

ROBERT RAUSCHENBERG ORAL HISTORY PROJECT

The Reminiscences of

Harold Hodges

Columbia Center for Oral History Research

Columbia University

2015

PREFACE

The following oral history is the result of a recorded interview with Harold Hodges conducted by Cameron Vanderscoff on November 9, 2014. This interview is part of the Robert Rauschenberg Oral History Project.

The reader is asked to bear in mind that s/he is reading a transcript of the spoken word, rather than written prose.

Transcription: Audio Transcription Center

Session #1

Interviewee: Harold Hodges

Location: Shohola, Pennsylvania

Interviewer: Cameron Vanderscoff

Date: November 9, 2014

Q: Today is Monday, November 9, 2014, and we're here in Shohola, Pennsylvania. This is Cameron Vanderscoff for the [Robert Rauschenberg Oral History] Project with Harold Hodges to talk about his collaborations with Robert Rauschenberg and the New York City art scene in the 1960s as an engineer. But before we talk about the sixties, I'd like to hear a little bit about how you came to be an engineer. I found a biography of you online which mentions that you had some background, prior to your research at Bell Labs [New Jersey], in clock making and this sort of thing. And so I wanted to ask if you could walk us through you becoming an engineer.

Hodges: Well at that time, I guess the people—such as my parents—weren't college people themselves so they didn't really push the college side of things. And I sort of drifted out of high school. I had a band. And in fact that's how I got up here in Shohola, is I had the band for the summer over here at Sagamore. And that's where I met my wife.

Q: You had a band?

Hodges: Yes.

Q: What sort of music?

Hodges: Jazz, camp music. Sagamore was an adult summer camp kind of a thing, right down the road here. Or it was; it's now a housing development. But anyhow, let's see, you want to know about the technical side of things.

Q: Sure, so you were up here and you were playing in your jazz group and you met your wife up here.

Hodges: Yes. But I was from Dunellen, New Jersey—I actually lived in Dunellen, New Jersey. This was just a summer job. I was just out of high school.

Q: Playing this jazz music. And so you mentioned that you came from a family, that your parents weren't college people.

Hodges: No.

Q: And so you're in this context where you're playing an instrument in this band. And so how then does that lead into your ultimate work, which is in research engineering?

Hodges: [Laughs] Well, the way the world works. That's when the Second World War came along, so we got into the navy there for three years. And then when I got out of course I had both a wife and children. So that sort of cancelled out going back to college, probably mostly because of the money situation. But at that time they didn't have all the help that surrounds them today or that later came about.

But anyhow a lot of the stuff that we were doing in 9 Evenings[: Theatre & Engineering, 1966] and for Rauschenberg and all the rest of the group was stuff that we picked up as we were kids. That's the kind of thing we would do, just play with things like that. And so after the Second World War I went looking for a job and I thought I'd like to do watchmaking. So I went to school for that and came back and set up a business in Milford [Pennsylvania].

Q: Hand-making watches?

Hodges: Well no, it's actually selling them and repairing them but not making them. That's a misnomer. But anyhow, that all occurred. And after a couple of years that really wasn't enough to do the job of supporting a family and so forth, so I started looking around for work. And I just happened to run across Bell Labs as one of the places I applied. They were in need of somebody that had watchmaking background and was interested in mechanics and the whole ball of wax. And so I joined the lab and went down there to work.

Q: And so you were there in some capacity consulting on mechanical matters?

Hodges: No, no, I got a job with their basic research department and it was mostly building things. Like you'd have a physicist, say, that had ideas of how to prove something or other on whatever they were working on. And then they'd have technicians, and the technicians were the guys that actually built the stuff and made it work along the lines that the leader of the group wanted it to go.

Q: Sure, and at this point, we're in the 1950s, yes? Early fifties or so?

Hodges: Yes. I'm very bad on dates so I couldn't pin it down for you really.

Q: That's all right, just a general sense of—

Hodges: And then I continued along and we kept doing different kinds of jobs. We worked on the LEDs [light-emitting diodes] that are in—well almost everything has little red lights.

Q: Sure.

Hodges: We were involved in that first breakthrough with turning electricity into light.

Q: Right, right. And of course now LED lights are quite ubiquitous. You see them—

Hodges: Yes, they're all over.

Q: And so that was one of the problems that you were working on then?

Hodges: Well that was just an incidental one that just happened to come into my mind. It was all kinds of stuff that had nothing to do with art that we worked on down at the labs. They had enough facilities there. They could have put together a battleship if they wanted to. With that

kind of diversity that they had just in the laboratory itself and the actual equipment to do something like that, it was very remarkable. I'd have paid them to work there, to tell you the truth.

[Laughter]

Hodges: In fact I think I learned more from them than they got from me. But anyhow, and then I got to working for [Johan Wilhelm] Billy Klüver.

Q: Right, so you meet him then, when you're both employed at Bell?

Hodges: Yes, absolutely. And then he got interested in that whole [art] scene going on in New York. And people would ask him to get things for them and do things for them and he'd accommodate them. A lot of the stuff was just sort of fool around work. I remember building—somebody wanted to have a piano fall apart. And so we built up a support out of Wood's metal and then put a heater inside of it and then had it so you just turned the switch and the switch would heat up the Wood's metal. It would all go and melt and whatever was being supported would collapse on it.

Q: Because Wood's metal as an alloy has a very low melting—

Hodges: Yes. So that kind of thing they had.

[Laughter]

Q: So Billy Klüver then is your point of introduction to this New York art scene. If you look at some of this stuff, some of the projects that you worked on with Rauschenberg and some of these other folks—by this time we're into the early sixties. And by that time, Bob Rauschenberg had already been producing art, that sort of thing, for ten years, him and his contemporaries in that movement. So was that a world that you were at all aware of? Was this a world that you had any sort of interest in? Given that you're in this research engineering world, I'm curious about whether this comes out of a clear sky.

Hodges: Yes, we kind of slid into it because Billy would get me to do things for artists that had nothing to do with Rauschenberg or 9 Evenings or any of the rest of it—just that they had a problem and he said, “Hey, what can you do about that?” And so I thought about it a while and then made something up for them—you know, no big deal. It didn't take a lot of time or anything, so it was no problem to do it.

Q: So this is a matter of Billy Klüver then being your point of contact and coming back and recruiting people to work on these various, “Oh, here's this project” or—

Hodges: No, it was just like he was having dinner with somebody that happened to include a couple of artists and one of them would say, “Look, I've got this problem.” And of course they knew that he was an engineer. Well, he was a physicist I guess. But they knew he worked at the labs and knew about all kinds of stuff. So he acted like an expeditor, I guess you'd call it.

Q: And I understand that one of the earlier projects that you worked on—and I don't know if this was the first—was with Jean Tinguely, the *Homage to New York* [1960], which sounds very similar to that piece that you were just describing, this piece of art that would need to destroy itself essentially. Because there was a piano, I think—

Hodges: Yes, out in a garden someplace.



Preparations for Jean Tinguely's *Homage to New York* (1960) in the Sculpture Garden of the Museum of Modern Art, New York, March 1960. Pictured to the right of the construction: Richard H. Koch and Rauschenberg. Photo: David Gahr

Q: MoMA [Museum of Modern Art, New York]. [Laughs]

Hodges: Yes, that was the one we worked with. But those kinds of things are simple-minded because they don't really require a lot of work. It's just that these artists would run against the point where they had no association with anything, so they didn't know about doing things like that. So it was no problem for me and it was a big problem for them.

