westin Bonaventure Hotel in Los Angeles, California. It is Friday, September 26th, 2003, and I'm interviewing Brigadier General Robert L. Cardenas, the Operations Officer for the X-1, breaking of the sound barrier project.

Good morning, General.

**Cardenas:** Good morning.

**Kilanowski:** If you could please give me your full name, the date, and where you were born.

**Cardenas:** My name is General Robert Cardenas. I was born in Mérida, Yucatán, Mexico in 1920.

**Kilanowski:** Can you tell me how you were selected for the X-1 program?

**Cardenas:** I was the last guy selected for the team. Boyd [Colonel Albert Boyd] had already interviewed many pilots for the X-1. I was Chief of the Bomber Test Section, and the B-29 was going to be the airplane used to drop [launch] it, and I had run airborne inflight structural integrity tests on the B-29. When our B-29s were bombing Japan, they were losing the vertical rudder on some of them, where they were making violent turns after the bomb run, and what it was, was that Boeing had not run inflight dynamic structural integrity [tests], so Wright Field got the job to do it.

So for that one, we'd go to 20,000 feet, max power, and both the pilot, myself, and the copilot would go into a dive holding full force while I was rolling in rear trim, and then at 15,000 feet, you put it into a near-vertical bank and then both of us would pull back as hard as we could to see max G that we could get, to see what was going to happen. Well, the tail didn't come off. I got a very large wingtip deflection on each side. They've got pictures of it, about five feet on each side or so. But the tail didn't come off. So I wrote my report, explaining it was structurally sound.

So then another pilot—I'm not going to mention names—another pilot repeated the same thing. In his case, right as he was trying to pull max G's in there, a loud bang occurred. The vertical tail didn't fly off, but it fractured the main spar, and he landed gingerly. They came in and landed.

So Paul Bickle determined that what was wrong was, as he was making his—you use coordinated rudder, and as he was doing it, the nose started to drop a little bit, and so he hit top rudder to bring the nose up. Well, a vertical tail is not meant to be a horizontal

stabilizer, and in the bank when he hit top rudder, it imposed loads on it. So that report went back to LeMay, and he had his B-29 pilots practice coordinated turns, because that's all it was. It wasn't the airplane; it was the pilots were snapping that thing off.

So Boyd called me in and he said, "We're going to have this project out at Muroc, and I want you to be the project officer," or he called it operations officer. "I've already talked to Chuck [Yeager], I've already talked to Jackie [Ridley], I've talked to [Bob] Hoover about I want you to sort of kind of run things out there. You're going to have a problem, because this is the first research airplane that has been turned over to the Air Force," Army Air Corps, military, "and there's going to be a little jealousy or antagonism on the part of the NACA people [National Advisory Committee for Aeronautics], but you've got to use them as a team because they've got all the ground telemetering and everything. So just be careful. Use them as a team, but they're going to be pressuring you."

So I said, "Okay. Fine."

Then he handed me a letter, and the letter said, "Due to the nature of the project, the tests will be progressive, step by step, and they will be brief. Safety of flight is paramount, but it is not to limit success." So I knew what the old man meant. He wanted to get it over with.

So we went out and we did. I picked up the X-1 at the plant with the B-29, 5 July, [1947]. We went through the speed of sound 14 October, [1947] just a couple of months later. So we did what the old man wanted, and the rest is history.

**Kilanowski:** I'd like to talk about your duties on the X-1 project both as the Operations Officer and also as B-29 launch pilot.

**Cardenas:** Well, taking the Operations Officer first, primary thing was to work with Walt Williams of NACA as Boyd said, as part of the team. There was a little bit of antagonism because we were doing what they thought they should be doing, but he was cooperating. I didn't have too many problems with him.

Also, my other job was to keep track of Hoover and Yeager. That was a bigger problem. But, in general, things went pretty smooth, nothing as part of the Operations Officer's duties. One big thing was when Chuck broke his rib. I had been given authority by Boyd in his appointing me as officer in charge and he had given me Hoover as the alternate [X-1 pilot] in the event anything happened. When Walt Williams said, "How's Chuck doing?" like I said before, I knew he knew, and I was waiting to see what he would do and would that result in Boyd intervening. But typical Boyd, he picked his team, he gives the job, he wasn't going to meddle, and by sending his deputy out to ride copilot on the B-29, was his way of still keeping in touch and holding our hand, you might say.

