UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICRO MOTION, INC.,

Petitioner,

-vs-

Case Nos. IPR2014-00167
IPR2014-00170
IPR2014-00178
IPR2014-00179

INVENSYS SYSTEMS, INC.,

Patent Owner.

Video Examination of MICHAEL D. SIDMAN, Ph.D., taken at the instance of the Patent Owner, under and pursuant to 35 USC 316(a)(5)(A) and 37 C.F.R. 42.53(d), before JENNIFER L. SCHMALING, a Registered Merit Reporter, Certified Realtime Reporter, Certified Broadcast Captioner and Notary Public in and for the State of Wisconsin, at Foley & Lardner, 777 East Wisconsin Avenue, Milwaukee, Wisconsin, on August 6, 2014, commencing at 9:16 a.m. and concluding at 5:49 p.m.

A P P E A R A N C E S

FOLEY & LARDNER, by
MR. JEFFREY N. COSTAKOS,
777 East Wisconsin Avenue,
Milwaukee, Wisconsin 53202,
appeared on behalf of the Petitioner.

DLA PIPER LLP, by
MR. EDWARD H. SIKORSKI,
401 B Street, Suite 1700,
San Diego, California 92101-4297,
appeared on behalf of the Patent Owner.

DLA PIPER LLP, by
MR. JEFFREY L. JOHNSON,
1000 Louisiana, Suite 2800,
Houston, Texas 77002,
appeared on behalf of the Patent Owner.

DLA PIPER LLP, by
MR. JAMES M. HEINTZ,
11911 Freedom Drive, Suite 300,
Reston, Virginia 20190-5602,
appeared on behalf of the Patent Owner.

A L S O P R E S E N T

Mr. John Spohnholtz, CLVS, Videographer.

* * * * *

I N D E X

* * * * *

I N D E X

* * * * *

Disposition Of Original Exhibits:
Returned To DLA Piper LLP.

* * * * *

TRANSCRIPT OF PROCEEDINGS

(Exhibit Nos. 2014 and 2015 were marked.)

09:16:50 THE VIDEOGRAPHER: We are officially on the record at 9:16 a.m. Today's date is August 6th, 2014. This is Disk No. 1 in the deposition of Dr. Michael Sidman.

This deposition is being taken in the matter Micro Motion, Incorporated, Petitioner, versus Patent Owner Invensys Systems, Incorporated. This matter is pending before the Patent Trial and Appeal Board, United States Patent and Trademark Office, Case Nos. IPR2014-169, 2014-170, 2014-178 and 2014-179.

This deposition is being taken at the offices of Foley & Lardner located at 777 East Wisconsin Avenue, Milwaukee, Wisconsin. My name is John Spohnholtz, videographer for U.S. Legal, and the court reporter is Jennifer Schmaling. Will counsel please state their appearances and whom they represent, beginning with petitioner's counsel, and then the reporter will swear in the witness.

MR. COSTAKOS: Jeff Costakos, Foley & Lardner, for Micro Motion and for the witness.

MR. SIKORSKI: Edward Sikorski of DLA

Piper on behalf of Invensys Systems, Inc., the patent owner.

MR. HEINTZ: James Heinz, also from DLA Piper, also on behalf of Invensys Systems, Inc., the patent owner.

MR. JOHNSON: Jeffrey Johnson from DLA Piper, also on behalf of Invensys Systems, Inc.

MICHAEL D. SIDMAN, Ph.D., called as a witness herein, having been first duly sworn on oath, was examined and testified as follows:

EXAMINATION

BY MR. SIKORSKI:

Q Good morning, Dr. Sidman.

A Good morning.

Q I've marked for the record, just for formality sake, the first two exhibits, Deposition Exhibits 2014 and 2015. They're the Notice of Deposition in two of the four IPRs. You can glance at them.

MR. COSTAKOS: Do you have copies for me?

MR. SIKORSKI: I do.

MR. COSTAKOS: Great. Not that I really need those particular ones, but --

MR. SIKORSKI: You asked for them, you get them. There you go.

MR. COSTAKOS: Okay. Just so I have them

09:19:05 correctly, which one is which now? 2014 is '178.
09:19:10 Okay. Got it.
09:19:13 BY MR. SIKORSKI:
09:19:14 Q For the record, these Notices and Notices for the
09:19:16 other two IPRs were already in the public PTO
09:19:18 record, so we'll dispense with entering the other
09:19:20 two Notices. Dr. Sidman, I noticed that counsel as
09:19:24 we were preparing for the deposition dropped a
09:19:26 couple of documents in front of you. Do you mind
09:19:27 telling me what those documents are?
09:19:32 A One page consists of a list of claimed
09:19:38 constructions that the --
09:19:41 Q Mind if I look at that?
09:19:43 A Sure.
09:19:43 MR. COSTAKOS: I have one if you want for
09:19:45 your own copy.
09:19:47 THE WITNESS: Set forth by the Patent
09:19:51 Office in their rulings, orders on these four IPRs.
09:19:54 BY MR. SIKORSKI:
09:19:54 Q So this sheet, I assume, and, counsel, you're free
09:19:57 to answer if you want, they're a summary of claim
09:20:01 constructions from the various PTO orders?
09:20:04 MR. COSTAKOS: Yeah. That's what it's
09:20:05 meant to be.
09:20:06 MR. SIKORSKI: We'll mark that as 2016,

please.

(Exhibit No. 2016 was marked.)

BY MR. SIKORSKI:

Q There's another document in front of you that counsel gave you?

A And that's a document that consists of four pages, one page per IPR, that lists by the -- each IPR order what grounds were accepted by the Patent Board for the purpose of these IPRs and give us page numbers and paragraphs.

Q I believe you said that your copy is four pages. The copy that counsel handed me is five.

A Okay. And the fifth page, right, is just a -- an outline of the background sections of my IPRs.

Q Sort of table of contents or index, so to speak?

A Correct, of the introductory of background sections that were common to each of the four IPRs that we're discussing today.

Q And just so I'm clear, the four IPRs received four separate Declarations from you, right?

A One for each, correct.

Q And this fifth page is simply identifying the portions of those Declarations that are common among -- among them?

A Right.

09:22:02 MR. COSTAKOS: Object to the form.
09:22:05 THE WITNESS: That pertain to the -- as it says, "The introduction or background sections."
09:22:11 MR. SIKORSKI: Okay. Why don't we mark your copy of this as Exhibit 2017, if you don't mind.
09:22:24 (Exhibit No. 2017 was marked.)
09:22:30 BY MR. SIKORSKI:
09:22:31 Q Dr. Sidman, you have a website, right?
09:22:35 A I have sidman.com, yes.
09:22:37 Q That's a website dedicated to your engineering consulting practice?
09:22:41
09:22:42 A That's a fair statement. Yes.
09:22:44 Q On that website, you list -- excuse me -- you dedicate a page to expert services for the legal profession. Do you recall that?
09:22:48
09:22:50
09:22:52 A I -- I recall it. I haven't looked at it recently, but yes.
09:22:55
09:22:56 Q And it indicates that you are an expert for hire or for various legal topics such as expert reports, deposition, trial, et cetera. Do you recall that?
09:23:01
09:23:05
09:23:08 A Generally, I recall that.
09:23:10 Q So you --
09:23:11 A It's not a complete statement, but yes.
09:23:13 Q You've been deposed how many times?

09:23:20 A I can't give you an accurate answer to that, but I
09:23:23 would say more than a dozen times over a 25-year
09:23:29 period.
09:23:30 Q Do you recall when your first deposition was, give
09:23:33 or take?
09:23:34 A I honestly don't.
09:23:36 Q So several years ago?
09:23:39 A It was, I'm sure, decades ago.
09:23:45 Q Have you testified at trial?
09:23:46 A I have.
09:23:47 Q How many times?
09:23:52 A I've testified as an expert five times over the
09:24:02 past 25 years, approximately.
09:24:08 Q Now, you indicated that you testified as an expert.
09:24:11 Were those all patent cases?
09:24:13 A No.
09:24:14 Q Which were -- Can you just break them up, which
09:24:17 were patents, which were something else?
09:24:20 A Well, I have to think offhand. But I mean,
09:24:25 generally, it's -- the cases I'm involved in relate
09:24:33 to patent disputes of patent infringement,
09:24:40 sometimes trade secret disputes or breach of
09:24:45 contract. I can't -- I'd have to think about how
09:24:54 to answer your question specifically for the cases
09:24:57 that I testified at trial at, but that's -- maybe

that suits your purpose.
Q That's fine. If I need more detail, I'll revisit it. Thank you. You understand that the parties in this case include not only Emerson Electric but also Micro Motion, Inc.?
A Yes.
Q Are you familiar with those two companies' names?
A Yes.
MR. COSTAKOS: Objection to form.
BY MR. SIKORSKI:
Q Have you prior to this case, and I'll put an umbrella over this case, as to the current dispute, the patent dispute between the parties, did you do any previous work for Emerson Electric?
MR. COSTAKOS: Objection to form.
THE WITNESS: I don't recall doing any previous work for Emerson Electric.
BY MR. SIKORSKI:
Q How about for Micro Motion?
A Yes, I have done some work for them. I taught a technical course, MATLAB and SIMULINK training, more than 16 years ago to their design engineers in Boulder. It's a course that I teach, a course that I teach to industry, generally, to design engineers and scientists.

09:26:16 Q How is it that you recall giving this program to
09:26:23 Micro Motion some 16 years ago?
09:26:25 A Well --
09:26:26 MR. COSTAKOS: Objection to form.
09:26:28 THE WITNESS: -- they're obviously a
09:26:30 party to this case, and I recall having taught that
09:26:34 course and having developed specific examples for
09:26:43 the course based on Coriolis flowmeter technology.
09:26:52 BY MR. SIKORSKI:
09:26:52 Q Were there any students in the course that you
09:26:54 recall from that time that are involved in the
09:26:57 current dispute?
09:27:00 A I'm not sure how to answer that question. I mean,
09:27:07 if you were to name names, maybe I could recall.
09:27:10 Q I'm wondering, do you recall whether there were any
09:27:13 Micro Motion employees or other people affiliated
09:27:17 with Micro Motion that you taught 16 years ago that
09:27:20 you are now seeing either in person or by name in
09:27:23 the present dispute?
09:27:24 MR. COSTAKOS: Objection to form.
09:27:31 THE WITNESS: I haven't -- First of all,
09:27:33 I haven't seen any Micro Motion employees by name
09:27:40 with respect to the current dispute. However, I do
09:27:46 recognize at least one name as being an inventor of
09:27:55 a prior art patent that's associated with this

09:28:03 case.
09:28:03 BY MR. SIKORSKI:
09:28:04 Q I'm sure you know what my next question is. Who is
09:28:06 that?
09:28:07 A I believe his name was Rick Maginnis attended my
09:28:13 course 16 years ago. I think it was in March of
09:28:20 '98, a three-day course at Micro Motion.
09:28:28 Q That's quite the recollection. You indicated that
09:28:32 the course that you taught 16 years ago, again,
09:28:35 correct me if I misunderstood, in your preparation
09:28:39 for that course, you created some sort of examples
09:28:44 using Coriolis flowmeters; is that right?
09:28:47 A Yes. I generally customize my MATLAB and SIMULINK
09:28:54 laboratory training courses for each set of
09:28:58 clients, so I did that for these -- this group of
09:29:05 engineers. It makes things more relevant for them,
09:29:12 and then they can hit the ground running using
09:29:15 MATLAB and SIMULINK.
09:29:16 Q Is there a particular model number or commercial
09:29:20 identifier associated with the Coriolis flowmeter
09:29:23 that you looked at 16 years ago?
09:29:25 A I don't remember anything specific like that. The
09:29:29 technology -- The examples that I remember offhand
09:29:34 developing for them related not to any specific
09:29:43 product but to a couple of technologies involved in

09:29:49 Coriolis flowmeters. For example, the resonant
09:29:56 dynamics of two driven vibratory tubes created --
09:30:06 created a SIMULINK model that not only modeled the
09:30:12 mechanical dynamics and the -- and how they operate
09:30:16 as being driven by a frequency or source that could
09:30:21 excite more than one flexible mode. And also, I
09:30:29 recall an example that demonstrates the operation
09:30:37 of synchronous demodulators. There may be other
09:30:45 things, but that's what I can recall offhand.
09:30:50 Q I'm sure you're aware that for some of these
09:30:56 IPRs -- I'm sorry. Do you need to take a break?
09:30:59 A I'm just trying to get comfortable, so go ahead.
09:31:03 Don't mind me.
09:31:03 Q That's fine. I'll give you a second. I'll think
09:31:05 about my next question.
09:31:06 A Sure.
09:31:09 Q You understand. You've been deposed enough. If
09:31:11 you need to take a break, just ask me.
09:31:14 A Okay. Thank you.
09:31:20 Q I'm sure you're aware that for some of the IPRs,
09:31:24 you cite to a purportedly commercial device that
09:31:29 I'll just refer to as the Model D flowmeter. Are
09:31:33 you familiar at least with that short reference?
09:31:35 A I -- I referred to a Model D Manual and the slug
09:31:41 flow document associated with that, yes.