[Laughter]

Q: So you work on that piece, that's in the garden at MoMA. Are you working on this, like you're making, for example, block diagrams or something like that? Are you doing that in New Jersey or is this something where you're going into the studio?

Hodges: Oh no, I was doing that just in off hours. The kind of stuff I was doing took a little thought to figure out just how to go about it, just like you do on a normal project. But it was much less because it was all stuff that you knew worked and you didn't have any problem putting it together. And Billy then would ask, if he needed a particular thing, he'd go buy it. And then we'd throw it together and he'd cart it back over to the artist and they'd use it.

Q: And so this is something that you're doing almost like a hobby or something in spare time?

Hodges: Sure, absolutely. And it didn't get into anything big until they did—the trouble with getting older is you forget words. [Laughs]

Q: Well, so there's the 9 Evenings, but there's also the *Oracle* [1962–65] piece.



Robert Rauschenberg

Oracle, 1962–65

Five-part found-metal assemblage with five concealed radios: ventilation duct; automobile door on typewriter table, with crushed metal; ventilation duct in washtub and water, with wire basket; constructed staircase control unit housing batteries and electronic components; and wooden window frame with ventilation duct

Dimensions variable

Musée National d'Art Moderne, Centre Georges Pompidou, Paris

Gift of Mr. and Mrs. Pierre Schlumberger, 1976

Engineers: Billy Klüver, Harold Hodges, Per Biorn, Toby Fitch, and Robert K. Moore

Hodges: *Oracle*, that's the one I was trying to think of. Yes, we got into that and that was strictly a three-way thing.

Q: Three-way in the sense of—?

Hodges: Well, Billy and Bob got together and decided what they wanted to do. And then Billy expedited stuff to me and then I would put the thing together.

Q: Right and so you met Bob Rauschenberg first then? Because I know that Bob Rauschenberg, he was apparently at the *Homage to New York*, the melting piano, self-destructing art event or

Happening, I guess, in the garden at MoMA. Did you meet him around that time or were you at that event or—

Hodges: I don't think I met Bob until we actually started building *Oracle*.

Q: Which, I have that here as '62 to '65 is *Oracle*.

Hodges: Somewhere along there, yes.

Q: So then if Billy's giving you the—

Hodges: See, it was two different components. There was the electronic part of it and then there was the physical, you might say, side picture of what was going on. But the electronics was something that you could plug in there.

Q: Right, so in that sense, you were specifically working on that component which was then being fit into this whole—

Hodges: Yes, yes.



Harold Hodges working on *Oracle* (1962–65). Photo: courtesy Experiments in Art and Technology

Q: And so again, this is something, Billy Klüver is sort of being the middleman between you and Rauschenberg on this?

Hodges: Absolutely, sure. After we got it built and it was presented and all that stuff—in fact, I rebuilt it three different times. We tried three different ways of doing the same thing. But I took the *Oracle* down to, what was it, Dallas? I guess it was—in Texas. Then I took it out to Chicago. [Note: *Oracle* was exhibited in the 68th American Exhibition, Art Institute of Chicago, 1966; subsequently in *The Machine as Seen at the End of the Mechanical Age*, Rice University, Houston, 1969; and later in *Poets of the Cities: New York and San Francisco 1950–1965*, Dallas Museum of Fine Arts, 1974]

Q: For exhibitions or for—

Hodges: Yes, for exhibitions.

Q: So you were traveling with the piece then?

Hodges: I think the piece went separately, but I just went out by train.

Q: To see the exhibits?

Hodges: Well, put the thing together, so to speak.

Q: And you mentioned that you had to rebuild the system several times. And looking back at some notes that Billy Klüver has written about the thing, it seems that a part of the problem was your homemade AM [amplitude modulation] transmitters, interference between them and operating in unstable and broad frequencies.

Hodges: Sure, absolutely.

Q: One of the interests of this [oral history] project is definitely the process. And so you're faced with this request where Bob Rauschenberg wants these different radios and these different transmissions to be going out and they can be tuned and dealt with separately. Are these reasonable requests? What do you do about a problem like that, the frequency thing?

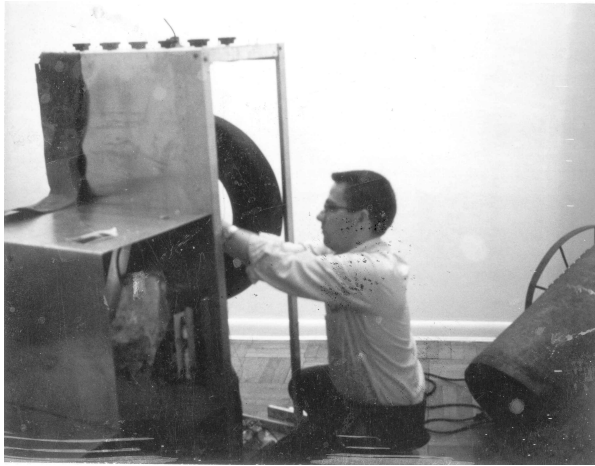
Hodges: That was part of the problem. We didn't really know how that whole thing— Nobody, well I suppose somebody someplace, had experienced this kind of thing, but I'd never run across

it and I don't think any of the rest of the people there had run across it. So it's just something you have to try one way or the other, or some other way, and see if you can make it operate the way you want it to. That's all. That happens to everything, any kind of thing you're trying to build.

Q: Sure. In the course of your normal work at Bell Laboratories, these sorts of requests, would that be a typical request? Like, I need five AM transmitters going to separate speakers, all in a very contained, immediate proximity? [Laughs]

Hodges: No. Actually I think basically the thing that was wrong was that we were trying to do the broadcasting from one to the other in the same frequencies that we were using as the actual radio stations were bringing in. So that's where they got clashing, I guess.

See, what the problem was, you had the five radios in the central piece and then each one of the pieces that are around the *Oracle* had a receiver and we were doing all this stuff to the signal and everything at that central place and then re-broadcasting over to each one of the individual things. And he wanted to be able to move both the stations that you got to and the speed of the scan. And you're broadcasting in the same wideband that you are receiving on, so that's where the problem came. But you build something and you then know where you are with the project, so you have to keep playing with it. And you keep playing with it and you don't exactly know where you are. And it's just a question of time. That's the reason we rebuilt it a couple of times.



Harold Hodges with the control console of *Oracle* (1962–65) in Rauschenberg's studio, late 1964–early 1965. Photo: courtesy Experiments in Art and Technology



Console of *Oracle* (1962–65) in Harold Hodge's home. Photo: courtesy Experiments in Art and Technology

Q: And working on a system then, how do you know you've reached a point where a system is not viable and you need to build another one? What's that like? [Laughs]

Hodges: Well it just didn't work. It didn't come out clean, I guess is the way to look at it. It was more interference than was acceptable. But see, what they do today with Bluetooth, if you look out on the web how Bluetooth actually works, you'll be so amazed—you'll just be amazed.