From that aspect, that was the only time that I really had, shall we say, a crunch point as to whether I would move Bob Hoover in. I knew that I would have to call Boyd to say, "Hey, I'm going to put Hoover in instead of Chuck." What would have happened, I don't know. I can't even surmise what would have happened if that had come up.

But the other reason I didn't do it is that—I know people think I'm crazy when I talk about this, but Chuck, when he crawled in that X-1 and that door, clamshell, shut, he ceased being a human being. He was part of that machine. He loved mechanical things anyway, and that was his beginning, but when he went in there and sat in it, I don't think—no disrespect to Hoover's pilot's ability, but I don't think Hoover could have done what Chuck did, because when you consider what Chuck had to do, not only once we discovered that we could have a flying tail, he had to fly that thing [unclear], he had to keep all four dome pressures level so he wouldn't blow out a tube, while still flying the airplane. So, basically, I think I made the right decision not to call, and Boyd made the right decision not to interfere, and so we did it.

Now, so far as my duties on the aircraft, the B-29, I had to monitor the loading of the X-1, along with Jack Russell. Jack Russell was a crew chief on the X-1. We had a pit, a loading pit. NACA, back east, was building a huge hydraulic lift to lift the B-29. It was going to cost a lot of money. Out there in the desert [at South Base], we built a hole in the ground, we put the X-1 down in the hole and towed the B-29 around and used the B-29 as the winch to pull the X-1.

We had a quick modification, as I mentioned previously. Boyd had said it would be progressive and brief. Well, we didn't want to fool around modifying and building some special holding device, so we used a World War II 2,000-pound bomb shackle to hold the aircraft that weighed 12,500 pounds empty, no Chuck, and then we drilled a hole and put a pin in there. Also, the X-1 worked on 5,000 pounds of nitrogen gas pressure, 5,000 PSI, but on the climb up, because nitrogen was being used to pressurize the cockpit, we had big tanks inside the B-29 and we had little rubber tubes that went from the big tanks, hooked into the X-1 to keep them topped off, and Jackie Ridley, as copilot, one of the tasks he had was that before drop, he would go back in the back, pull the rubber hoses off from the X-1, and also pull the pin on the shackle. I had visions of Jackie riding that X-1 if it prematurely dropped on him, but he wore a chute, so it wouldn't have mattered.

The flight profile was very simple. Takeoff. Now, takeoff, I had no problem. I had plenty of power. It was like carrying a big bomb. But I only had 10 inches of clearance between the ground and the belly, the bottom of the X-1, and if you see pictures, you'll see a big white patch on the X-1. That's not paint. That's frost, because right on the other side of that skin is 600 gallons of liquid oxygen, and liquid oxygen and sparks don't work too well, and that 10-inch clearance was with the oleo shocks on the B-29 in a static position, you might say. Takeoff, I had a long runway, so the only thing I had to do was I could not lift the nose wheel more than about 10 inches without scraping the X-1, so I took a nice long run.

My nightmare was if Murphy's Law hit us and the thing {X-1] wouldn't drop, and that actually happened one time. We tried everything, but apparently it had jammed. So I told Chuck to come back on up; we were going to have to land with the thing on. I told him, "Before you come up, dump as much of the LOX [liquid oxygen] out as possible." So, still having some gas pressure, he was able to dump out about half of that load. That would help a lot, because I envisioned when I land, the oleo struts on the B-29 were going to compress somewhat on the landing. But everything worked. He stayed in it till we got to about 5,000 feet in case it prematurely dropped, but he came back up and we landed. So that was probably the best landing I've ever made in a B-29. So that was about it, fairly routine after a while.

**Kilanowski:** Well, with only 10 inches of clearance and landing with the X-1 underneath you, that's quite a feat and quite a tribute to your piloting skills. Can you describe the flight that morning, everything you did, what you were thinking, feeling? If you can go through the whole day with me, what kind of a morning was it?