09:31:45 Q Right. You've not personally used the Model D or
09:31:49 the slug flow --
09:31:51 A Board.
09:31:52 Q -- edition -- board? Thank you.
09:31:56 A No, I have not. I've reviewed those documents.
09:32:13 Q Prior to the dispute that brings us here today, did
09:32:16 you have any engagements, were you ever hired, I
09:32:19 should say, by the Foley law firm?
09:32:22 A I've never been hired previously by the Foley law
09:32:26 firm.
09:32:28 Q The Declarations that were submitted under your
09:32:35 signature in these IPRs no doubt took some time.
09:32:39 I'm wondering, what proportion of your work
09:32:41 nowadays is experting as opposed to other
09:32:45 engagements?
09:32:46 MR. COSTAKOS: Objection to form.
09:32:53 THE WITNESS: Well, it depends on your
09:32:55 time frame. Over the -- Since 1992, I've been an
09:33:02 independent engineering consultant. Most of my
09:33:07 business over all that period relates to technical
09:33:13 consulting, so that's teaching my courses. And
09:33:23 there's two basic sets of those courses which
09:33:25 include MATLAB/SIMULINK/Toolbox training courses,
09:33:31 also Digital Servo Design classes, courses.
09:33:38 That's -- Generally, that's also a three-day course

09:33:42 developing simulations of mechatronic systems which include mechanical dynamics, electronic dynamics, control system, digital control system, sensor and actuated dynamics, nonlinearities, signal processing, whether it be analog or digital.

And then I think the third broad classification of my work as a technical consultant relates to what I would call fire fighting, helping companies resolve technical problems often resulting from technical differences between engineers who have different perspectives on the design of mechanical systems, so electrical engineers versus mechanical engineers. The goal is to make the product work, and -- and there are compromises involved.

BY MR. SIKORSKI:

Q Thank you.

THE VIDEOGRAPHER: I'm sorry. Counsel, we need to go off for just a second.

MR. SIKORSKI: Hold your thought.

THE VIDEOGRAPHER: We are off -- If he's done. I'm sorry.

MR. COSTAKOS: Well, he wasn't done, I don't think.

MR. SIKORSKI: Let's go off the record.

09:35:08 THE VIDEOGRAPHER: Yeah. We're off the record at 9:35 a.m.
09:37:06 (Discussion off the record.)
09:37:07 THE VIDEOGRAPHER: We are back on the record at 9:37 a.m.
09:37:10 THE WITNESS: I didn't finish answering your question --
09:37:12 BY MR. SIKORSKI:
09:37:12 Q You can answer. Thank you.
09:37:13 A -- because of the interruption. Over the past years, especially since the recession, more and more of my business has been associated with legal consulting as an expert witness. And I would say over the past several years, it's been mostly that.
09:37:35 Q Mostly or exclusively?
09:37:42 A I would say mostly.
09:37:51 Q In 2014, have you had any request for experting engagements other than for the legal service profession?
09:38:01 A I've had requests, yes.
09:38:02 Q Did you accept them or deny them?
09:38:05 A Most -- Most of them I deny --
09:38:09 Q Okay.
09:38:10 A -- for reasons other than -- other than whether they are technical or not.

09:38:19 Q When did you first get hired to work on these IPRs?
09:38:25 And the IPRs are the four that we're here to
09:38:27 discuss today.
09:38:28 MR. COSTAKOS: Objection to form, but go
09:38:29 ahead.
09:38:29 THE WITNESS: You asked when was I hired?
09:38:32 BY MR. SIKORSKI:
09:38:32 Q Yes.
09:38:32 A About a year ago. I'm going to guess about mid
09:38:38 August of 2013.
09:38:41 Q And since that time, how many hours have you put in
09:38:44 to these four IPRs?
09:38:47 MR. COSTAKOS: Objection to form.
09:38:53 THE WITNESS: I can't give you a number,
09:38:55 an accurate number, offhand, but I would guess more
09:39:00 than 300 hours.
09:39:05 BY MR. SIKORSKI:
09:39:05 Q And each of those hours were billed at your current
09:39:07 rate of $450; is that right?
09:39:09 A Yes.
09:39:10 Q Is there any other compensation that you've either
09:39:13 received or expect to receive from these four IPRs?
09:39:16 A None. I expect to receive nothing.
09:39:21 Q Other than hourly --
09:39:22 A Other than my hourly rate.

09:39:23 Q Understood. Thank you. Who at the Foley law firm
09:39:31 have you been working with on these four IPRs?
09:39:35 A Mr. Jeff Costakos, Ms. Angela Murch and Mr. Rick
09:39:47 Florsheim.
09:39:51 Q Anyone else?
09:39:55 A There might have been a paralegal, but those are
09:39:58 the only attorneys that I can recall.
09:40:03 Q How about at Emerson or Micro Motion? Are you
09:40:06 working or interacting with anyone there on these
09:40:08 IPRs?
09:40:09 A No.
09:40:14 Q You're aware that there's a litigation between
09:40:18 Invensys and Emerson and Micro Motion?
09:40:21 A Yes. That's what I presume this case is.
09:40:38 Q Other than working on these four IPRs, have you
09:40:41 done any projects for the Invensys versus Emerson
09:40:45 and Micro Motion litigation?
09:40:47 MR. COSTAKOS: Objection to form.
09:40:52 THE WITNESS: Well, I don't know what you
09:40:53 mean by "project." But I have, as I'm sure you're
09:40:58 aware, filed Declarations on three other IPRs that
09:41:02 I understand are not at issue today.
09:41:06 BY MR. SIKORSKI:
09:41:06 Q Right. For today we can put those to the side
09:41:10 unless some specific question addresses them.

09:41:12 Thank you. If you want me to give you a
09:41:20 Declaration, I'm glad to. And eventually, we will
09:41:22 today. But, for example, one of your Declarations
09:41:25 incorporates by reference something that was
09:41:26 submitted to the court or at least exchanged
09:41:29 between the parties in the patent litigation. And
09:41:31 I'm wondering -- Based on that and other
09:41:34 information that I see in your Declarations, I'm
09:41:36 wondering if you have any involvement in the
09:41:38 litigation as opposed to these IPRs?
09:41:41 MR. COSTAKOS: Objection to form.
09:41:43 Foundation.
09:41:51 THE WITNESS: I think -- I would say the
09:41:53 answer to that is "yes" in the form of the --
09:41:58 helping draft the invalidity contentions for these
09:42:04 seven patents at issue.
09:42:06 BY MR. SIKORSKI:
09:42:06 Q In other words, you helped to prepare the
09:42:08 invalidity contentions that were used by Emerson or
09:42:15 Micro Motion in the litigation?
09:42:17 A Right. They were filed by Foley & Lardner.
09:42:24 Q Have you had any involvement in the noninfringement
09:42:27 or infringement part of the patent litigation?
09:42:34 MR. COSTAKOS: You can answer "yes" or
09:42:35 "no" or "I don't know."

09:42:39 THE WITNESS: I would say the answer to
09:42:40 that is "yes."
09:42:43 BY MR. SIKORSKI:
09:42:43 Q And what has that involvement been to date?
09:42:48 MR. COSTAKOS: I think the -- the way
09:42:50 that question is phrased is privileged, so I'm not
09:42:53 going to allow him to answer that question.
09:43:00 MR. SIKORSKI: All right. If you're
09:43:01 going to stay on that privilege objection for that
09:43:03 line of questioning or topic, I'll move to
09:43:06 something else.
09:43:06 MR. COSTAKOS: The way you asked it, I
09:43:07 think, calls for privileged and work product
09:43:09 information, so --
09:43:11 MR. SIKORSKI: Work product makes a lot
09:43:12 more sense than privilege, but that's all right.
09:43:16 BY MR. SIKORSKI:
09:43:17 Q Okay. And based on your representation, counsel,
09:43:19 I'll not discuss that. I've asked you who at the
09:43:30 Foley law firm you've worked with on these IPRs,
09:43:34 and you kindly answered. Then I asked whether
09:43:36 you've had any contact with employees of Emerson or
09:43:41 Micro Motion, and you answered that as well. My
09:43:44 next question is, have you worked with any other
09:43:48 experts hired by either Foley, Emerson or Micro

09:43:53 Motion in this case?
09:43:55 A The answer is "no."
09:43:56 Q I'm sorry?
09:43:57 A No. I'll try to speak up.
09:44:04 Q My apologies. I just happened to not catch your
09:44:07 word. You're otherwise speaking fine. Thank you.
09:44:35 Dr. Sidman, the website for your Sidman Engineering
09:44:38 Company I referenced earlier also has a page
09:44:40 dedicated to design projects. You, I assume,
09:44:45 recall that?
09:44:45 A Yes, generally. I haven't looked at it recently
09:44:50 but generally, yes.
09:44:50 Q And on that web page, there's a bullet point that
09:44:56 refers to dynamic simulation and animation of
09:45:00 vibrating Coriolis flowmeter. I'm wondering, other
09:45:04 than the description you gave earlier with respect
09:45:09 to your class 16 years ago, have you done any other
09:45:13 analysis of Coriolis flowmeters other than,
09:45:17 obviously, the topic that brings us here today?
09:45:21 A The -- Okay. So that bullet on that -- on that
09:45:27 list of representative design products relates
09:45:29 specifically and only to the examples that I
09:45:34 developed for that class and nothing else.
09:45:39 Q So is it fair to say that between the date of that
09:45:42 class 16 years ago and, give or take, August of

09:45:46 2013, you did no work on Coriolis flowmeters?
09:45:51 A As --
09:45:51 MR. COSTAKOS: Objection to form.
09:45:54 THE WITNESS: As opposed to mechatronic
09:45:58 systems in general?
09:46:00 BY MR. SIKORSKI:
09:46:00 Q Devices that are not Coriolis flowmeters?
09:46:08 A I think that's a fair statement.
09:46:09 Q And just because we've had an interaction, what's a
09:46:12 fair statement?
09:46:13 MR. COSTAKOS: Objection to form.
09:46:14 BY MR. SIKORSKI:
09:46:14 Q You're saying it's fair to say that you've had --
09:46:16 A Yeah. Really, my business relates to mechatronic
09:46:21 systems which is the intersection of mechanics or
09:46:25 mechanical engineering, electrical engineering,
09:46:29 control systems. Some people include software in
09:46:36 with that. And to the -- and that's really my
09:46:40 bread and butter, so that's -- Coriolis flowmeters
09:46:50 are well within that realm, so -- but to the extent
09:46:57 that I think -- to answer your question
09:47:01 specifically only to that extent and not beyond
09:47:04 that.
09:47:20 If you look at my website, it also
09:47:21 mentions motor motion control and servo systems, so