[Laughs] It's very complicated. And we were trying to keep things simple. We were making little audio transmitters and that kind of thing. Well maybe you haven't played with these kinds of things, I don't know. But that was one of the fun things that we used to do. You could buy these transmitters and then transmit into your own FM [frequency modulation] stations or whatever.

Q: Well you mentioned maybe fifteen minutes ago that some of these projects you worked on with artists, it was sort of like the stuff that you would do as a kid. Like maybe putting together a crystal radio set or something—

Hodges: Sure, exactly. I had one for the longest time, using the bedsprings as the antenna.

[Laughter]

Hodges: WEA and WOR and WJZ, great fun.

Q: Right and that sounds actually like very good preparation for these sorts of projects that we're talking about.

Hodges: Yes. Well, I guess one of the other problems that we ran into of course is that here's Bob who was up in the art world and there's Billy who also had a pretty good job in the Bell Labs itself and then there was me in the bottom of the situation, but I also had commitments at home and everything. So it isn't like I could just drop everything and just concentrate on that one little project because I have several projects going for the lab itself. So it's a part-time, like you said, hobby. And the problem is he really would need an engineer to develop something like the Bluetooth in order to make it really work properly. And that wasn't happening so they were trying to do it on a QT [off the record] sort of thing, so we never really did get that to work like we really ought to or what they had in mind anyhow.

Q: Well in recent years in New York I've been doing some teching work and we actually fairly recently had a problem where our wireless microphones were getting extremely disrupted due to a lack of available channels. We were trying to run these five wireless microphones—the same number actually—simultaneously. And so is that then a sort of similar problem to what we're dealing with here?

Hodges: I think that's probably that same kind of thing, yes. I don't know. We could have probably gone through three or four different configurations and maybe got one that was a little bit better than some of the rest of them, but we didn't. After we built it a couple of times, we gave up on the whole idea.

Q: Yes, what I have found looking back through some of Billy Klüver's notes is that you wound up using new technology, crystal controlled and full transistorized wireless microphone systems—so units with factory-set FM frequencies.

Hodges: Yes.

Q: And so then, coming to a solution like that, did you have much say then over the constraints under which you were working? Because I understand that one of Bob Rauschenberg's requests—or maybe it was a demand, I don't know—was that it not be wired. Because one solution, of course, would be that you would just wire these units together, but he wanted a wireless model. And so if Bob Rauschenberg came to you and said something like that, is that

something that you have a say in or is it kind of like, here's your project and this is the problem and go solve it.

Hodges: Well, we just talked it over and I would say they left it up to me as far as the way I would try things. And so I tried the most simple thing that I knew of. And so we ran through that kind of thing and then juggled the thing around a couple of times and that was the end of that.

Q: And so did you find in the end, using these FM transmitters, did you find that these problems were solvable or did the constraints of the assignment have to be modified?

Hodges: No, it was the fact that you were trying to use the same frequencies for both features there. You were receiving from the outside world the same kind of frequencies you were broadcasting. And since they were being swept back and forth as far as where they were on the dial, you couldn't just—I probably could have taken half the dial and done that, that might have worked—hmm, hadn't thought of that.

[Laughter]

Q: We'll have to let them know. [Laughs]

Hodges: It's an idea. And you think that might work, so you try it. Well everything's like that.

Q: Sure. But even something like power, how do you maintain a good grounding system? Are you using independent power sources for each transmitter?

Hodges: Well, they're all battery driven. Let's see, how did we rig that up? Oh, I think we were using a car battery or something like that for the main power source for all the stuff that was in the main unit there. And then each of the ones on the outside were powered by just regular batteries. And I guess they were just rechargeable.

Q: Like you'd just get a regular DC [direct current] battery at a—

Hodges: Yes. I don't know whether you're aware of it, but one of the problems that those artists were having was that the museums had their own electricians and had their own code of what had to be this way and that way, depending on how they saw the projects that they wanted to show came up. But evidently [it was] a fair amount of money to just have them do that kind of thing. And so one of the things that all of the artists got going on was the fact that everything had to be battery driven and rechargeable rather than just plug it into the wall.

Q: Because that was best practices then or the standard that was being set by—

Hodges: No, it was a money problem I think, because they didn't want to pay the museum the money they wanted in order to— I don't know why that whole thing was a problem or whether they just didn't want to get involved with it or not, but that was what the deal was.

Q: So you had to make these units self-containing insofar as power sources.

Hodges: Self-containing, yes. Supposedly the museum workers would then come around and plug them in at night in order to recharge the batteries or somebody would. I never got involved in that side of it.

Q: Right. And so then your involvement in this project, it's a hobby, it's a part-time thing. Are you coming on as— Is this like a formal contracting opportunity or this is something if you have an hour here, you have three hours this night?

Hodges: It's something sort of fun to do just to see if you can do it.

Q: Right. I'm curious that also working with, the opportunity to work with other engineers in this context. I mean if you could—

Hodges: Never got together like that. There was no organization that way.

Q: So it was fairly compartmentalized in terms of— So it might be Billy Klüver's talking with Rauschenberg in New York. You're in Murray Hill [New Jersey] for example and you're working on the transmitter unit there and then you ship it in or Billy Klüver picks it up or something like this?

Hodges: Well we never got to the actual—*Oracle*—physical side of it until it got into a museum. The electronics were all added to it. Let's see, one time I think they did truck it up to my house when I built the connection to the home play, you might say, that staircase kind of thing that they built.



Rauschenberg working with the controls for *Oracle* (1962–65) in his Broadway studio, New York, ca. 1964–65. The Getty Research Institute, Los Angeles. Photo: Alexander Liberman © J. Paul Getty Trust

Q: Right, that central, the controlling unit.

Hodges: Yes, that's right, because I remember having that up there where we lived at the time.

Long time ago. [Laughs] Old memories, yes.

Q: And you mentioned then that you went to Dallas for instance, to the exhibition of this machine. So is this something that needed an engineer's presence in order to run? When you went there to Dallas, what exactly were you doing to ensure that everything was going properly?

Hodges: Well, just to see that it was running and everything. It was not something you could just— You had to hook up the batteries and so forth and place the stuff around and make the right connections. And the museum wasn't going to take care of things like that. They'd plug in a charger and that kind of thing as part of the service, but I don't think they ever got involved in this themselves.

Q: And so you're working with Billy Klüver. What sort of relationship do you have with Bob Rauschenberg then? I did find some photos of the two of you around *Oracle* from approximately this time.



Harold Hodges and Rauschenberg through the window frame of Rauschenberg's *Oracle* (1962–65), 1960s. Photo: courtesy Experiments in Art and Technology

Hodges: Yes, I've been down to the nunnery. [Note: 381 Lafayette Street, New York formerly belonged to the orphanage of Saint Joseph's Union Mission of the Immaculate Virgin]

[Laughter]

Hodges: Does he still have the turtle?

Q: No, the turtle passed away a few years ago, Rocky. But really recently though, I think.



Rauschenberg in his Lafayette Street studio, New York, 1968, with Rocky and kittens. Photograph Collection. Robert Rauschenberg Foundation Archives, New York. Photo: Shunk-Kender © J. Paul Getty Trust

Hodges: I remember I brought my daughter down with me one time and the turtle scared the shit out of her.