**Cardenas:** Well, it was a little bit tense because we knew that that was the day that we were going to try to go through the sound barrier, tense in that Colonel Paul had come out to fly copilot for me. Normally, Jackie [Ridley] always flew copilot. In the back of my mind, I knew the reason he was there, although he never said anything about it. So there was a little bit of tenseness, you might say, and anticipation, a large degree of anticipation, because during this whole time that we were out there, those few months we were out there, I had scientists, not just NACA people, but MIT people and other professors from universities and whatnot, telling me that we were going to kill Chuck and we were going to wreck the airplane, that we didn't know what was on the other side of the sound barrier. In fact, one guy said there's probably an ultrasonic barrier that would just dissolve the aircraft. And they were learned gentlemen that were saying these things. Now, there was a heat barrier, but we had little spots of paint on the leading edge of the wing on the X-1 that we knew what kind of heat we were getting close to the sound barrier. So from all of that, there was a little concern, but there was a lot of anticipation, because we were pretty sure we were going to go in.

It was Dick Frost who had helped to build the airplane and was also test pilot for Bell, he had related to Jackie between the two of them, because Jackie was the Air Force brains, Dick was the Bell Aircraft brains, that he related his belief was the shockwave had hit the hinge line of the elevator, or close to it, causing a loss of control, but that when Bell built the airplane, they built it so the horizontal stabilizer could be moved down or up a couple degrees and then locked into place. So his suggestion was to unlock [the horizontal stabilizer].

**[Interruption of interview]**

**[General Cardenas discusses how he recovered from a stall while flight testing the Northrop YB-49 Flying Wing]**

**Cardenas:** But I would be dead today if the throttles had been where they normally are, you know, by your side. In this case, they had two throttles hanging down from the ceiling, each one connected to four engines. On takeoff, I just shoved both throttles forward, and the flight engineer fine-tuned all the other seven, eight. But I'm often asked did I do that because I knew that if I did that, I would get out of it [stall] and the answer is no. Sure, survival is the only thing I had left. I reached the left throttle and applied full power to the left side, and that asymmetric power sort of wheeled me over into a spin that I could get out of. But, still, I started at 20 [20,000 feet altitude] and I recovered about 1,000 feet, 800 feet above the ground there.

**Cardenas:** Well, lucky it was there. When Glen Edwards and Danny Forbes got killed, why they didn't do that, I don't know. Maybe they didn't have time. It's not been determined.

Also, the other mystery to me is Glen Edwards was not flying the airplane. It was Danny Forbes, the copilot. That's an unanswered question. A lot of conspiracy things that had been said, but I'll never understand it, because the airplane was the stability and control airplane.

**Cardenas:** Well, that first tumble, when I landed, after I settled down, I wrote a one-page report that the aircraft should never be intentionally stalled, and Boyd read the report and he never asked me to stall the airplane again.

The company [Northrop] said, "No, no, the airplane does not stall." They asked Max Stanley, who was a company pilot, to run a stall series, and Max said, no, he wouldn't. They finally got Charlie Tucker to run stalls, but Charlie had not had some of the advice that I had, so he never got a full stall. The aircraft had slots out on the wingtips to reduce tip stall, but even with the slots, as he approached the stall, he'd fall off on a wing.

Paul Bickle, who was the chief engineer back at Wright Field, had told me, "You'll never get a stall, Bob. It'll fall off on a wing. So what you do is as you're approaching a stall, instead of pulling back pressure, use the trim tab. Keep trimming in rear trim," because the tab was out at the wingtips. So that's what I did, and I got a full wing stall. Charlie never did. I got a full wing stall. But it proved that the airplane—I have never said it was unstable. I said it was marginally stable about all three axes, but it was a dangerous aircraft, particularly if you were at an aft CG. it was not, but at an aft CG, it might even be worse.

Going back to a long time before that, one of the Northrop test pilots—Max Constant, I think it was—he was flying the little one, the N-9M, at an aft CG, and it pitched on him. He deployed the spin chutes. It went off into a spin. But he never

recovered, and when they found him, they said possibly what had happened, he'd done stick reversal and the wheel was against his chest and he couldn't get out.

So the wing [flying wing], in my case, I did not get a stick reversal, wheel didn't pin me back, but in an aft CG, you could get that wheel come back and just pin you in the seat. Of course, it didn't matter. [laughs] It wouldn't have mattered anyway, because to get in the airplane, I crawled in underneath in the back hatch, and you walk up about 15 feet along a catwalk and then the seat was up there 90 degrees from the line of flight. You put your rear end in there, and one handle here, you'd rotate the seat and align it then with the other handle. You'd pump yourself up four and a half feet up into the bubble. So any odd maneuver like the stall, centrifugal forces had me pinned. I couldn't get out anyway.

