

Transcripts from troubleshooting think-aloud interview

Dimitri Dounas-Frazer | UMD PERG Seminar | 18-Feb-2015

Length of clip: **4:35**

Clip interval: About half-way (clip starts at 14:36, activity ends at 32:39)

Speakers: Two student participants (S1 and S2) and one interviewer (I)

Context:

Leading up to this clip, the students oriented themselves to the circuit by comparing the circuit to the schematic and the datasheet. While the circuit was disconnected from the power supply, function generator, and oscilloscope, the students verified that the connections on the circuit were correct. They also measured resistor values, identifying and replacing a resistor that had an incorrect value. After this process, they connected the circuit to the power supply, function generator, and oscilloscope. The clip starts as they discuss what settings to use on the function generator. In the context of S1's first comment, "no output" means that the function generator is on but outputting zero signal.

In this episode, the students measure the output of the circuit for the first time and observe a discrepancy. By the end of the clip, the students have decided to move on to a new iteration of their troubleshooting process.

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- 1 S1: Yeah, yeah. But I mean I was just going to say we should look at it with no
2 output to make sure we aren't getting anything.
- 3 S2: Anything weird?
- 4 S1: So what's two? Two is Vout. And--
- 5 S2: Is it?
- 6 S1: Yeah, so this is going to channel 2, our supposed Vout. And right now, we're
7 getting, um, negative something.
- 8 S2: That's interesting. That's very interesting.
- 9 S1: I mean, did we even check if these are the right chips? That'd be kind of stupid.
- 10 S2: It would probably be a good call [chuckles].
- 11 S1: Okay, I guess we do have-- can we just, like, pull a chip out and replace it? So--
- 12 S2: Yeah, I mean that'd be, like, the brute force method to making sure it's the right
13 chip. Pull it out and put the right one in.
- 14 S1: What we could do is get out a probe and we can just go through the first one
15 and measure Vout, and we could see if that's what we expect it to be.
- 16 S2: Yeah, for sure. And then we'll measure all the power--
- 17 S1: Yeah.
- 18 S2: --too, and make sure it's doing what it should be doing.

19 [silence]
20 I: Can you guys talk out loud?
21 S2: Sure. Uh, so I was just spacing out there for a little bit [chuckles].
22 S1: But right now, we're going to go through the circuit piece by piece to see if we
23 can't figure out what is not working.
24 S2: Yes. First, should we just check the power to the chips?
25 S1: Yeah, I guess we could.
26 S2: That would be a good place to start.
27 S1: Here, I can cut one of these wires a little bit, so we have it to look around.
28 S2: So we can look around it? Yeah, for sure. Turn off channel one and two for now,
29 and we'll just look at channel three for the probe.
30 I: You can make that message go away if you hit 'menu.'
31 S2: I don't know why that just popped up. All right. So I'll check the positive
32 voltage on pin 7 of the first op-amp, which should be 15. Crank the scale up a
33 little bit, so you can see it better. And that looks pretty much spot on. Fifteen.
34 S1: Fifteen.
35 S2: Now, we'll check the negative voltage on pin 4. And we have negative 15.
36 S1: Okay.
37 S2: Good sign. We'll check the negative voltage on pin 4 of the second op-amp.
38 Negative 15 there as well. And positive voltage on pin 7 of the second op-amp.
39 We have positive 15. So it looks good. I guess we can check the ground
40 connections. I don't know why they wouldn't be--
41 S1: Looks to be zero.
42 S2: --grounded, but-- pretty solid. But then when we check Vout--
43 S1: We're at that negative--
44 S2: --of the circuit we get negative, a little less than 15. Which is a bummer.
45 S1: Okay, so--
46 S2: We'll check Vin as well for the circuit and that's zero, so Vout should definitely
47 be zero at this point.
48 S1: So let's check Vout, just of the first guy.
49 S2: Of the first one, gotcha. So pin six here. That seems okay, that's at zero. If you
50 want, we can put a waveform in and see if the first stage works as it should.
51 S1: Yeah, I guess we could do that really quickly, just turn the output on.
52 S2: Yeah, try maybe a 1 kilohertz sine wave and see.

End of clip