[Laughter]

Hodges: She didn't realize he was in the tub. And he started scratching around and she looks in there and there's this great big turtle sitting in there.

Q: Yes, any sort of memory that you have of your relationship with him or Lafayette, the nunnery.

Hodges: Let's see, why did we go down there? I don't recall. I remember going down a couple of times.

Q: Sure, well possibly it was for an assembly component or something like that maybe, once your compartmentalized work was being put into the larger context of the sculpture.

Hodges: Complete blank.

[Laughter]

Q: That's fine.

Hodges: It was a long time ago.

Q: It certainly is. Well, perhaps more generally, you're an engineer. I'm not, though my grandfather and brother are, and they're part of my brain trust for this. [Laughs] So how would you go about explaining technological capacity and limitation to artists because they don't have

shared language? I assume that you could have certain conversations with Billy Klüver or with [James] Jim McGee or these various other engineers who are working on this project, but there's still the challenge then of translating that to an artist who might have an idea or a vision, but doesn't have any sense of how that actually correlates to existing technology. How do you deal with that difference in language?

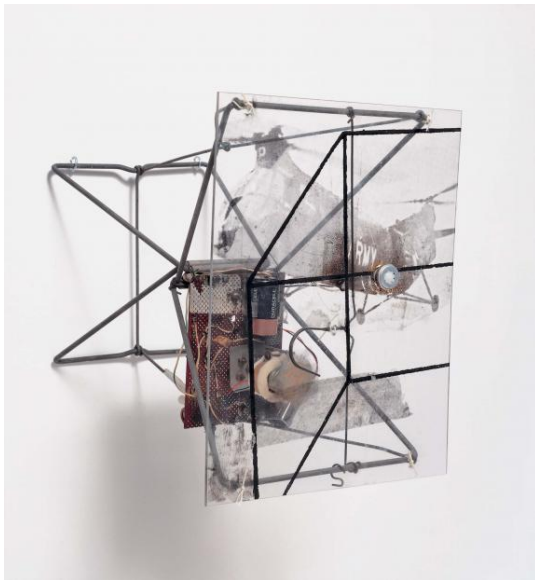
Hodges: I think it was more like the artist has something in mind. They visualize in their mind anyhow what it is they would like to do and then they talk about it. And somebody gets a hold of one of the technicians that was working on the project and they say, "Yes, you can do that easy," or, "We can give it a try if you want," and that kind of thing. And that was the end of it. I don't recall any talking back and forth about what's possible and what's not and all that because the kind of things they were asking for was pretty much simple-minded. There wasn't anything really tough about it.

Q: Sure. Though, so take this frequency problem with the AM radios. If you or another engineer is saying this to Rauschenberg, would Bob Rauschenberg or one of these other artists who you work with, would they understand the nature of the problem in any sort of technical terms or would this be a simple matter of: "Well, this isn't working with the AM format. We're going to try to incorporate this new FM transmitter." Or is that just a conversation amongst the engineers?

Hodges: I remember having a few conversations with Billy about it, but I don't recall anybody else ever saying anything about it. Plenty of people fooled with this kind of thing, but I don't

think they'd ever gotten into that, that so many [radios] were working at the same time, which is of course where the problems come in.

Q: Right. I know another project that you were working on with Rauschenberg at this time was *Dry Cell* from 1963, which involved this interactive sculpture featuring a microphone wired to a motor that causes a little piece of metal to spin around.



Robert Rauschenberg
Dry Cell, 1963
Silkscreen ink and oil on Plexiglas, with metal coat hanger, wire, string, sound transmitter, circuit board, and battery-powered motor on metal folding camp stool
15 x 12 x 15 3/8 inches (38.1 x 30.5 x 39.1 cm)
Robert Rauschenberg Foundation

Hodges: Could have been. [Laughs] It's not something I recall.

Q: With an instruction like that, is that a straightforward thing then for you to do, to take a microphone and wire it to a motor that would cause a piece of metal to spin? That sort of voice activation of—

Hodges: Whatever you wanted it to do. Those kinds of things are not much of a problem.

Q: And was it your sense that the artists had a sense of the difference between what was possible and impossible?

Hodges: Well, they never got into any impossibles. It's just that you didn't know how well they would work [in a new scenario and application]. They weren't presenting problems that were very tough. I remember somebody down there was into ballet and they had these moving platforms with the model on each one. [Note: Deborah Hay, *Solo* (1966) for 9 Evenings]

Q: This is for 9 Evenings?

Hodges: It could have been, yes.

Q: That might have been Rainer, Yvonne Rainer?

Hodges: I don't remember, but that was one of those things where the model airplane people had already gone through this whole thing and had it all solved. [Laughs] It was like just putting a bunch of pieces together. Of course, they chose to do it right from scratch, which was a big pain, but the guys were gung ho to do it, so they did it that way. But at the time that they were making that thing, they had digital controllers and you could sit there with a little joy stick in your hand and you could move it just a little bit and then it would move the rudder a little bit—or move it way over and it would move it way over. It was a proportional kind of thing. And these were

all— You just went to the store and bought them, so it was no problem to match it up with a motor to truck this thing around.

Q: To manipulate these platforms?

Hodges: The platforms, yes.

Q: Right. So all of this—it's a hobby; it's something you're doing outside of the context of your work. And I know a big sort of summit of all of this art and technology is 9 Evenings in October of 1966.



Robert Rauschenberg
Poster for 9 Evenings: Theatre & Engineering, 1966
Offset lithograph
36 1/2 x 24 1/4 inches (92.7 x 61.6 cm)
From an edition of 90

And so in that model, I know that you work primarily with [Öyvind A. C.] Fahlström on *Kisses Sweeter Than Wine* [1966], but there's also Rauschenberg's *Open Score* [1966]. And so I'm wondering if you could share that process of 9 Evenings because that seems to be the summit, this huge bringing together of all of these smaller collaborations that had been existing prior, like *Oracle*, into this huge event at the [69th Regiment] Armory [New York].

Hodges: —Well, I built a radio-controlled blimp and we ran that around the arena there.

Q: For Fahlström?

Hodges: For Fahlström, yes.

[INTERRUPTION]

Q: And I know there was one thing made out of Mylar.

Hodges: Yes, that was it.

Q: This is it.

Hodges: Yes, Billy found that stuff. That was Mylar coated with—I don't remember the name of it, but it was a type of plastic that was easily sealed.



Nil Waldhauer with helium-filled Mylar “missile” for Öyvind Fahlström’s *Kisses Sweeter Than Wine*, 9 Evenings: Theatre & Engineering technical rehearsal, Berkeley Heights, New Jersey, Summer 1966. Photograph Collection. Robert Rauschenberg Foundation Archives, New York. Photo: Frances Breer

Q: So for a material like this, for this plastic or for this Mylar, are these things that you’re getting from work? Are these things that are commercially available?

Hodges: It happened that they were. They developed this stuff for meatpacking, I believe. But Billy ran across this someplace or other and he bought a big roll of it and then we fabricated a blimp sort of a thing and put the radio controls on it and a little motor, a little fuel motor, and had it zooming around the place pretty nice.

Q: And so the buoyancy, was that helium?