But in extremis, you always have to have some escape, even if it's mental. I figured I could rotate the seat, drop down, so I had them fasten a nylon rope with a knot about every 12 inches. I left my chute back by the hatch with a bungee cord holding it open, and I thought maybe I could drag myself back there. It wouldn't have done me any good in the maneuver. However, say, in the case of fire or something like that, to try to get out, that's one way I could get out. The rest of the crew could have gone out before me, but in a serious high-G maneuver, you'd never get out, no.

Of course, when that happened to Glen [Edwards], see, I had started the program—we had two airplanes, one for performance, one for stability and control, and I had finished about 80 percent of the performance tests on one airplane and I got a chance to go to USC and finish my aero engineering [degree]. Boyd was real nice about it. He said I could go if I could get a pilot, so I asked for Glen because Glen had helped Dr. Perkins at Princeton write the book on stability and control, and the next step was stability and control. So Boyd gave me Glen, and so on May 20th of 1948, I checked Glen out and he inherited the rest of my crew, my copilot, Danny Forbes, etc.

So I took off immediately and climbed in the car, drove nonstop to Dayton, Ohio. I told my sweetheart [Gladys] back there that, "Hey, no more flight testing. I'm going to go to school. You don't have to worry. Let's get married. If you trust me, we'll get married en route back to San Diego," my home, or L.A., where we were going to study. And she did, and we did. We got married in the Little Church of the Gamblers in Las Vegas on our way back.

But just fifteen days later, I was driving her down to San Diego to meet my parents, 5 June [Saturday, June 5. 1948], and I heard on the radio the wing had crashed, and I did a 180, went back to the apartment. Boyd was on the phone, said, "I guess you heard."

And I said, "Yes, sir."

He said, "Well, get back up there, finish the tests. Try to find out what happened to Glen."

The accident board actually never really—well, they asked me some questions, but I was not really part of the accident investigation team. However, I did see—I didn't find it, but I saw one of the data cards they had, and across the top was "stall entry maneuvers." So they were checking out stall entry maneuvers. Didn't say "stalls;" said "stall entry."

In my case, when I entered that stall, because of the way I was doing it like Paul Bickle recommended of trimming, I was getting down to a very minimum speed to enter that stall. Charlie Taylor, when his fell off on a wing, he was at a higher speed than I. Now, it could be that Glen—well, Danny, because Danny was flying the airplane, not Glen. Why, I don't know. Danny was a little more ham-fisted than Glen. It could be that he overstressed the airplane. The airplane was designed and built for 200,000-pound gross. I never flew it above 175,000 gross because I knew they had not done static structural integrity tests on the airplane. They were moving along so fast. They wanted to sell the airplane. So I kept the gross weight down and I tried to keep—I knew the design limit was 2G's, the structural design, trying to keep it below two.

Now, in their case, Russ Schleeh, another test pilot, was down on the lakebed shooting jackrabbits, hunting, and what he saw was the center section of the airplane tumbling down. The engineers, when they found the outer wing—the wing separated outboard of the engines and they separated in a positive-G mode. In other words, it folded in and sheared off. That would have happened probably about 2.5G, so I think they got into a stall at a little higher speed than I did and the aircraft failed.

When they hit, they hit upside-down. The center section hit upside-down so flat that there was very little lateral movement, and both Danny and Glen didn't have their seatbelt unbuckled, so their hands were up here [demonstrated]. I've often asked myself what I could have told Glen, but he knew—well, Danny Forbes was with me when I stalled, so he knew what would happen if you stalled. So I don't know. It'll remain a mystery for a long while. But I think that's what happened to them.

Mr. Northrop was a gentleman like my grandfather. He was a nice man. As the Air Force, Army Air Corps—it was Air Force by then, '48—pilot, my job was to sign off whether it was operational or not, and it was not. It was not unstable, and it was not because of the stall, but when you maneuvered the airplane like turning onto a bomb run, it was marginally stable about all three axes. Now, Paul Bickle told me it wasn't marginal stability; it was the response. But what you would do as you rolled out, you'd get a phugoid oscillation, and when you add a couple of minutes on the bomb run where they're shooting at you, you don't want to sign off on that airplane.