09:47:28 that's a set of technologies involved with
09:47:31 mechatronics, and I'm involved with that also.
09:47:37 And, again, Coriolis flowmeters fit within those
09:47:44 general descriptions.
09:48:58 (Exhibit Nos. 2018 and 2019 were marked.)
09:49:13 MR. SIKORSKI: Did I give you a copy of
09:49:14 the second one?
09:49:15 MR. COSTAKOS: No.
09:49:20 BY MR. SIKORSKI:
09:49:21 Q Dr. Sidman, I've handed you copies of Exhibits 2018
09:49:26 and 2019; is that right?
09:49:30 A That's correct.
09:49:30 Q Okay. And for the record, 2018 is also in the PTO
09:49:36 record as Micro Motion Exhibit 1002. It is a
09:49:41 Declaration of Dr. Michael D. Sidman with respect
09:49:45 to the 179. Let me grab this. There's too many
09:50:04 numbers going on. Let me start again. So Exhibit
09:50:10 2018 is the same as Micro Motion Exhibit 1002 which
09:50:15 is part of the record for IPR 179 that relates to
09:50:25 patent 7,124,646.
09:50:37 And Exhibit 2019 is already in the record
09:50:40 as Micro Motion 1002 in IPR 178 which corresponds
09:50:50 to Patent No. 7,136,761. Thanks, Dr. Sidman. Flip
09:51:27 through them 'til you're comfortable, but these are
09:51:30 Declarations prepared by you, correct?

09:51:33 A It appears that -- I haven't looked at each page,
09:51:36 but they appear to be complete versions of my
09:51:39 Declarations for the '646 and '761 --
Q And each of the --
09:51:46 A -- patent IPRs respectively.
09:51:47 Q I'm sorry. And each one of them bears your
09:51:51 signature. Yes?
09:51:59 A Yes. It's on the last page of each of those two
09:52:04 documents.
09:52:09 Q Did any of the attorneys from Foley, other than
09:52:13 those mentioned by you earlier today, help you in
09:52:16 preparing this or these Declarations, I should say?
09:52:22 A I think that would be a fair statement, that it was
09:52:26 a collaborative effort, yes.
09:52:36 Q In either of these Declarations, if you could flip,
09:52:41 please, to paragraph 34.
09:52:54 MR. COSTAKOS: I'm sorry. Paragraph 34?
09:52:56 MR. SIKORSKI: Yes.
09:52:56 MR. COSTAKOS: Okay.
09:53:01 MR. SIKORSKI: I believe the paragraphs
09:53:03 are the same between these two Declarations.
09:53:06 MR. COSTAKOS: Yeah. I was just looking
09:53:07 at the page as opposed to the paragraph. Okay.
09:53:15 BY MR. SIKORSKI:
09:53:15 Q Are you there?

09:53:16 A Yep.
09:53:16 Q So paragraph 34 cites to a reference book at the
09:53:20 end?
09:53:26 A I'm just going to refer to one of the documents,
09:53:30 not to both of them, since they should be the same
09:53:44 in that regard.
09:53:58 Q You see that it cites to a -- some sort of
09:54:02 publication in 1990 from Micro Motion, Inc.?
09:54:06 A Right. I don't think it's a textbook, but it's --
09:54:10 It is a Micro Motion 1990 publication entitled "How
09:54:15 the Micro Motion Mass Flow and Density Sensor
09:54:21 Works."
09:54:21 Q And, in fact, your Declaration has a bunch of
09:54:24 references. For example, if you flip to paragraph
09:54:28 50 on page 19 --
09:54:38 A Yes. I see that.
09:54:39 Q -- you see there's a reference to some sort of 1968
09:54:43 publication?
09:54:44 A That's a textbook, university textbook, that was
09:54:53 used in a control systems course, "Introduction to
09:54:56 Continuous and Digital Control Systems" by Saucedo
09:55:00 and Schering, 19 -- 1968.
09:55:03 Q On paragraph 52, the next page, there's a reference
09:55:06 to yet another citation?
09:55:10 A Right. That's Canfield's book, "Electromechanical

Control Systems and Devices," 1965, reprinted in 1977. That's also a textbook or reference book.

Q And that next page, page 21, there's a dictionary in paragraph 54?

A Yes. That's also a book on my bookshelf entitled "Dictionary of Mechanical Engineering, Fourth Edition." 1996 is the publication date.

Q Right, and we can flip through this for the next minutes or hours and find a list of citations. My question for you is, are these books off of your bookshelf, or were these books or citations that were fed to you?

MR. COSTAKOS: Objection. Overbroad.

THE WITNESS: So far, all of those books that we've discussed are on my bookshelf.

BY MR. SIKORSKI:

Q Okay.

A And there are others that are also on my bookshelf.

Q Including the Micro Motion document referred to --

MR. COSTAKOS: Objection to form.

BY MR. SIKORSKI:

Q -- in paragraph 34?

A I don't think I characterize that as being a textbook, but I have that document. It's not sitting on my bookshelf. It's someplace in my

office.
Q I guess my question is, did you have all of these references, however you want to characterize them, books, articles, whatever, before this case, or were they supplied to you by the Foley law firm or someone else involved in this case?
MR. COSTAKOS: Objection. Multiple. Overbroad.
THE WITNESS: Of the references we've discussed so far, the only one that was given to me by the Foley law firm is the Micro Motion publication, "How The Micro Motion Density and Mass Sensor Works." All the others are books that I've had on my bookshelf, and there are others as I've mentioned.
BY MR. SIKORSKI:
Q If you could flip to paragraph 99, I'm looking at the Declaration for your '646 patent, but I'm sure the identical paragraph appears in the other.
A Yes, I see that.
Q Read it to yourself, and let me know when you're done.
A I'm done.
Q In this paragraph, you indicate that the control -- Let me start again. To paraphrase this paragraph,

09:58:43 you indicate that processing and control systems
09:58:48 employed in the patents that we're dealing with in
09:58:51 this IPR were, quote, "known and used long prior to
09:58:55 any of the applications leading to those patents
09:58:59 were filed," end quote. You see that?
09:59:02 A Yeah. You left off the words "digital signal" in
09:59:09 your question.
09:59:09 Q Yeah.
09:59:10 A And so I would say digital signal processing and
09:59:13 control systems versus processing and control
09:59:15 systems.
09:59:16 Q When you refer to "known" and "used," I just want
09:59:19 to make sure that I'm not misunderstanding the
09:59:23 opinions that you express in this Declaration.
09:59:25 You're not -- Because earlier you testified that
09:59:29 you've not used any Coriolis flowmeters, I want to
09:59:34 make sure you're not relying on any actual devices
09:59:38 that were allegedly used long prior to the patent
09:59:42 applications in this case. I'm focusing on the
09:59:46 language that you decided to use in this paragraph.
09:59:49 MR. COSTAKOS: Objection to form.
09:59:52 THE WITNESS: I'm not sure I understand
09:59:54 your question.
09:59:54 BY MR. SIKORSKI:
09:59:54 Q Sure. I'll ask it again. The opinions you express

09:59:57 in these two Declarations are based on published
10:00:01 articles, textbooks, something in paper form,
10:00:05 correct?
10:00:06 MR. COSTAKOS: Objection. Form.
10:00:09 THE WITNESS: What I documented in here,
10:00:12 yes. Obviously, I have working experience in those
10:00:18 areas.
10:00:21 BY MR. SIKORSKI:
10:00:22 Q But --
10:00:22 A You know, where I have a specific reference or
10:00:27 basis, I tried to put that into these Declarations.
10:00:32 Q Understood. But the prior art, the pieces of prior
10:00:35 art that you rely on, are simply published
10:00:39 articles, et cetera, things that are on paper as
10:00:41 opposed to commercial products, right?
10:00:52 A For the basis of my report, I would say, yes,
10:00:56 that's generally true.
10:00:58 Q So --
10:00:58 A That is true.
10:00:59 Q So, in fact, you have no basis for saying that the
10:01:03 digital signal processing systems were, in your
10:01:08 words, used long prior to the patent applications
10:01:10 in this case, right?
10:01:12 MR. COSTAKOS: Objection to form.
10:01:18 THE WITNESS: I don't really understand

your question.
BY MR. SIKORSKI:
Q Do you have any basis for expressing an opinion that the digital signal processing and control systems disclosed in the Henry patents found themselves in any commercial device before those patent applications were filed?
MR. COSTAKOS: Objection to form.
THE WITNESS: That's my belief, that they were.
BY MR. SIKORSKI:
Q Which commercial devices by product name and number?
A Well, we would have to go through it technology by technology.
Q Well, the fact that you earlier told me you've not looked at any commercial devices has me wondering what commercial devices you know used the digital signal processing and control systems disclosed in the Henry patent applications.
MR. COSTAKOS: Objection to form.
THE WITNESS: Okay. If you ask the question explicitly, maybe I can help you on that.
BY MR. SIKORSKI:
Q Okay. I'm not sure where I'm losing you because I

10:02:27 thought I was pretty straightforward.
10:02:29 A Okay.
10:02:29 Q You indicated that the prior art that you're relying on in these Declarations is printed publications, right?
10:02:34
10:02:36 A Yes.
10:02:36 Q And earlier, you testified that you've never used an actual commercial Coriolis flowmeter, right?
10:02:40
10:02:43 A That's correct.
10:02:45 Q So I just want to be clear that you have no opinion that the digital signal processing and control systems that are disclosed in the Henry patents were found in any commercial devices before those applications were filed, right?
10:02:50
10:02:53
10:02:58
10:03:01
10:03:03 MR. COSTAKOS: Objection to form.
10:03:09 THE WITNESS: Well, I don't think that's correct. I mean, for example, one of the publications that I provided and cited in here relates to a prior art, Micro Motion model.
10:03:11
10:03:15
10:03:19
10:03:27 BY MR. SIKORSKI:
10:03:27 Q The Model D?
10:03:28 A The Model D Manual.
10:03:29 Q But you've never used the Model D device, right?
10:03:34 A And some of the prior art patents, I can think of one offhand, describe specific commercial models of
10:03:40

10:03:49 Coriolis flowmeters that adopted the technology in
10:03:54 those patents.
10:03:55 Q They're purportedly commercial, but you've never
10:03:58 seen them on the shelf, purchased them or used
10:04:01 those commercial devices, right?
10:04:03 A I -- I think that's a fair statement. I'm
10:04:23 generally aware of Coriolis flowmeters outside of
10:04:27 the context of this litigation and having developed
10:04:36 a course specifically related to Micro Motion
10:04:40 technology, just in the electrical engineering and
10:04:45 product literature that I receive, trade
10:04:49 publications, for example.
10:04:52 MR. SIKORSKI: Reserve our right to
10:04:54 strike that as nonresponsive to any question.
10:04:57 BY MR. SIKORSKI:
10:04:57 Q Dr. Sidman, for -- Let's start with the '646
10:05:09 patent, and you can use anything in front of you,
10:05:11 your summary sheets or whatever. For the '646
10:05:22 patent, what claims were you asked to look at? And
10:05:27 I'm happy to pass you the patents if you need to
10:05:29 look at them as well.
10:05:32 A The claims that were at issue between the parties
10:05:39 in this case. I could give you the numbers if
10:05:54 that's what you're looking for.
10:05:55 Q Well, your cheat sheet, I believe, is what you're

looking at. It lists Claims 1, 2, 5, 9 through 12, 15 and 19; is that right?