Hodges: Yes, helium. Yes, that was the reason for the special material because the helium atom is so small and if you did a regular kind of plastic material it would just work its way through and wouldn’t stay inflated. And if you used hydrogen then you had explosion problems. So it was a great discovery to find something that would work with the helium.

Q: So you specifically needed this material that was not at all porous?

Hodges: Yes, exactly.

Q: And so that's interesting, then. And in a situation like that, you have previous knowledge of Mylar or do you have to go around testing different— How do you vet?

Hodges: All of this kind of stuff is, well, it's enjoyment. Like today, I'm interested in the LED situation and solar power and all those kinds of things and new materials. They just discovered a kind of material that's very, very light, but it's about as strong as aluminum.

Q: And it's a metal?

Hodges: It's a metal I guess, yes. It's sort of like a foam, but it's exceedingly light. They plan to build a car out of it or an airplane and it would solve a lot of fuel problems and so forth because of the light weight.

Q: That's extraordinary.

Hodges: Yes. Well, it's one of those things, they do it in the lab, but making it practical is another story. But it's those kinds of things that interest me a lot, so all of that kind of stuff comes to mind.

Q: And so now how do you find out about those things? How do you keep up?

Hodges: Oh, all kinds of— My daughter is always bringing home stuff because she's kind of interested in that sort of thing too. But there are publications. You just keep your eye open for them and follow them along. But there's a heck of a lot of stuff going on that's really interesting.

Q: That's extraordinary. And so then in the sixties, in the time of this collaboration, would you be learning about things in a similar way? Are you reading trade journals, that sort of thing?

Hodges: Well, not trade journals. It's like—hmm, I don't know that I can put my finger on any one thing, but if you keep your ears open, you hear certain kinds of things from all kinds of places.

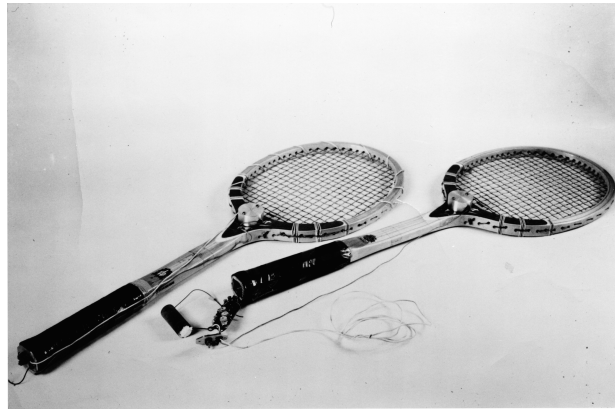
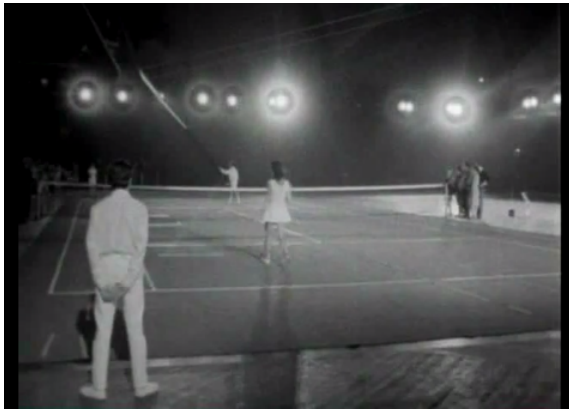
Q: And so you find out about things like Mylar. Working with Öyvind Fahlström, you're in the program for 9 Evenings. You're listed as the lead engineer on that. And so I'm curious then, was that sort of collaboration much like it was with Rauschenberg or was that different, given that this is a performance and you're working with someone else?

Hodges: Well no, because when I was working with Bob, I don't know— Was *Oracle* actually in 9 Evenings?

Q: I don't believe it was.

Hodges: No, I don't think so either. I think he was more for promoting his art and his— Yes, I think he had other projects going too, but I don't think any of them were in 9 Evenings. He just supported it as a patron, I guess you'd call it.

Q: Well he did have a segment called *Open Score*, where there were two people playing tennis and then transmitters in the handles of the racquet.



Mimi Kanarek and Frank Stella on the tennis court in Rauschenberg's *Open Score* (1966), 9 Evenings: Theatre & Engineering, 69th Regiment Armory, New York, October 1966. Still from *9 Evenings: Theatre & Engineering* (1967). Produced by Experiments in Art and Technology (E.A.T.). Audiovisual Collection. Robert Rauschenberg Foundation Archives, New York

Sound-wired tennis rackets used in Rauschenberg's *Open Score* (1966), 9 Evenings: Theatre & Engineering, 69th Regiment Armory, New York, October 1966. Photograph Collection. Robert Rauschenberg Foundation Archives, New York

Hodges: I didn't know that was at the— Yes, I remember that one.

Q: Yes and then that led into a sequence with infrared camera.

Hodges: Yes, all kinds of stuff. [Laughs] But all pretty much perfected stuff that everybody knew about, just nobody had ever done anything about it in that kind of vein.

Q: And did you work on it? Because I know Jim McGee was the lead engineer on *Open Score* but I was watching a documentary that Experiments in Art and Technology [E.A.T.] put together and you're listed as someone who helped build and test the equipment for *Open Score*. [Note: *Open Score*, 2007, directed by Barbro Schultz Lundestam]

Hodges: Well I probably did, but I probably didn't register it as such.

Q: Like working on that particular—

Hodges: Yes. The electronic part of it or whatever they were using was usually separate from what was actually happening. So it was like the basic idea of something had to be proven, so to speak, that it worked like you wanted it to work.

Q: Right. I was looking at that documentary and you're interviewed in it. And in it, you say that “When you get on the technical side of things, you tend to look at things in just a certain way, and here's this whole bunch of people who come along”—the artists—“and want to do something else with the technology.”

Hodges: Well, not something else. They just wanted to use a little of it and they didn't know anything about it or the technical details involved. You take wire A to wire B and all that.

[Laughter]

Hodges: But on the other hand, I can't paint either, so we're even. [Laughs]

Q: Yes, I'm interested in that because some of these things, some of these ideas, are pretty wild. The idea of let's put this transmitter in the handle of a tennis racquet and each time the ball hits the racquet another light will go out in the space. I'm curious about your impression of the imagination of these artists.

Hodges: Well, I think they, just like anybody, look at anything and their impression of it is different from the person standing next to them. Nobody sees exactly the same thing and they're not interested in the same thing that the guy standing next to him is interested in either.

Q: Sure. And so further, my question is then, were you [able to] look at one of these things—at an AM radio or you could look at a material like Mylar—and think of its applications? Were you surprised at the sort of applications that these people came to?

Hodges: Well, no. Billy mentioned that the stuff was developed for this and had this particular ability to not pass helium. And so from there, the only thing you can think of there is helium balloons—so straight line.

Q: Sure, sure. I understand that one other thing for the Fahlström piece was snowflakes falling up.

Hodges: [Laughs] Oh yes, that was interesting. I don't know why nobody every picked that up. That was another one of those things that was really fascinating. We took regular soap bubble material and put it in a can and then ran a pipe into the bottom of the can and we blew helium through it. And what happened was it rose up the can and it looks like Styrofoam, but it just kept going right on up until it got enough lift that it would break off the column. And then the column would just float up. So what we did was we put a bunch of cans around in a circle and we flooded them all up at the same time and what happened was that they would go up and they would touch one another and then cling. And they'd start doing this thing in the air as it's going up. It was just what you wouldn't think of happening, that's all.