But it was in November '48 that Boyd got a hold of me and said, "Bob, you're a young major with a promising career, so if you don't object, it's risky. It's not a court-martial, but let me call a General Officers Board and you can tell them everything."

So I said, "Fine. As long as Mr. Northrop is in the audience, I'd be glad to do it."

And Mr. Northrop came and he was in the audience. So I told them what a beautiful concept it was and all the good things about it and the good things that could exist. I said, "However, the aircraft has exceeded the human sensory and response capability. Humans are reactive. Even autopilots are reactive. This ship needs a proactive system, and I don't know what it is." Well, the B-2 today has a proactive system, fly-by-wire, which we didn't have.

And Mr. Northrop got up, and to the general he said, "Sir, it looks like Northrop has a lot of work to do."

Some guy got up and said, "Mr. Northrop, you not only have a lot of work to do, you've got an impossible task."

And he didn't even look at the guy. He kept looking at the general. He said, "General, I'm surprised you have people in your employ that think the impossible is actually impossible," and that ended the meeting.

That basically, in my book, anyway, it was the end of the program, because, number one, General LeMay did not want that airplane. Number two, there were four-star head of ARDC, AMC. The brain trust was there, the power was there, and after they'd listened to me and they supported my position and they knew what had to be done, but there was no way they could do it technically, yeah, they decided to cancel the program then.

But the Northrop lobby people, they still—that was November '48. In January '49, they had me fly the thing to Washington. They [wanted] to have it come in for Truman's presidential air show. Well, the B-47 was at Moses Lake in Washington. I was here at Muroc, and the distance to Andrews is about the same. The B-47 took off, made the flight in three hours and fifty-seven minutes. So they put Max Stanley in as copilot, help bend the throttles, try to beat that record, but Max understood that we had a .78 bird and the 47 was a .82 bird and there was no way we could do it unless we hit a jet stream stronger than they did. Well, we came close. We made it in four hours and five minutes.

It was parked on the ramp, and President Truman, they saw to it that he came out to the airplane. He came up, he crawled in the cockpit, looked around. He was a crusty old gent. A lady's present, I can't say exactly what he said. He said, "It looks pretty goddamn good to me. I think I'm going to buy some of these." I had to bite my tongue.

On the ground, he turned to the Chief and he said, "General, why don't you have this young whippersnapper fly this down Pennsylvania Avenue rooftop level. I want people to see what I'm going to buy."

I thought, "The man is crazy."

But an hour later, Boyd got a hold of me. He said, "Slow down. Don't hit any radio towers. Be careful."

So I was going down Pennsylvania Avenue. I slowed down to about 300 knots. But there were tall radio towers and I was on the lookout, and, all of a sudden, dead ahead I saw the Capitol dome. I had to pull up to go over the Capitol dome. I have a picture of that somebody took on the steps of the Capitol. And, you know, I hadn't thought about it till 9/11 came around and that guy [terrorists] went into the Pentagon. Going down Pennsylvania Avenue, I never realized how heavily forested the city of Washington really is. I would lose the avenue for the trees and dodging towers, I'd lose it, and to my right was an open field with a big huge building, the Pentagon. I'll bet you that guy [terrorist] was headed for the Capitol, and when he lost his way, took the alternate target [the Pentagon].

On the way home from Washington, we stopped at Wright Field to let the people there see the odd airplane, and then from there, we flew back to Muroc. But en route, right over the Rockies, the guy in the back end started singing out, "Fire on six, fire on four, fire on two." Flight engineer kept shutting each one down.

So I asked Pete Sellers, my new copilot, "Give me a bearing to the closest airfield we can make, Pete."

So he said, "Winslow, Arizona."

And I said, "Okay. Fine. Pretty high."

He said, "High, but the runway's okay." Said, "However, you have one problem. The runway's only 50 feet wide." Yeah, the tread on the gear was 41.2, but we got down okay.