A Right.

Q So those are the claims you were asked to look at for this IPR?

A Yes. I can confirm that. If you'd like, I'll confirm that that's the exact --

Q I believe that's the exact list.

A Those are the exact claims that I wrote about in my report.

Q That's fine. Were you asked to look at any other claims in the '646 patent?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Well, I've reviewed the entire specification which I understand technically involves all of the claims, but I've only reviewed this set of claims for invalidity.

BY MR. SIKORSKI:

Q Did you arrive at any opinion that any claim in the '646 patent is valid?

MR. COSTAKOS: I'm sorry. Can you read that question over?

(Last question read.)

MR. COSTAKOS: Objection to form.

THE WITNESS: The only thing I've opined

10:07:29 on or formed a conclusion about are the claims at
10:07:35 issue in this case. And of those, I've stated my
10:07:43 opinion that I do not believe they are valid.
10:07:48 BY MR. SIKORSKI:
10:07:48 Q So for the '646 patent, you agreed 100 percent
10:07:53 that -- Strike that. For the '646 patent, you
10:07:58 agreed that each of the patent claims you were
10:08:01 asked to look at by the Foley law firm is, in your
10:08:05 opinion, invalid, correct?
10:08:11 A My goal was not to agree or disagree. It was to
10:08:16 form an independent conclusion based on my reading
10:08:21 of the patent, its file history, the prior art and
10:08:31 state my opinions. And to the extent that that may
10:08:35 coincide with the opinions of one of the parties,
10:08:42 so be it.
10:08:47 Q Your Declarations obviously refer to certain prior
10:08:53 art against each of these claims in the -- in the
10:08:59 subset, right? My question is, who found that
10:09:04 prior art --
10:09:06 MR. COSTAKOS: Objection.
10:09:07 BY MR. SIKORSKI:
10:09:07 Q -- you, the Foley law firm or someone else?
10:09:10 MR. COSTAKOS: Objection to form.
10:09:16 THE WITNESS: It was a combination --
10:09:19 BY MR. SIKORSKI:

10:09:20 Q Do you remember what -- Oh, sorry if you're not
10:09:24 complete.
10:09:24 A -- of prior art information, patents or
10:09:29 publications provided by the Foley law firm and
10:09:33 other prior art that I found or was aware of.
10:09:39 Q For the '646 patent, do you recall what prior art
10:09:42 you found as opposed to being supplied by others?
10:09:48 A I can't tell you offhand, but I would say that the
10:09:53 material in the -- that's described in the
10:10:04 introduction or background sections either
10:10:13 principally came from me or exclusively came from
10:10:16 me.
10:10:17 Q Excepting, of course, the Micro Motion publications
10:10:20 that you've already referred to, right?
10:10:22 A That's the only -- We can go through, but that's
10:10:24 the only one I can recall offhand that doesn't fit
10:10:27 that mold.
10:10:28 Q How about for the '761 patent? Were you asked to
10:10:35 look at every claim in that patent or just a
10:10:38 subset?
10:10:52 A I think my answer would be the same, not only for
10:10:54 the '761 but for -- is what I've stated with
10:11:00 respect to the '646 or the '761.
10:11:08 Q In other words, with reference to your Exhibit
10:11:10 2017, you were asked by the Foley law firm to look

at Claims 1 through 4 and 9 through 12 of the '761 patent?

A I believe that's correct. I could confirm that in my Declaration if you'd like, but I think off the cuff, that's correct.

Q I believe that list is accurate as well as to the ones that were identified in your report. My question is, were there any -- any patent claims -- Strike that. For the '761 patent, as you sit here today, do you have any opinion whether any claim in the '761 patent is valid?

MR. COSTAKOS: Objection. Form.

THE WITNESS: My answer would be similar or identical to the answer I've provided with respect to the '646 patent.

BY MR. SIKORSKI:

Q Just so I understand, so outside of Claims 1 through 4 and 9 through 12 of the '761 patent, you have no opinion one way or the other whether they're valid or invalid? And we can --

A I think that's a fair statement, yes. I don't have an opinion.

Q As to the prior art that your Declaration applies against the '761 patent claims, do you recall whether that prior art was found by you or supplied

10:12:47 to you?
10:13:36 MR. COSTAKOS: I'm sorry. For the '761,
10:13:38 did you say 1 through 4 and 9 through 12 because
10:13:43 there are other claims that are --
10:13:44 MR. SIKORSKI: I didn't say he --
10:13:45 MR. COSTAKOS: No. You said --
MR. SIKORSKI: I asked --
10:13:46 MR. COSTAKOS: You said it was an
10:13:46 accurate list.
10:13:47 MR. SIKORSKI: I -- I asked him what that
10:13:48 list is.
10:13:49 MR. COSTAKOS: Oh, for crying out loud.
10:13:51 Okay.
10:13:54 THE WITNESS: It sounds like I need to
10:13:56 confirm in my report --
10:13:58 BY MR. SIKORSKI:
10:13:59 Q I certainly didn't mean --
10:14:00 A -- the accuracy of that list.
10:14:01 Q If I in any way led you inaccurately, I apologize,
10:14:05 Dr. Sidman. I was simply asking what claims were
10:14:07 you asked to look at, which claims you arrived at
10:14:10 an opinion on and which claims you, I guess, didn't
10:14:16 either.
10:14:21 A To answer your question, I'll go through my report
10:14:23 to give you an accurate --

10:14:24 Q Okay.
10:14:25 A -- response.
10:14:39 Q And certainly, we can short-circuit this, Dr. Sidman, if you can identify claims that you did not look at, but feel free to answer it however you wish.
10:14:41 10:14:44 10:14:48
10:15:43 A Okay. The way I'm trying to make this a little bit more simple is to look at the conclusion page on page, actually, 100 of the -- of my '761 Declaration where I state at paragraph 219, "I am, therefore, of the opinion that Claims 1 through 12 of the '761 patent are invalid for the reasons given above." I think that summarizes all of the claims that I have formed an opinion of. This cheat sheet only refers -- that is, 1 through 4 and 9 -- Claims 9 through 12 relate to particular claims listed with respect to specific grounds. So that -- I think -- I think the better place, the more complete list, is in paragraph 219 of that -- of my Declaration.
10:15:46 10:15:51 10:15:58 10:16:05 10:16:09 10:16:14 10:16:19 10:16:25 10:16:30 10:16:44 10:16:54 10:16:57 10:17:02
10:17:06 MR. SIKORSKI: All right. We've been going about an hour. Why don't we take a break.
10:17:08
10:17:10 THE VIDEOGRAPHER: We are off the record at 10:17 a.m.
10:17:11
10:17:14 (Recess taken.)

10:27:11 THE VIDEOGRAPHER: We are back on the record at 10:27 a.m.

10:27:20 BY MR. SIKORSKI:

10:27:20 Q Dr. Sidman, the patents at issue, the Henry patents, generally relate to Coriolis flowmeters, right?

10:27:30 A I think that's a fair statement, yes.

10:27:31 Q And one thing that Coriolis flowmeters do is measure flow rate of a flowing liquid, right?

10:27:44 A They could measure mass flow rate. They could measure density, volumetric flow rate, temperature. Those are the things that come to mind off the cuff. There are other things, too.

10:28:04 Q So -- And just to kind of set the stage, Coriolis flowmeters include one or more flowtubes; is that right?

10:28:16 A I believe that's a fair statement.

10:28:19 Q And --

10:28:20 A You need at least one. Many have two.

10:28:23 Q How would you characterize what it is -- Strike that. How would you characterize a flowtube in a Coriolis flowmeter?

10:28:32 MR. COSTAKOS: Objection. Form.

10:29:15 BY MR. SIKORSKI:

10:29:15 Q I see you're digging into your Declaration. Is

that something you need to look at in order to answer the question?

A Well, I want to answer the question, your question, in the most accurate way. And instead of providing you with an answer that is most accurate, I would go back to what I've stated in my Declaration. So I'm looking for that page that describes that topic. Okay. So on -- I'm looking in this case in Exhibit 2019, my '761 Declaration. I have a section there entitled "Introduction to Coriolis Flowmeters." And I'm looking at the moment specifically at paragraph 23 which is a partial answer to your question which reads, "Coriolis flowmeters is a measurement device that measures the effect of Coriolis forces on a material flowing through a rotating frame of reference, in parentheses, (in particular an oscillating conduit.)"

MR. SIKORSKI: Can you read back my last question?

(Following question read.)

Q How would you characterize what it is -- Strike that. How would you characterize a flowtube in a Coriolis flowmeter?

10:31:54 THE WITNESS: Okay. And then in paragraphs 25 and 26 I describe the flowtubes, or I call it -- in this Declaration I call them conduits. I could read those for you. Coriolis -- This is paragraph 25 on page 8 of the Exhibit 2019. "Coriolis flowmeters include one or two conduits through which material flows. One conduit is described for simplicity, but the discussions herein are generally applicable to a system with two conduits." And I cite patent '614 in that paragraph.

Paragraph 26 states, "A material flowing in the tube may be a single type of material, paren, (single phase or multiple types of material together mixed together multiphase.)" And then it discusses various types of materials that might flow through the conduit in a Coriolis flowmeter. Of course, I'm not going to go through all of that.

MR. SIKORSKI: Can you read back my question, please?

(Following question read.)

Q How would you characterize a flowtube in a Coriolis flowmeter?

BY MR. SIKORSKI:

Q Dr. Sidman --

10:33:28 MR. COSTAKOS: Objection to form.
10:33:29 BY MR. SIKORSKI:
10:33:29 Q -- can you just give me an answer to my question,
10:33:32 please? I'm still struggling to see how what you
10:33:34 read answers my question.
10:33:34 MR. COSTAKOS: Objection. Form.
10:33:40 THE WITNESS: Can I hear the question one
10:33:41 more time, kindly?
10:33:43 (Following question read.)
Q How would you characterize a
10:33:51 flowtube in a Coriolis flowmeter?
10:33:51 MR. COSTAKOS: Objection. Form.
10:34:02 THE WITNESS: This is not a complete
10:34:04 answer to your question. But generally, it's a
10:34:08 conduit through which material passes whose
10:34:11 properties the flowmeter may measure such as mass
10:34:22 flow rate.
10:34:27 BY MR. SIKORSKI:
10:34:27 Q Thank you. How would you define "mass flow rate"?
10:34:42 Strike that. Let me back up. Is it fair to say
10:34:45 that when you say -- Strike that. This conduit or
10:34:52 flowtube, I assume those two terms are synonymous
10:34:57 to you?
10:34:57 A I use them synonymously. I think the art does
10:35:04 also.

10:35:05 Q The conduit is a pipe, right, in simple terms?
10:35:09 A You could think of it as a pipe, not necessarily a straight pipe, mind you, but a pipe.
10:35:16 Q And through this pipe passes material as you just stated, right?
10:35:19 A Correct.
10:35:21 Q Sometimes the material is, I believe you indicated earlier, described as single phase, right?
10:35:28 A Correct.
10:35:29 Q And "single phase" means, correct me if I'm wrong, just one substance such as liquid or air, right?
10:35:37 A Right. So it could be a gas, a liquid or a solid.
10:35:50 Q Not a true solid of course, right?
10:35:52 A No, no, a mixture --
10:35:59 Q And --
10:36:00 A -- as I mentioned in paragraph 26, for example.
10:36:06 Q And this mixture you also referred to as multiphase; is that right?
10:36:14 MR. COSTAKOS: Objection to form.
10:36:18 BY MR. SIKORSKI:
10:36:19 Q Or strike that. Earlier, you referred to multiphase. In simple terms, what is multiphase in the context of a Coriolis flowmeter?
10:36:31 A Well, I cite an example of a multiphase material in that paragraph as being a gas/liquid mixture or a

liquid/solid mixture or combination of the three, gas, liquid and solid mixture.