[Laughter]

Hodges: But it was really neat because there are very few things that have bulk and will float like that.

Q: So the containers themselves, or the cans themselves, you're saying would—

Hodges: No, no. The cans just sat on the ground and as the bubbles went through the bubble material, liquid, it turned into bubbles. And all the bubbles stuck together and they made this stuff that looked like Styrofoam.

Q: So they'd sort of adhere to each other?

Hodges: Yes, but as it went up, it got pushed out of the can so that these big columns of apparent Styrofoam were floating up in the air.

[Laughter]

Q: And so were you in attendance at the 9 Evenings as a guest?

Hodges: Yes. Somebody had to run the, what they called the missile, I guess, the blimp around with the radio. We had a radio control on it.

Q: Oh and so you were steering the—

Hodges: Yes, the blimp.

Q: The blimp/missile, right.

Hodges: Yes, whatever.

[Laughter]

Hodges: Yes, that was rather peculiar. The first night we took it up, we got a little bit too close to one of the balconies and people were reaching out and pressing it down. But there must have been a draft or something up there because no matter if we cranked it over to pull it away, it would still stay there. So they eventually knocked it out far enough that it was able to be steered again. And some were jumping up and down at the— We had to put some kind of screen around the propeller because somebody might get cut. [Laughs]

Q: Right. You have to crowd-proof the technology.

Hodges: Yes, exactly.

Q: And so I'm curious then, for you to work on these pieces— Of course you'd work on projects constantly for Bell Labs, but I'm curious about for you the difference between seeing one of your projects being tested in the context of a laboratory and then seeing one of your projects, even something that's quite simple to do as many of these projects were, in this artistic performance, avant-garde context in front of an audience of, like a thousand people a night or something like that. That is a bit unusual for an engineer to also perform like that.

[Laughter]

Hodges: To tell you the honest truth, I thought these guys were all kidding.

[Laughter]

Q: Them being the artists?

Hodges: Yes. Well, the whole group, it's like we're all keeping this big secret that we're just fooling around—

[Laughter]

Hodges: —and never really trying to produce something real, I guess, or be part of something.

Q: Right because many people in the audience I'm sure were taking it quite [as] an artistic statement, if you will.

Hodges: Yes. Well it was about the time that that all started I guess; people doing weird things in order to gain some recognition.

[Laughter]

Hodges: I thought it was a lot of fun.

I don't know where it came from or whether I built it for him and then forgot about it or what, but they had pillowcases—or they looked like pillowcases. They were pillows themselves and

we filled them up with helium and then kept bouncing them off until they just stayed in midair kind of thing.

Q: Until you found the right—

Hodges: Yes, right proportion of the weight and stuff. But anyhow when they had them in their houses, the temperature in the house and the drafts and stuff would affect it and this thing would go drifting around the houses all by themselves with no steering or anything. And they'd come up against something and then get lifted off because of drafts and so forth, and follow the heat around, like in the nighttime, and go upstairs and then come down stairs. [Laughs] It was wild. It was like an unintended consequence.

Q: So this might be Andy Warhol [*Silver Clouds*, 1966].

Hodges: It's somebody like that, yes. I think Billy had one around his house for a while. They lasted quite a while, but not forever because even with the good seal and everything, you still couldn't really get it completely tight.

Q: So yes, what becomes of all of this technology then?

Hodges: Well, actually as far as the technology part of it was concerned, it was just old technology. I mean all of us, I think, had done similar things years before when the technology first came out and we fooled with it.

Q: There's an interesting quote from Billy Klüver which he wrote in the program for 9 Evenings and he makes the case that there were a couple of new things. And so I'd love to hear your comment on this. And he just said quote, "While working with [Robert] Bob Whitman, we rediscovered a phosphor that has already become an important tool in infrared laser research. Another example—" of something useful or new or something like this "—is the small power amplifier which has also attracted commercial interest." And he says that the feedback to industry from the interaction between artists and engineers is very important. And so I'm curious then, are things being discovered at all in this process? Does any of this seem to feed back into any sort of industrial relevance or is this, like you said, kind of like these fun gadgets, like a crystal radio you'd work on as a kid experimenting?

Hodges: I don't know. But I've found in the last forty years or so, there's been less interest in people tinkering in stuff and things like cars have gotten so that you can't tinker with them. And I notice when they build anything nowadays, it's built so you can't tinker with them. So that whole idea of doing things and fooling with them is sort of gone from the general way people grow up. Now they're all into buying something that does something and then they're playing with it as a game or something of the sort, without the actual tinkering involved. And of course that probably went back to the fact that there were more farms originally and when you're out on the farm, you had to make do with things or make other ways of doing things in order to get them accomplished. So in a form, that was tinkering in a way. But it led to curiosity about things I think, even unintentionally.

Q: The fact that you were coming up in a context where things weren't entirely prefabricated.

Hodges: Yes, right. It was very, very big back then to have kits. Heathkit—I don't know whether you know that name or not—but they used to put out all kinds of speakers and amplifiers and stuff for hi-fi [high fidelity]. And everything was all finished off; all you had to do was wire it and they had these diagrams that showed you where to put the stuff. And whole big kits of making stuff in the electronic side of things.

Q: And that's changed now?

Hodges: Yes, nobody does that anymore.

Q: And so these gadgets, these curiosities, for you then, working on these projects, there wasn't a great element of challenge, but there was perhaps one of curiosity. Is that fair?

Hodges: Yes, I was just seeing where it was going, that kind of thing. [Laughs] I had all this big group of people that wanted to do things and it wasn't very monumental kinds of things, but it was just to get them done. And it was just enjoyable I guess is a good word for it.

Q: Sure, sure. And so did you have any sense then, as Klüver is suggesting here in this intro, that any of these things that you were building or this whole artistic/engineer collaboration was anything that could feed back into industrial applications? [Laughs]

Hodges: Well, maybe. It wasn't along those kinds of lines though, really.

There was a lady that was doing some painting and stuff—what was her name?

Q: In 9 Evenings?

Hodges: No. Well, she might have been there. Her name was Ultra Violet [Isabelle Collin Dufresne].

Q: Okay, yes.

Hodges: Do you know that one? Let's see, what was it she was doing? Making paintings with, oh, a neon letter sticking out of it.

Q: Oh, because I know there was one with Jasper Johns with a neon R or something like that.

[Note: This refers to Johns's *Field Painting* (1963–64) for which Klüver worked on the neon.

Ultra Violet had also done work with neon.]

Hodges: Yes. Well, maybe it was him. It might have been something else I was doing for her.

But that one was just converting it to rechargeability so you didn't have to plug it into the wall—that same deal with the museum charger for the electrical connections.

Q: So you think that might have been more of a practical choice than an artistic one to not have a wire. [Laughs]

Hodges: Oh sure. It was, I'm sure. Well you can see that they'd have to get involved in the whole thing in order to be able to say it was safe to plug it into a wall; you didn't want the whole museum to go down. [Laughs]

Q: Right. Well actually, apparently at the *Homage to New York* with the self-destructing art and the player piano that melted and all that, apparently the fire department did actually come to that.