There's a humorous part to the story. The humorous part of the story is there was a C-47—I think it's American Airline—was parked waiting for takeoff, and, of course, they cleared me in ahead. And many years later, a Mr. Solomon [phonetic] got a hold of me, and he was the airline captain that was sitting in that C-47. He said he watched this monstrosity coming out streaming black smoke and fire, and he said, "For years as I went around the world flying passengers, I used to regale my crew with that thing about coming in, and now here we are and you were flying that." He lives up north in Montana and invites me to go fishing with him up there all the time.

But they changed all the—one other little incident, Winslow at that time did not have an ambulance, crash crew recovery, etc., but they had to deal with a local undertaker to have the hearse come out there in an emergency as the ambulance. [laughs] So the hearse came out. It wasn't needed, but they came out. However, there was a UP/AP correspondent happened to be vacationing out there and he was watching this whole thing and seeing that ambulance come out, or the hearse. My wife [Gladys], in the meantime, worked at base operations back at Muroc. She worked there in base ops. Of course, she got the word about this wing had crashed in Winslow.

Anyway, I diverted from the X-1. I'm sorry, Dana.

**Kilanowski:** Oh, no, no. That's a great story, and that's very important to get on tape. What I wanted to ask you is what breaking the sound barrier meant to mankind. I mean, it was a quantum leap that I think we had in the field of aviation, and if you can expound upon that.

**Cardenas:** Dana, when World War II ended, we had the greatest air armada that man had ever seen, and we'd conquered the world. But there were three things that very day, that we had that, they were all obsolete. They were all obsolete for three reasons. One of them I saw with my own eyes when I was flying a B-24. This airplane came from behind me so fast, I thought I'd stalled out. It was a new propulsion system, the Me 262, number one. Number two, our pilots flying against the Me 109s, some of them were destructing in midair without being fired on. They'd hit the sound barrier. Number three, Assistant Secretary of War Lovell had met with Churchill and Eisenhower because they had very serious information that Hitler was going to invade England, and if England was invaded, we would not be able to carry on the air war against Germany. So that night was born the requirement for an airplane that could go 10,000 miles carrying 10,000 pounds of bombs.

Those three things we were working at Muroc. Breaking the sound barrier solved that second problem. Development of a propulsion system, I flew the XP-59, the first jet aircraft. So we were working on a propulsion system, we were working on breaking the sound barrier, to get our air armada out of the "obsolete" can into the "prudent" can, and they were working on building one that could go ten-by-ten.

Unfortunately, it was not until the B-2 came along that you had that. Now, the B-52 could do it, but not in the way the B-2—the B-2 today can take off from Whiteman, Missouri, and bomb anywhere in the world within ten hours, and not carrying 10,000 pounds; 40,000 pounds. So it took us a little time, but the obsolescence of our air armada was solved right out here at Muroc, and that's what breaking the speed of sound meant.

**Kilanowski:** And when you reflect back upon the 100 years of flight—and you were part of the team that is part of aviation legend now. You're a living legend, and you helped change the history of aviation. What are your feelings about that?

**Cardenas:** Well, number one, glad to have been a part of it. First, I was lucky to be selected to be part of it. I, forever more, am thankful to have had a leader like Boyd. He was stern, he was rough and tough, but he wouldn't let you fly anything that he couldn't fly. He was a typical model of a leader, handpick his people, give them responsibility, and stay out of the way.

Overall, of course, I felt very honored to have been part of the effort, remembering also the many, many people that we lost achieving all these things, and that's why this organization [SETP] is so great in honoring not only present but past to keep it alive. We have to tell our children and our grandchildren and great-grandchildren what happened so that never again will we be obsolete. Historians have said that no great country lasts as a democracy for more than 200 years. Well, I hope the United States can

prove that to them, to remain free, to remain strong, and part of remaining strong, unfortunately, means to have the means to enforce that, if necessary.

So with all of that now, what does it mean about the future? I heard you ask Lovell [Astronaut Jim Lovell] about the future. Just as we have seen the cultural and societal changes that have occurred in the last twenty, thirty, forty years, I think the next fifty years, the society and cultural aspects are going to be such that you and I would not recognize. For instance, man walked on the moon. He may walk on Mars, because Mars is there. I see off in the far future another breed of astronauts dedicated to the travel in space. They may have to dedicate their whole life, because we humans are the weakest link in the whole system, and so they may be forcing a different career job. It's going to be extremely interesting, though, yeah. That's about it.

**Kilanowski:** Well, thank you so much.

[End of interview]