Q The substance inside the flowtube or conduit flows during operation of the Coriolis flowmeter, correct?

A Not necessarily.

Q Why not?

A Well, it may not be flowing for a number of reasons. For example, a valve might be closed.

Q Okay. In normal operation, mass flow rate is measured while the content of the flowtube is flowing, correct?

A I would not agree with that in general. It could either be flowing or not flowing --

Q Okay.

A -- while measurement is going on.

Q How would you characterize or design the flow rate of a flowing liquid through a Coriolis flowmeter's conduit?

MR. COSTAKOS: Objection. Form.

THE WITNESS: You could describe it in terms of units such as grams per minute or kilograms per minute or pounds per minute depending on the scale in the system of units that you're using.

10:38:31 BY MR. SIKORSKI:
10:38:31 Q Assuming this flowing liquid is actually flowing, okay, assuming the flowing liquid is actually flowing through the conduit, is it fair to say that at any given instant of time that fluid has one, and only one, flow rate?
10:38:56 MR. COSTAKOS: Objection. Form.
10:39:00 MR. SIKORSKI: We can read that back, please.
10:39:15 (Last question read.)
10:39:19 MR. COSTAKOS: Same objection.
10:39:27 THE WITNESS: Do you mean as measured by the device?
10:39:31 BY MR. SIKORSKI:
10:39:31 Q Yes.
10:39:36 A I think that's a fair statement. But if you didn't add that restriction, I wouldn't agree with that statement.
10:39:54 Q I'll try to ask the same question a little differently. At any given moment in time and assuming that the fluid is flowing through the Coriolis flowmeter's conduit, is it fair to say that the flowmeter measures one, and only one, flow rate for that flowing fluid?
10:40:20 MR. COSTAKOS: Objection. Form.

10:40:29 BY MR. SIKORSKI:
10:40:29 Q And we can have that read back.
10:40:30 A I can't think of one that would measure anything other or report more than one flow rate at any instant in time, either as described in the prior art or any commercial devices I might be aware of.
10:40:47 Q And that's true whether the flowing substance through the conduit is single phase or multiphrase -- multiphase, correct?
10:41:00 MR. COSTAKOS: Objection. Form.
10:41:02 THE WITNESS: It'll -- What is true?
10:41:06 BY MR. SIKORSKI:
10:41:06 Q That the -- Is it also true, is it not, that the Coriolis flowmeter will measure one, and only one, flow rate regardless whether the flowing fluid is single phase or multiphase?
10:41:24 A I would say "yes" given my knowledge of the prior art in commercial products that I'm aware of.
10:41:42 Q Does flow rate have the same meaning for single phase and multiphase substances --
10:41:53 MR. COSTAKOS: Objection.
10:41:53 BY MR. SIKORSKI:
10:41:54 Q -- given the context of Coriolis flowmeters?
10:41:57 MR. COSTAKOS: Objection. Form.
10:42:05 THE WITNESS: Do you mean mass flow rate

or volumetric flow rate? What do you -- I'm not sure what -- If you could ask your question more specifically.

BY MR. SIKORSKI:

Q Sure.

A Maybe I could --

Q Glad to. Does mass flow rate have the same meaning in the context of Coriolis flowmeters for single-phase substances as it does for multiphase substances?

MR. COSTAKOS: Objection to form.

THE WITNESS: All I can do is answer that question in a general way which is ideally it would.

BY MR. SIKORSKI:

Q Do you have --

A So -- So much mass passes through the conduit, whether it be gas, liquid or some multiphase combination, and that's what the Coriolis flowmeters ideally would measure.

Q Sitting here today, do you think -- can you think of a circumstance where flow rate would have a different meaning for single phase as opposed to multiphase substances?

A In the context of Coriolis flowmeters measuring

10:44:00 mass flow rate, I can't.
10:44:04 Q I'm sorry. You cannot?
10:44:05 A I cannot.
10:44:06 Q Thank you. Coriolis flowmeters, and specifically
10:44:37 the flowtube of a Coriolis flowmeter, is driven to
10:44:41 oscillate, correct?
10:44:47 A I think in general that's true. That's what
10:44:51 we're -- That's the technology that we're
10:44:53 discussing in this -- in these IPRs.
10:44:58 Q And the frequency of that oscillation, again,
10:45:02 specifically referring to the conduit or flowtube,
10:45:06 the frequency of oscillation is preferably at a
10:45:12 resonant frequency, right?
10:45:14 MR. COSTAKOS: Objection. Form.
10:45:20 THE WITNESS: I think we have to add a
10:45:22 bunch of statements just to put it into context.
10:45:30 But in general, in the context of the Coriolis
10:45:43 flowmeters and art that are at issue -- I should
10:45:48 say the technology that is at issue, I think that's
10:45:52 a fair statement. I'm not making any of these
10:45:58 statements for any particular device or patent but
10:46:04 just in general.
10:46:05 BY MR. SIKORSKI:
10:46:06 Q Yeah. We're just --
10:46:07 A There may be exceptions that will occur to me later

10:46:09 on.
10:46:09 Q Okay. And if --
10:46:12 A But if that's all you're seeking, it's a general
10:46:14 response, then let it be.
10:46:19 Q Again, I'm just doing general questions.
10:46:21 A Okay.
10:46:21 Q But certainly, if something comes to mind later in
10:46:23 the deposition that you want to clarify, feel free.
10:46:26 A Okay. Thank you.
10:46:42 Q So, again, in a Coriolis flowmeter that's
10:46:47 understood to be the technology that we're here to
10:46:50 discuss, the flowtube is affirmatively driven by
10:46:57 some external source to vibrate or oscillate,
10:47:02 right?
10:47:03 MR. COSTAKOS: Objection. Form.
10:47:06 MR. SIKORSKI: I'll ask that again.
10:47:08 BY MR. SIKORSKI:
10:47:08 Q In Coriolis flowmeters, some entity external to the
10:47:12 flowtube drives that flowtube to oscillate, right?
10:47:16 MR. COSTAKOS: Objection to form.
10:47:20 THE WITNESS: I would say generally but
10:47:22 not exclusively.
10:47:24 BY MR. SIKORSKI:
10:47:24 Q The pipe doesn't drive itself. There's an external
10:47:28 driver, generally speaking, right?

10:47:31 MR. COSTAKOS: Objection to form.
10:47:43 THE WITNESS: Generally, Coriolis
10:47:46 flowmeters include an actuator that drives the tube
10:48:03 or flowtube or conduit into oscillatory motion.
10:48:09 I'm not saying that's the only way that oscillatory
10:48:16 motion could arise, but I think that's what you're
10:48:18 asking about in general.
10:48:21 BY MR. SIKORSKI:
10:48:22 Q In your answer, you used the term "oscillatory
10:48:26 motion." What's that?
10:48:28 A Motion of the flowtube that is oscillatory. An
10:48:46 example of oscillatory motion, for example, would
10:48:52 be sinusoidal motion of the flowtube at its
10:49:00 resonant frequency or first other -- frequency of
10:49:06 its first flexible mode. That's not the only
10:49:11 possibility but just an example.
10:49:15 Q And this oscillatory motion that you speak of is
10:49:18 periodic, right?
10:49:20 MR. COSTAKOS: Objection to form.
10:49:29 THE WITNESS: Well, I would say, and
10:49:30 these statements I'm making are all in general.
10:49:48 The motion of the flowtube consists of motion of
10:49:56 a -- Let me strike that. Could I have the question
10:50:18 one more time, please?
10:50:41 (Following question read.)

Q And this oscillatory motion that you speak of is periodic, right?
THE WITNESS: Ideally or in theory, oscillatory motion is a sinusoidal time component. However, the world isn't perfect, and motion consists of a number of components, could have more -- I'm just thinking off the cuff here, could have more than one vibratory frequency excited in a particular structure at a given time, and the motion doesn't have to be the result of the driven -- of the drive signal or a sinusoidal drive signal. There are other disturbances that can excite oscillatory motion in a Coriolis flowtube.
BY MR. SIKORSKI:
Q You refer to the drive signal for the conduit as having a sinusoidal shape, right?
A It could have a sinusoidal shape, not necessarily.
Q When the drive signals are sinusoidal and if that's the only input to the flowtube, then you would agree, would you not, that the oscillatory motion is, I guess by definition, periodic, right?
A I would agree to that to the extent that that would be a general statement about long-term behavior of the flowtube but only in the ideal sense, not necessarily in the practical world, in the real

10:53:37 world.
10:53:41 Q I'm going to a little different topic. In a
10:53:49 real-life Coriolis flowmeter, you would agree,
10:53:52 would you not, that the resonant frequency of the
10:53:55 conduit depends on a number of factors, including,
10:54:00 for example, the material of the conduit itself,
10:54:05 conduit itself and the substance that's flowing
10:54:10 through it, right?
10:54:14 A I think you're asking about the first flexible mode
10:54:24 of the structure.
10:54:25 Q What's "first flexible mode"?
10:54:28 A Its first resonant frequency, so structures like
10:54:34 flowtubes can resonate at more than one frequency,
10:54:40 could resonate, for example, the harmonic of the
10:54:44 first flexible mode. So you used the word "the"
10:54:48 versus "a," so I'm just trying to narrow it down to
10:54:52 what I think you're concerned about which is the
10:54:58 first flexible mode of the structure.
10:54:59 Q Okay. If I refer to resonant frequency, I'm going
10:55:02 to refer to this first flexible mode. And if I
10:55:06 stray from that, I'll try to make that known. I'm
10:55:08 just thinking of the, sort of, predominant resonant
10:55:12 frequency of the tube, okay?
10:55:15 A Right.
10:55:16 Q So my question is a little bit different. The

10:55:19 resonant frequency of a conduit will be different
10:55:22 when it's empty as opposed to when it's full of
10:55:25 some sort of flowing substance, correct?
10:55:31 A That's correct.
10:55:31 Q Is it also fair to say that the resonant frequency
10:55:34 of an empty flowtube is going to be faster than the
10:55:38 resonant frequency of a flowtube carrying liquid or
10:55:43 something heavier having more mass, so to speak,
10:55:46 than air?
10:55:48 A I think generally that's true.
10:56:13 Q The -- If you want to refer to a diagram in your
10:56:24 Declaration at paragraph 34, actually, page 14,
10:56:47 and, again, the same drawings appear in either
10:56:49 Declaration, so it doesn't matter which one you're
10:56:51 referring to, but you're on page 14?
10:56:53 A I am of the '761 Declaration, Exhibit 2019.
10:56:58 Q Great. And you see some diagrams there, right?
10:57:01 A I do.
10:57:02 Q You can use these if you want. You don't need to.
10:57:04 My question is, for a vibrating conduit that's
10:57:11 oscillating at its resonant frequency, is there
10:57:15 such thing as a node and an anti-node in that
10:57:19 resonant vibration?
10:57:20 MR. COSTAKOS: Objection. Form.
10:57:49 THE WITNESS: I don't think those terms

10:57:50 are used in the prior art patents or in Henry's
10:57:57 patents at issue. But the term "node," for
10:58:04 example, could be used in a general mechanical
10:58:05 engineering sense that -- in a way to describe
10:58:13 vibration of a structure.
10:58:14 BY MR. SIKORSKI:
10:58:14 Q Would a node be shown in any of the drawings on
10:58:17 page 14 of your Declarations?
10:58:19 A Nothing explicitly designated as a node in there.
10:58:23 Q Designated or not, is it identifiable?
10:58:28 MR. COSTAKOS: Objection. Form.
10:58:33 THE WITNESS: Do you mean node --
10:58:35 what's -- In what context are you describing nodes?
10:58:40 BY MR. SIKORSKI:
10:58:40 Q A location that does not move when it's subjected
10:58:43 to the resonant vibration of a structure.
10:58:46 A Okay. So in that context, for example, Figure 1
10:58:53 shows the ends of the tube being held at a
10:59:03 relatively fixed position.
10:59:07 Q To the left?
10:59:08 A Compared --
10:59:09 Q To the left?
10:59:10 A To the left, yeah.
10:59:11 Q Okay. Is it fair to say the location where the
10:59:14 up-and-down arrow appears, can we refer to that as

an anti-node of vibration, or is that inappropriate?