[Laughter]

Hodges: I believe it. I don't know what kind of opinion they had of the whole thing.

[Laughter]

Q: So going through the archives at 381 Lafayette, this place that you talked about visiting, I found a questionnaire that was given out to artists and engineers which mentions a couple things and I don't know if you have any comment on any of these. One question was, "What was the main cause of the high failure rate—in general?" And I don't know whether that's referring to equipment or that's referring to the more performative element or something like that, but I'm curious if you have a memory of these things going off well or not or as planned shall we say.

Hodges: Well I don't see how anybody can start any kind of a project without anybody having done the kind of thing they want to do [and] say that they had a particular goal that they were trying to meet. That isn't why you do new things. It's to get new effects I would think.

Q: And that's true. While many of these devices from an engineering context might not have been entirely new technology; certainly they were new in that context of art.

Hodges: No, they depended on the engineering part of it to make it work. It was like half and half; half the physical world and half the technology.

That's an interesting point though. When you think about it, is if they make a painting and part of it's electronic? Does the technician that built the thing get credit for the painting?

[Laughter]

Q: Right, that's true. Because in this case, author credit went to the artist.

Hodges: Yes, I'm sure, as far as I know. I've never heard anything different.

Q: [Laughs] It's interesting that process of collaboration, especially here what you're talking about, this engineering component playing this very significant part in it. And so I'm curious, going more into that engineer's perspective, what was it like working with other engineers on 9

Evenings? Because there was a contingent of engineers on that one, at least one per project plus other folks coming in and vetting equipment and so forth.

Hodges: If there was, I wasn't aware of it.

Q: So again here you were working more in isolation like you were with *Oracle*, working in your shop, that sort of a thing.

Hodges: Sure. Well the whole lab is set up—or at least our department was set up—that way. I don't know that there was ever a group of technicians that worked a job.

Q: At Bell?

Hodges: Yes. But on the other hand, they had little shops all through the plant and there'd be a print shop and a wiring shop and if you want crystals or something you'd have a whole crystal shop that made stuff for you. I can't recall all of the different kinds of little departments that had to do with a particular thing rather than doing actual experiments with somebody. And that's the reason that I made that comment before: that you could have built a battleship if you wanted to, the machinery and the knowledge and all the rest of it was there. But I don't think any one person ever did all there was to do on that particular thing they had the project for.

Q: Right. And so my understanding is for 9 Evenings that Billy Klüber got Bell Laboratories to officially get involved.

Hodges: [Laughs] Yes, that was quite a— I think he shamed them into it.

Q: How?

Hodges: Well [laughs] you better ask Billy about that.

Q: But from your perspective, was that— This doesn't seem like this would be the typical R&D [research and development] venture for Bell Labs, working with New York artists. [Laughs]

Hodges: Oh no, it wasn't except there was a lot more desire, I'd guess you call it, to get involved with community efforts about things as the years went on. They get into all kinds of situations now and they support all kinds of things. All of the main corporations that is.

Q: Sure, so this was sort of like a community engagement or a civic—

Hodges: Yes, it's something other than what they do every day, a little something extra.

Q: Right, but do you have any sense of how? [Laughs]

Hodges: How it came about? No. I'm sure it was personality though.

Q: Because in all the other instances that you've discussed, you were working entirely on your own time.

Hodges: Well, partly. But there's also overlap there too. I could do something quicker or more efficiently with tools and stuff that were at the lab that I couldn't do at home.

Q: And that was allowed or acceptable for you to use company materials for a—

Hodges: The way the lab was set up when I was there was that the guys that were the technicians were pretty much on their own and there was nobody going around checking to see if you were working or what you were doing. We were more or less just responsible for the guy we were working for and he was looking out for things he wanted to do. So it was not like a regular job, not like working by the hour or having to put out a certain amount of material. It was much I guess like what you're doing. Nobody's looking over your shoulder saying, "Hey, you've only got twenty-five minutes more to go." You're using your own judgment as to what you're gathering and what you're not and so forth.

Q: Yes, that's an interesting parallel actually.

Hodges: And it has to be that way because you can't get things done if somebody's watching over your shoulder trying to push you all the time. And on the other hand that leaves you with a place where you can do other things [that] are not strictly business-wise the correct way to work.

Q: Right, right. And so then during these years that we're talking about—so I guess we're talking here '62 to '66—what were your main duties then at Bell?

Hodges: Just to do whatever needed doing.

Q: Because I know Billy Klüver was in lasers.

Hodges: Yes, sure. Let's see, I don't think it was for him that I built about a five-foot long laser out of a piece of glass sewer pipe. When we got it all built we took it out to the airport there in Hadley, I think it was called? Hadley Airport [South Plainfield, New Jersey]—and we tried to use it to disperse the fog.

Q: The laser.

Hodges: Yes. They had some theory that if they hit it at the right frequency they could make the stuff coalesce, much like when you use alum [aluminum sulfate] in a swimming pool. But it didn't work. The trouble with the laser is only about three percent of the power that you put into it actually is involved in making the light, or making the laser work, or what you're getting out of it is a better way to put it.

Q: But it never worked with dispersing the fog?

Hodges: No.

Q: See, I'm from near San Francisco so there's—

Hodges: Yes, that'd be very interesting.

Q: —if that ever gets industrialized, there's some money in it.

[Laughter]

Q: So we've talked about 9 Evenings. Beyond that I know of course that Bob Rauschenberg and Robert Whitman and [Frederick D.] Fred Waldhauer and Billy Klüver all get together—among other folks—and launch Experiments in Art and Technology, which then blooms through the later sixties into the early seventies. And so I'm curious then after 9 Evenings whether you had any involvement in Experiments in Arts and Technology or what you thought about this fairly high-minded venture, if you look at the rhetoric about the artist and the engineer for the benefit of society.

Hodges: Hmm—well, things are moving along so quickly in the engineering field that if you were working at it twenty-four hours a day I don't know that you'd really make much of a dent.

Q: In staying up to pace?

Hodges: Yes. It just amazes the hell out of me the way things go and one day everything's one way and bang, something comes up and it shifts over to a whole other way of looking at things. Well, I don't know, it must have been somewhere about in the seventies, all of that shifted out of Bell Labs. They started connecting the engineers directly to the manufacturing. And they did an actual—let's see, what's the word they used?

[INTERRUPTION]

Q: So you were talking about how technology kept shifting and increasingly it took a lot of time to stay at pace with it. And so for you then after 9 Evenings, which is October of '66, there's Experiments in Art and Technology going on, which Billy Klüver of course is quite involved with. And so I'm curious then whether you had further involvement on these sorts of arts projects or whether after that your focus was more at work at Bell Labs.

Hodges: Oh, I was going to mention that. Somewhere along in there is when I retired, a medical discharge from Bell Labs. And right after that, the thing that all went to pot with— Well, they changed their emphasis and now they were all connected to plants that manufacture things. And they put their time into improving their product or new products. But the old way of looking at it was changed. Originally when I was at the labs, the way the money side of things went is that the people at Bell Labs figured out what it was they needed to run their operation and took care of anything that was asked of them. They would submit a budget and then AT&T would actually allocate that bunch of money to Bell Labs. And then it was up to Bell Labs to spend it doing what they were asked to do.