MR. COSTAKOS: Objection. Form.

THE WITNESS: If you want to use it, that's fine. That's not a term that I would generally use, but that's -- I'd rather not think -- I'd rather not describe it in that term because that's not a term that's used either in Henry's patents at issue or in the prior art patents that I'm aware of.

MR. SIKORSKI: Okay. Then we won't.

(Exhibit No. 2020 was marked.)

BY MR. SIKORSKI:

Q Dr. Sidman, we just handed you what I marked as Exhibit 2020. It corresponds, however, to Micro Motion Exhibit 1014. Flip through that to your heart's content. It is a Model D Meter Supplement, comma, Slug Flow and Loading/Unloading, Instruction Manual, purportedly dated September 1987. Have you seen this before?

A Yes, I have.

Q Now, your two Declarations each cite to this instruction manual, right?

A I believe this is the version. I can confirm the date if you'd like. To the best of my

recollection, I think it is.
Q Great. Thank you. For -- You've got several opinions in your Declarations that cite to this. It's fair to say that each of those opinions combine, I will use as a verb, this Model D Supplement with a much thicker document for the actual Model D device, correct?
A Right. This is a supplement to what I call in short -- in short terms the Model D Manual.
Q Right. For the '646 patent, you cite to this Slug Flow Manual for purposes relating to the transition of a conduit or flowtube from substantially empty to substantially full, right?
MR. COSTAKOS: Objection. Form.
BY MR. SIKORSKI:
Q And, again, Dr. Sidman, if you want me to hand you the '646 patent, I can. I just don't want to clutter the table if we don't need to.
A Okay. I'm just looking at my '646 Declaration, Exhibit 2018, page -- it actually starts on top of page 94 where I make reference to the Slug Flow Supplement or Loading/Unloading Instruction Manual. So if I could hear the question again, maybe I'll offer a more complete answer.
(Following question read.)

Q For the '646 patent, you cite to this Slug Flow Manual for purposes relating to the transition of a conduit or flowtube from substantially empty to substantially full, right?

11:06:57 THE WITNESS: Yes. There are a number of places I could direct you to in my Declaration, for example, the claim chart that ends on page 102 --

BY MR. SIKORSKI:

Q Well, let's --

A -- the last entry there where it says, "The supplement further discloses measurement when, quote, 'the flowmeter is filled with fluid from an initially empty state.'" The one above it discusses states, that is, the slug flow supplement discloses monitoring, quote, "during loading or unloading of fluids from such places as tanker transports, batching tanks or holding tanks." And I have more to say about that issue, for example, in paragraph 223 on page 103 of my Declaration.

Q So let's flip to 10 -- page 102 in your Declaration since you pointed us in that direction. Are you there?

A Yes.

11:08:22 Q At the top of that page, there's a box which includes the final paragraph of Claim 1 of the '646 patent, right?
11:08:37 A The block on the left-hand side, yes.
11:08:40 Q And that portion of Claim 1 can be paraphrased, I'm not going to quote it, but paraphrased, it's determining the flow rate of the flowing liquid during the transition of the conduit or flowtube from a substantially empty state to a substantially full state, right?
11:09:06 A Based on the sensor signal is what it says.
11:09:08 Q Right.
11:09:09 A Yes.
11:09:09 Q And if I understand your claim chart correctly, for that claim limitation, you believe that the slug flow supplement, Exhibit 2020, also identified as Micro Motion Exhibit 1014, satisfies that claim limitation, right?
11:09:46 A It satisfies it, and I also cite Ruesch on that claim section.
11:09:59 Q Well, you say Ruesch for the fact that he measures the flow rate of the flowing liquid. You don't seem to say Ruesch for measuring the flow rate during that transition from substantially empty to substantially full, right?

11:10:19 MR. COSTAKOS: Objection to form.
11:10:32 THE WITNESS: Okay. The three documents
11:10:34 are connected to the extent that Ruesch makes
11:10:39 reference to the Model D Manual and that that
11:10:53 manual is supplemented by the slug flow supplement.
11:11:04 I guess it would be -- I think it would be a fair
11:11:06 statement to say that it does. To the extent that
11:11:11 it's a separate and independent document, no.
11:11:16 BY MR. SIKORSKI:
11:11:17 Q So just so I understand what you just said, if I
11:11:19 were to give you the Ruesch document, would you be
11:11:22 able to identify within its four walls any
11:11:25 disclosure of determining flow rate as the conduit
11:11:29 transitions from a substantially empty state to a
11:11:33 substantially full state?
11:11:35 MR. COSTAKOS: Objection. Form.
11:11:39 THE WITNESS: I'd have to look at that --
11:11:43 at that patent. I think it describes a
11:11:55 measuring -- I would say I'd need to look at it.
11:11:58 But offhand, I would say it does not if you were
11:12:02 just asking me about my recollection of that. If
11:12:07 it had, I would have put it in here, so I'm not
11:12:12 sure if that answers your question.
11:12:14 BY MR. SIKORSKI:
11:12:14 Q It does. And just understand from my point of

11:12:16 view, all I have before today is your Declarations.
11:12:21 And my understanding of this box on page 102 of
11:12:25 your Declaration points to the slug flow
11:12:30 supplement, Exhibit 2020, for alleged disclosure of
11:12:34 this flow rate determination during the transition
11:12:37 from empty to full.
11:12:39 A Right.
11:12:39 Q If I'm misunderstanding your claim chart, please
11:12:42 let me know.
11:12:42 A I think you -- I think you have it exactly right.
11:12:45 Q Okay. Great. So now --
11:12:46 A And it's only to the -- I'm not an attorney. I'm
11:12:48 an engineer, so -- But only to the extent that
11:12:51 these documents might be linked by reference would
11:12:58 it be referenced within Ruesch. But outside of
11:13:02 that, it's only disclosed in the slug flow
11:13:12 supplement.
11:13:12 MR. SIKORSKI: Thank you. I'm told we're
11:13:14 supposed to change video, so why don't we take a
11:13:17 break.
11:13:18 THE VIDEOGRAPHER: We are off the record
11:13:19 at 11:13 a.m. This is the end of Disk No. 1 in the
11:13:24 deposition of Michael Sidman.
11:13:27 (Recess taken.)
11:22:55 THE VIDEOGRAPHER: We are back on the

record at 11:22 a.m. This is the beginning of Disk No. 2 in the deposition of Dr. Sidman.

BY MR. SIKORSKI:

Q Dr. Sidman, when we left off, we were referencing Exhibit 2020 which is Micro Motion 1014, the slug flow document.

A I have it, yes.

Q And, again, where we left off, I believe you rely on this slug flow supplement, I believe you call it, for the proposition of determining the flow rate as the flowtube transitions from a substantially empty to a substantially full state; is that right?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Well, I also rely on Ruesch as I show on -- in the chart, for example, on page 102 of my Declaration.

BY MR. SIKORSKI:

Q I don't want to revisit the last few pages of this transcript. We just kind of left off before the last break with you agreeing that Ruesch discloses and incorporates the Model D but does not within its own four walls disclose determining the flow rate during the relevant transition from empty to full, right?

11:24:24 A From substantially empty to substantially full, that's correct. Yes.
11:24:31 Q Right. And, again, just so we're on the same page, for that specific claim limitation in the '646 patent, Claim 1, you cite this slug flow supplement, right?
11:24:44 A That's correct.
11:24:46 Q If you could look, please, at page 2 of the supplement, there's several sections, among them 2.0, Principle of Operation. Do you see that?
11:25:01 A I see that section, yes.
11:25:06 Q In that second paragraph there that begins, "In some" -- excuse me, "In some instances," do you see that?
11:25:11 A I see that paragraph. I haven't read through it, but go ahead.
11:25:15 Q In the middle there starting around line 4, there's a sentence that begins, "If the signal out voltage." Do you see that?
11:25:25 A I see that.
11:25:25 Q So I'll read that sentence in the record, and I'll ask you a question. Quote, "If the signal out voltage exceeds 3.5V, comma, the board will inhibit the output of flow pulses," period, end quote. My question for you, sir, is, what flow pulses are

being referred to in this slug flow supplement?
A I think you'd have to go look first at the Model D Manual. It may be mentioned in here, but that might be a better place to look.
Q At a very high level, sitting here today, you don't recall what kind of flow pulses are being measured by the Model D or this slug flow supplement?
MR. COSTAKOS: Objection. Form.
THE WITNESS: Well, many of these meters have more than one type of output, analog, digital. So I'd have to look through, for example, the Model D catalog to answer that question with certainty.
BY MR. SIKORSKI:
Q You would agree, would you not, that these flow pulses are an indication that the Model D device is used to measure mass flow rate?
MR. COSTAKOS: Objection. Form.
THE WITNESS: Could I hear that question again, please?
(Last question read.)
THE WITNESS: Again, I need to go look at that Model D Manual to answer that question accurately.
BY MR. SIKORSKI:
Q All right. We'll do that in a second, but why

11:28:03 don't we flip to the next page of the slug flow
11:28:07 supplement, and you can walk me through how this
11:28:10 device works, okay? Are you on page 3?
11:28:18 A I'm on page 3.
11:28:19 Q At the top, there's a heading, 3.2,
11:28:25 Loading/Unloading. See that?
11:28:26 A Yes.
11:28:26 Q Is it your opinion that this section of the slug
11:28:31 flow supplement is relevant to your opinion on
11:28:35 determining flow rate between the transition of a
11:28:38 conduit from empty to full?
11:28:59 A I think it's relevant.
11:29:02 Q The operation during the loading/unloading
11:29:05 operation is described with these numbered sections
11:29:12 one through five. Do you see that?
11:29:15 A I see that, yes.
11:29:16 Q Okay. Let's walk through that.
11:29:22 A If you can just give me a second to read through
11:29:24 this again.
11:29:25 Q Yeah. Read the page, and let me know when you're
11:29:27 done.
11:31:28 A Okay. I've read through it.
11:31:38 Q Let's start with the second paragraph on this page.
11:31:42 I assume you read the entire page?
11:31:44 A No. I just read Section 3.2.

11:31:49 Q I'm referring to the second paragraph in Section 3.2.

MR. COSTAKOS: The one that begins, "Loading/unloading applications"?

MR. SIKORSKI: Yes.

MR. COSTAKOS: Okay.

THE WITNESS: Let me look at that one more time. I was looking further down.

BY MR. SIKORSKI:

Q Read the entire page from top to bottom, and let me know when you're done.

A Okay.

Q Thank you.

11:35:37 A Okay. I've read it.

11:35:40 Q So forgive me. That took a couple of minutes to go through one piece of -- You are familiar with this document, right?

11:35:45 A Yes. I just wanted -- I don't know what question you're going to ask, so I'm trying to --

11:35:52 Q Today's not the first -- Today's not the first day you've seen this document, right?

11:35:56 A Absolutely not.

11:35:56 Q Okay. Good.

MR. COSTAKOS: You did ask him to read it, so --

MR. SIKORSKI: Yeah. You read it, counsel, in about 30 seconds. Anyway --
MR. COSTAKOS: Well, I'm not being asked questions.
MR. SIKORSKI: Great.
MR. COSTAKOS: I'm just sitting here.
BY MR. SIKORSKI:
Q Dr. Sidman, on Section 3.2, the second paragraph, you recall it starts, "In loading/unloading applications"?
A Yeah. I do see that.
Q There it states that, quote, "The meter is typically empty on start-up," end quote. You see that?
A I do.
Q Okay. Great. That sentence continues by saying that the batch is run, and the meter is purged of liquid at the end of the run. See that?
A I do.
Q I assume that sentence is relevant to your opinion that this slug flow determines a flow rate during the relevant empty-to-full transitions of the flowtube?
MR. COSTAKOS: Objection to form.
THE WITNESS: I think it is relevant.

11:36:59 BY MR. SIKORSKI:
11:36:59 Q Okay. Well, in the numbered paragraphs one through five, there's a description of how this loading/unloading operation is preferably implemented, right?
11:37:11 MR. COSTAKOS: Objection. Form.
11:37:18 THE WITNESS: It describes one way of a start-up technique for starting a loading process.
11:37:29 BY MR. SIKORSKI:
11:37:37 Q Are you not relying on these steps one through five in your opinion relevant to Claim 1 of the '646?
11:37:39 A Well, to the extent that these steps indicate a practice for start-up or a start-up technique, it is related. To -- I'm not sure about the -- what the context of your question is. That's the reason I'm having trouble answering it.
11:38:25 Q Well --
11:38:32 A This does not relate -- These steps don't relate specifically to how the slug flow board operates. It just suggests a start-up technique. As it says, it's worked well for loading and unloading.
11:38:39 Q Well --
11:38:47 A So I'm not quite sure how to answer your question.
11:38:51 Q Well, let's look at these five steps and see how this slug board operates, okay?
11:38:57
11:38:58
11:39:02
11:39:07
11:39:15
11:39:17
11:39:18
11:39:21
11:39:23

11:39:25 A Sure.
11:39:26 Q So -- I'm not going to read them all into the record, but you've just read them. Step three talks about slowly filling up the conduit, right? It says, "Open the downstream valve to allow one-quarter or less of the normal fluid flow. This will minimize the amount of fluid missed on start-up." Do you see that?
11:39:55 A Right.
11:39:56 Q All right. So you would agree, would you not, that this item three admits that the slug flow supplement misses fluid, misses measuring fluid flow, on start-up, right?
11:40:14 MR. COSTAKOS: Objection. Form.
11:40:37 THE WITNESS: It may or may not --
11:40:38 BY MR. SIKORSKI:
11:40:39 Q It says it.
11:40:41 A -- depending on -- depending on the situation. So, for example, if the fluid is single phase and the meter is already powered up, it ought not to miss anything in substance.
11:41:07 Q Right, but the relevant claim limitation is the transition of the flowtube from a substantially empty state to a substantially full state. So inherently, there's two-phase flow, right?

A The slug flow board deals with the situation when there is two-phase flow. This -- These steps here describe basically how to fill the meter or the conduit, a priority to measurement. I'm not sure where -- I'm not sure I really understand your question or what you're trying to get at.

Q Well, the way I interpret the slug flow supplement to be describing is, among other things, this start-up mode. You see the start-up mode? It's been mentioned on this page and specifically in item No. 3 on page 3.

A Right. I see that.

Q And the start-up mode is, in fact, the mode when the pipe transitions the conduit of the flowmeter transitions from substantially empty to substantially full; isn't that right?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I don't think I can make that as a -- agree with that as a general statement. All I can agree with is that during -- using this start-up technique and depending on the fluid composition at the time within the meter, fluid may -- fluid may or may not be missed by the Coriolis flowmeter.

BY MR. SIKORSKI:

11:43:44 Q The fact that this sentence says, quote, "This will minimize the amount of fluid missed on start-up," end quote, does that sentence not tell you that the slug flow supplement invariably misses the measurement of flow during that transition from empty to full?

MR. COSTAKOS: Objection to form.

THE WITNESS: Okay. If you go back to page 1, it's actually the slug flow manual page 2, principle of operation, describes how if the gas -- if the -- the density, the specific gravity, that is, drops below a certain level, then the slug flow board inhibits reporting of whatever is being measured. So I'm not quite sure how to answer your question other than that's -- this is what it does. I think it's clear -- clearly describes that. And on the other hand, Section 3.2 just describes a way to manually start up flow during a batching or loading and unloading operation.

BY MR. SIKORSKI:

Q So let's --

A We're talking about two different things here. Maybe that's -- that's the problem.

Q There's some disconnect because I feel as though your reference to Section 2.0 just admitted that

this device is incapable of measuring flow rate between the full transition of empty to full --

MR. COSTAKOS: Objection.

BY MR. SIKORSKI:

Q -- in the conduit?

MR. COSTAKOS: Objection to form.

THE WITNESS: Could I hear that question one more time?

BY MR. SIKORSKI:

Q Sure. Why don't we take a step back. The last paragraph of Claim 1 that's in your Declaration on page 102 --

A Right.

Q -- that claim limitation, again, Claim 1 of the '646 patent, talks about determining the flow rate of the flowing liquid during the transition of the flowtube from a substantially empty state, which I read to be generally air or gas, agreed --

A That's fine.

Q -- to a substantially full state, which I read, but please correct me if you have a different interpretation, to be substantially full of the fluid. Yes?

A The fluid, or -- or it could be a two-phase mixture.

11:46:47 Q Right. Now, your opinion, again, correct me if I'm
11:46:50 wrong, is that the slug flow supplement satisfies
11:46:54 that portion of Claim 1 in the '646 patent?
11:47:01 A Okay. The word "satisfy" needs to be defined. I
11:47:13 don't want to make a statement that might be taken
11:47:16 out of context.
11:47:17 Q Um-hum.
11:47:17 A So the word, I think, "satisfy" needs to be --
11:47:22 Q Do you prefer a different verb?
11:47:26 A You're the one asking the question. The slug --
11:47:36 Let me just make a statement. Maybe it'll clarify
11:47:39 it. The slug flow board in and of itself doesn't
11:47:51 perform the measurement. It inhibits reporting of
11:47:56 the measurement when the specific gravity sensed by
11:48:01 the Coriolis flowmeter drops below a specific
11:48:07 threshold as discussed in the second paragraph on
11:48:09 page 2 of the slug flow and unloading instruction
11:48:17 manual.
11:48:23 Q I wasn't sure if you were finished. Okay.
11:48:26 A That's all I have to --
11:48:27 Q Okay.
11:48:28 A -- say on that.
11:48:29 Q When the flowtube is substantially empty, in other
11:48:33 words, full of air, would you agree that the
11:48:36 specific gravity of the flowtube's content is below

11:48:42 0.5?
11:48:43 A I think that's probably the case in a practical
11:48:47 sense, yes.
11:48:47 Q Right. So when a flowtube begins the transition
11:48:53 from being substantially empty to substantially
11:48:56 full, this slug flow board inhibits, in your words,
11:49:03 the reporting of flow measurements until the
11:49:07 specific gravity exceeds 0.5, correct?
11:49:13 A I think that's correct. The Coriolis flowmeter
11:49:17 itself continues making the measurement
11:49:23 irregardless of the specific gravity. It's
11:49:28 operating continuously. It's making measurements,
11:49:38 and it's determinating -- determining based on the
11:49:43 sensor signal the flow rate of the flowing liquid
11:49:46 during that transition.
11:49:48 Q Well, isn't --
11:49:50 A But the slug flow supplement board inhibits
11:49:54 reporting of that determination or measurement
11:50:05 under a very specific condition, that is, when the
11:50:09 specific gravity drops below a threshold --
11:50:16 Q So if I --
11:50:17 A -- which can occur during loading and unloading.
11:50:21 Q So the -- The Model D device, the basic device, in
11:50:26 your view calculates the flow rate, forwards that
11:50:31 in whatever form to the slug flow supplement, and

11:50:36 the slug flow supplement inhibits that measurement
11:50:41 from being forwarded downstream to whatever device
11:50:44 is supposed to receive the flow rate measurement?
11:50:47 MR. COSTAKOS: Objection. Form.
11:50:47 BY MR. SIKORSKI:
11:50:48 Q Is that what you're saying?
11:50:49 A Well, the slug flow board plugs into the Model D
11:50:57 transmitter. So whether the flow rate signal
11:51:06 itself passes through the board or on its way to
11:51:14 however it's being reported to the customer or
11:51:17 whether the slug flow board just inhibits or sends
11:51:23 an inhibit signal into some other portion of the
11:51:26 meter to prohibit the communication of that
11:51:28 determination or measurement to the customer, I
11:51:31 don't know, but its net effect is to block that --
11:51:38 to block that reporting.
11:51:45 Q What's your understanding as to why the slug flow
11:51:52 board inhibits the reporting of flow rate when the
11:51:56 contents of the conduit or flowtube is below 0.5
11:52:01 specific gravity?
11:52:04 A Okay. One more time.
11:52:18 (Last question read.)
11:52:29 BY MR. SIKORSKI:
11:52:29 Q I'll ask that -- Sure. Go ahead.
11:52:48 A It's to, in general, prohibit the reporting of what

may be inaccurate determinations of mass flow rate by the Coriolis flowmeter to the customer.

Q Because the measurements by the Model D meter when the specific gravity is below 0.5 are not trustworthy, correct?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I wouldn't make that as a general statement, but I think in the context of this discussion it's to -- it's to accomplish that under certain conditions.

MR. COSTAKOS: Hold on a second while I --

(Mr. Costakos leaves the room.)

MR. SIKORSKI: Why don't we go off the record.

THE VIDEOGRAPHER: We are off the record at 11:53 a.m.

(Discussion off the record.)

THE VIDEOGRAPHER: We are back on the record at 11:54 a.m.

BY MR. SIKORSKI:

Q Dr. Sidman, this slug flow supplement talks about two -- I don't know if modes of operation is the right word, but it talks about slug flow operation on the one hand and loading/unloading on the other;

11:55:02 is that fair?
11:55:02 A I think that's fair, yes.
11:55:05 Q And generally speaking, slug flow operation is when there's an expectation for unwanted bubbles to be in the flowing substance; is that fair?
11:55:16 MR. COSTAKOS: Objection. Form.
11:55:19 THE WITNESS: Well, they may be wanted or unwanted, but they may occur.
11:55:23 BY MR. SIKORSKI:
11:55:24 Q Fair enough. And loading/unloading is something different. Instead, loading and unloading is, I guess, generally speaking, moving fluid from one location to a destination location; is that generally fair?
11:55:43 MR. COSTAKOS: Objection. Form.
11:56:01 THE WITNESS: I think in general that's fair. I'm trying to think if that's -- that I can agree with that under all circumstances, so I think I can only agree to that as a general statement within the context of what I think you are talking about.
11:56:18 BY MR. SIKORSKI:
11:56:18 Q Okay. Be that as it may, on page 3 in the middle of the slug flow supplement, there's a sentence, quote, "Just as with slug flow, the slug flow

11:56:33 inhibit board will prevent a portion of the liquid
11:56:36 flow from being counted during loading/unloading,"
11:56:40 end quote. Do you see that?
11:56:41 A I do.
11:56:42 Q So you would agree that regardless whether used in
11:56:45 its slug flow -- slug flow capacity or its
11:56:49 loading/unloading capacity, this slug flow inhibit
11:56:52 board, quote, "prevents," end quote, a portion of
11:56:58 the liquid from being counted, right?
11:57:00 MR. COSTAKOS: Objection. Form.
11:57:05 THE WITNESS: It could prevent that from
11:57:07 happening --
11:57:10 BY MR. SIKORSKI:
11:57:10 Q Well, it --
11:57:11 A -- depending on the situation.
11:57:12 Q The sentence I just read actually says, quote,
11:57:16 "will prevent," end quote, in no uncertain terms.
11:57:21 So should I see elsewhere for some reference that
11:57:25 says that this sentence is incorrect?
11:57:27 MR. COSTAKOS: Objection. Form.
11:57:29 THE WITNESS: It will prevent it in the
11:57:31 context of this start-up procedure under some
11:57:41 circumstances of -- of -- Just leave it there.
11:57:46 BY MR. SIKORSKI:
11:57:46 Q And in fact, in any circumstance where the specific

gravity of the flowtube's content is below 0.5, right?