But then I think after that they started tying it to some manufacturing side of things where there was a closer contact, I guess, with the money side of it. And it took on a whole other way of looking at things.

Q: Right. And so this is happening before you leave?

Hodges: No, I left first, I believe, because we were still operating the way I was talking about before up to that point.

Q: And this is roughly speaking the seventies? Or when is this—sixties?

Hodges: I think it was 1970 or '71. I forget now which it was, but somewhere along in there.

Q: There's the significant switch in terms of how business is done and the role of outside companies and how—

Hodges: How they actually handled their money or how they came by it. Because they didn't sell anything. It was just a research laboratory.

Q: So there was this fundamental shift.

Hodges: Yes. I know Jim for a while there had some project going and he retired. And then they hired him back as a consultant, but he was doing exactly the same thing he was doing when he worked there, for a few years anyhow.

Q: And so then for you, you left Bell Labs then in the late sixties.

Hodges: Yes.

Q: In that context then, did you have further contact with the art world or Rauschenberg, working on projects in this vein?

Hodges: No.

Q: Because I know for example that at least now you still have occasional contact with Julie Martin.

Hodges: Yes, she sends me e-mails once in a while. But since I shifted over to the iPhone, I don't play with the computer much anymore. So it's just by chance if I happen to run across one of them because it's not very easy to work the iPhone for your e-mail. There's not quite enough feedback.

Q: Right. And so you work on these projects in the sixties and I'm curious about your impression of them. You have this involvement in the art world for the early sixties, the middle-sixties, and

I'm curious then if this led to a changed perspective on art for you in any way. You mentioned that this all seemed kind of strange, kind of funny or fun. And so I'm curious about that, about your take on art as a result of this project—art and artists as a group, shall we say. What were your conclusions?

[Laughter]

Hodges: Well like I said, I thought it was a lot of fun, but it was obviously people earning their living that way. I don't really know where the art world is today. Did they continue on that same path or is something else now the way of looking at things?

Q: I think a lot of that openness and a lot of that sort of experimental flavor has really persisted. I was just last weekend up at the Storm King gallery up near Bear Mountain, the Storm King Art Center [New Windsor, New York]. And there's an exhibit there right now [of Lynda Benglis] which is polyurethane and bronze and iron and other metals all melted into various shapes and worked into water fountains. So that's one. And then there are others that are extremely different. And so I think some of the trends that you were not only observing but that you were a collaborator on have really actually persisted if anything.

Hodges: Yes, I could see that is possible. When I read back and read stories about art and they're usually into something about stealing them or somebody trying to paint old masters and that sort of thing. But I don't know that people have that same regard for the old artists anymore. It's like I don't see them having a lot of interest in jewels and that kind of thing.

Q: The old artists being?

Hodges: Well [Pablo] Picasso and that whole crew. I don't get the impression—I don't see him advertised at all any place or anything about it.

Q: Rauschenberg?

Hodges: Well anybody—I haven't run across anybody. People refer to them as something they've already done, but I don't know that there's—I guess it's a marketability.

Q: Yes, it always is, I think.

Hodges: Yes, I remember he was doing—what was that? He was using silk and—what the hell was he doing with it?

Q: Well, he did a lot of silkscreening, I know.

Hodges: Yes, he was doing screening on it, but there was something special about it. It doesn't come back to me. But anyhow, I remember him doing that kind of stuff and that was about the last I heard of anything that he was producing. Do you know of anything that he's done lately?

Q: Sure. Well, Rauschenberg, he kept on doing different things into the eighties, into the nineties. He passed away in 2008, but prior to that time he was working on pieces that would be produced, among other things, via inkjet printers, so he was incorporating some contemporary printing technology and that sort of thing. A lot of things—in the early nineties he was welding huge pieces of automobiles together.

[Laughter]

Q: He's known for many things, but very prolific and constantly going in new forms.

Hodges: Oh, interesting.

Q: Yes and so for you then, so you have these years involved in the art world working on these projects. And of course now *Oracle* is still there; it's exhibited from time to time. *Dry Cell*—

Hodges: The radio stations have gone away.

[Laughter]

Q: Well there's still AM.

Hodges: A lot of preaching going on.

Q: Right, exactly. Yes, you'll get a lot—

[Laughter]

Hodges: Get religion.

Q: Yes, there's an irony in that. That's true, I suppose a lot of preaching, a lot of talk shows. And an interesting example, probably in a mode that Rauschenberg would like or approve of, of the art continuing to evolve and to change.

Hodges: Yes, you could do that whole thing now with the Bluetooth, no problem at all. [Laughs] So [take] something like the movies with [Walt] Disney and there's—what's the one big one he did?

Q: A Disney film?

Hodges: Yes. I remember the reel had to have a special setup in the movie houses to run them.

Q: Oh, that's interesting. No, I don't know which one that would be. What's the plot?

Hodges: I don't know it had a plot. It was a bunch of disconnected things.

Q: Like *Fantasia* [1940] or something?

Hodges: *Fantasia*, that's the one I was thinking of, yes. They were talking in one of the books I was reading about how tough it was and all the panels they had to draw in order to have the movie go on. And then the computer came; you could run the thing off in a few hours.

[Laughter]

Hodges: It just boggles the mind all the time that they put in on those things. Actually I understand there's a pretty good market for the individual—I don't know what they call them, but whatever the stuff that they— Those panels. You had to have a million of them in order to make an hour's worth of playing or something.

Q: Right, these things come around and have strange lives. And it's interesting that you pointed out that the sort of thing that you were doing with him now could perhaps be recreated with the Bluetooth system.

Hodges: Oh sure, no problem.

[Laughter]

Q: And so it's interesting, it makes me wonder what the frontier of these sorts of collaborations, where that frontier sits now. Because at the time when you were working on it, it might not have been the edge for engineering to be working on things like this, but it certainly was the edge—

Hodges: For the artist's part of it, yes.

Q: Based on the amount that you had to maybe explain these things, yes. [Laughs]

Hodges: Interesting.

Q: So we've gone ninety minutes. And before we close out, is there anything else that you'd like to say about Bob Rauschenberg or working on these projects?

Hodges: No, but it was certainly interesting to see Bob in his nunnery and find out what a really nice guy he is and so forth. He's about the first artist I ever knew.

Q: And so that was your experience of him, that he was warm in that regard?

Hodges: Yes, you bet.

Q: Well, that's great. And so thinking about that disposition, did that prove to be the rule for the artists? Because you were also working with Warhol and with Fahlström and with—

Hodges: It was like all the rest of them were off in the ether someplace, whereas Bob was like a regular guy. [Laughs] You could talk to him about anything and he would come back and join the conversation, no problem. Just a good guy all around.

Q: And that in itself is significant in that work. So great, on my end, I'd like to thank you for your time—

Hodges: Well you're welcome.

Q: —and for these remarkable pieces which you've contributed to. I've been spending all this time researching them and it's been very interesting.

[Laughter]

Hodges: One of those things that just happened, I guess, is how it works.

Q: Right place and the right time and right skills.

Hodges: Yes.

Q: Perfect. And with that, we'll close off this record.

Hodges: Okay.

[END OF INTERVIEW]