MR. COSTAKOS: Objection. Form.

THE WITNESS: It will -- Under those circumstances, it will inhibit reporting. And so the accurate -- accuracy of the totalized result might not be accurate because fluid flow may not be counted but under some circumstances, not in every possible situation.

BY MR. SIKORSKI:

Q Is there a situation where the specific gravity is below 0.5 and whatever fluid is flowing through that conduit or flowtube is being -- the flow rate of that slug is being measured?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Okay. Let me just step back and say the Coriolis flowmeter is measuring all the time. It doesn't matter if it's being loaded or unloaded, whether or not there -- whether there's two-phase conditions or single-phase conditions, whether it's all liquid or all gas or some mixture, whether there's a slug there or not. It's making the determination all the time. The slug flow board simply recognizes that under some conditions of specific gravity of whatever at the

time is in the conduit of the flowmeter may not result in an accurate determination, and so it inhibits the reporting of that to the customer.

BY MR. SIKORSKI:

Q I'm going to move to a different topic but still with regard to the slug flow. There's a sentence, No. 4 on page 3. And, again, this description deals with getting air out of the conduit.

A Just a second. Which --

Q Sure.

A Just a second. The pages -- I'm not sure if when you're saying "page" --

Q Ahhh.

A -- if you're talking about --

Q I understand.

A -- the number of the page in the document or --

Q Sure. So Section 3.2 --

A Okay.

Q -- very middle of the page, No. 4, are you there?

A "Slowly open the upstream valve --"

Q Right.

A "-- to force the air out and slowly fill the flowmeter. The slow opening minimizes the shock to the meter and reduces the recovery time," is what it says.

12:01:24 Q Right. What are you -- what are you -- The term
12:01:27 "shock" in that second sentence, that talks
12:01:30 about -- that refers to, I should say, the
12:01:34 transition from a zero specific gravity gas such as
12:01:38 air to the presumably heavier, more massive fluid
12:01:45 that's going to flow through the flow meter's
12:01:48 conduit, right?
12:01:49 MR. COSTAKOS: Objection. Form.
12:01:57 THE WITNESS: I would say in general,
12:01:58 true. I mean, it's really analogous to what you
12:02:02 would call in your household hammer, water hammer,
12:02:05 where you rapidly open and close a valve, you might
12:02:08 hear knocking in the pipes from another room.
12:02:11 That's the type of shock that I think they're
12:02:14 referring to.
12:02:14 BY MR. SIKORSKI:
12:02:14 Q Right. Then you and I are on the same page. But
12:02:18 my question is, when this kind of shock is
12:02:30 expected, the resonant frequency of the pipe
12:02:34 likewise goes through a sudden transition from its
12:02:39 empty resonant frequency, which you indicated
12:02:42 earlier today is of a higher frequency, to a second
12:02:49 lower resonant frequency when the conduit is full
12:02:53 of whatever its contents are, right?
12:02:56 A I think in general that's true. However, I'd like

to indicate that these conduits or flowtubes and Coriolis flowmeters are generally lightly damped structures. So the resonant frequency or the oscillatory vibration of the tube doesn't instantaneously change. The tube keeps ringing.

Q It has some momentum to it you're saying?

A It has momentum. It's a spring mass system. The resonant frequency will eventually change if the density of the fluid within it changes.

Q Does the peak-to-peak travel or displacement of the tube change when it transitions from full of air to full of liquid?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Could I hear that question one more time, please?

(Last question read.)

THE WITNESS: The peak-to-peak displacement of the tube, as I think you refer to, in proximity, which I assume you refer to in proximity to the actuator, will change over time when that happens.

BY MR. SIKORSKI:

Q The peak-to-peak displacement is greater when --

A In general. It may not, but it's -- in general it would.

12:07:18 Q In general, the peak-to-peak displacement would be
12:07:22 greater when the tube is empty, right --
12:07:23 MR. COSTAKOS: Objection form.
12:07:24 BY MR. SIKORSKI:
12:07:24 Q -- as opposed to when it's full?
12:07:28 MR. COSTAKOS: Objection. Form.
12:07:59 THE WITNESS: Okay. Assuming the signal
12:08:01 drive and amplitude remains the same, in general,
12:08:12 the peak-to-peak displacement of the tube might
12:08:18 very well change when there is a change in density
12:08:25 of whatever is flowing through the tube. However,
12:08:28 the flowmeter attempts to control the peak-to-peak
12:08:40 motion of the flowtube. It may not be
12:08:42 displacement. It may be velocity, for example, but
12:08:46 there is some regulation that the flowmeter
12:08:50 attempts to perform.
12:08:57 MR. SIKORSKI: It's now a good time to
12:08:58 transition to lunch.
12:08:59 MR. COSTAKOS: Sure, whatever you want.
12:09:01 THE VIDEOGRAPHER: We are off the record
12:09:02 at 12:08 p.m.
12:09:04 (Lunch recess taken.)
01:15:11 THE VIDEOGRAPHER: We are back on the
01:15:14 record at 1:15 p.m.
01:15:16 MR. SIKORSKI:

01:15:17 Q Good afternoon, Dr. Sidman.
01:15:19 A Good afternoon.
01:15:20 Q When we left off, we had in front of us the slug flow supplement, if you can grab that, please.
01:15:45 On -- Under Section 3.2, loading/unloading, we were looking at the numbered sentences one through five.
01:15:58 Can you find your way to that, please.
01:15:59 A I'm there.
01:16:02 Q In Section 4, I guess we'll call it, there's that sentence that talks about shock to the meter and
01:16:09 recovery time. Do you recall the conversation we had before lunch about shock?
01:16:12
01:16:15
01:16:17 A Yes.
01:16:17 Q I believe you said something to the effect of the water hammer in a house is akin to that?
01:16:20
01:16:24 MR. COSTAKOS: Objection to form.
01:16:28 THE WITNESS: I said what I said. I'm not -- I won't disagree with you.
01:16:30
01:16:34 MR. SIKORSKI:
01:16:34 Q The sentence also refers to recovery time. I'll read that sentence into the record. Quote, "The
01:16:36
01:16:38 slow opening minimizes the shock to the meter and reduces the recovery time," end quote. What's your
01:16:41
01:16:44 understanding of "recovery time"?
01:16:53 A In this context, I presume it means a period of

time while the meter is still making measurements and perhaps, perhaps, it may not be making the most accurate measurement or determination of, for example, mass flow rate.

Q When you say it's not making the most accurate, are you trying to mince words in admitting that it makes inaccurate measurements of flow rate during that time?

MR. COSTAKOS: Objection to form.

THE WITNESS: I don't know what the author of this particular article meant or had in mind specifically by "recovery time," but I would presume it relates to a period of time when the flowmeter is continuing to make measurements but perhaps not the most accurate measurements.

BY MR. SIKORSKI:

Q So, in other words, it's a transition from inaccurate measurements to more accurate measurements; is that fair?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I can only surmise and speculate what the author had in mind --

BY MR. SIKORSKI:

Q Well, you --

A -- for that -- with that term.

01:18:18 Q You --
01:18:18 A But I wouldn't disagree with you necessarily.
01:18:21 Q You understand that you're rendering opinions based on this document. So if there's any interpretation that you've given after reading these things, I'm entitled to know them. If you have no opinion, then just -- just say you don't, okay?
01:18:35 A Okay.
01:18:36 Q The next one is No. 5, also under Section 3.2 of the slug flow supplement. Are you there?
01:18:45 A Um-hum. Yes, I am.
01:18:46 Q That paragraph begins, quote, "Once the flowmeter begins counting in a normal manner," end quote. The sentence continues. What's your understanding of "counting in a normal manner" in the context of this Model D slug flow supplement?
01:19:05 A I presume that the author of this article meant that it was producing -- that the flowmeter was producing accurate measurements when he uses the term "normal."
01:19:23 Q That sentence implies that before the normal manner, there was an abnormal manner, right?
01:19:29 MR. COSTAKOS: Objection. Form.
01:19:44 THE WITNESS: If there was -- If there
01:19:52 was a time at which the meter was not operating in

a normal manner, I presume that he meant during this recovery time that he mentions in the previous sentence.

BY MR. SIKORSKI:

Q So let's walk through that sentence. It begins, once the flowmeter begins counting in a normal manner, and it continues after that, that is in no uncertain terms a statement that you were to wait for the abnormal manner of counting to end, right?

MR. COSTAKOS: Objection. Form.

THE WITNESS: That potentially could be the case but not necessarily. For example, that previous sentence says, "This slow opening minimizes the shock to the meter and reduces the recovery time." The shock may not be substantial, and the recovery time and the meter may be producing accurate measurements throughout. Perhaps it is. Perhaps it isn't.

BY MR. SIKORSKI:

Q Well, now it sounds like you're speculating because paragraph four says it minimizes the shock. It doesn't say it eliminates the shock. And likewise, it says it reduces recovery time. It doesn't say eliminate recovery time , correct?

MR. COSTAKOS: Objection. Form.

01:21:34 THE WITNESS: My understanding of
01:21:37 "minimizes the shock" is that it minimizes the
01:21:41 potential shock.
01:21:42 BY MR. SIKORSKI:
01:21:42 Q So you're inserting a word into the sentence that
01:21:46 doesn't exist?
01:21:46 A Well, you're asking for my interpretation.
01:21:48 Q Okay.
01:21:49 A I don't see why shock necessarily would occur. I
01:21:58 think it may or may not under those circumstances.
01:22:01 Q What about recovery time? It says it reduces
01:22:04 recovery time. It does not say it eliminates
01:22:08 recovery time. What's your interpretation of the
01:22:10 sentence in Section 4 of the page we're looking at?
01:22:19 A Okay. Again, the meter or a given meter may
01:22:22 potentially be operating in an accurate manner
01:22:26 throughout this operation of loading or unloading.
01:22:35 There may be a recovery time during or -- following
01:22:45 transition of the flow.
01:22:46 Q Are you reading from the document?
01:22:47 A No.
01:22:47 Q Or are you reading into the document?
01:22:50 MR. COSTAKOS: Objection to form.
01:22:51 THE WITNESS: Well, if you'd like, I can
01:22:52 look at you while I'm answering. I'm just looking

01:22:54 at the document while I'm reading it.
01:22:58 BY MR. SIKORSKI:
01:22:58 Q You --
01:22:59 A I'm just trying to present my interpretation of it
01:23:02 as I'm reading it off the cuff.
01:23:03 Q Okay.
01:23:05 A I honestly haven't considered the --
01:23:33 Q The what?
01:23:40 A The inevitability of shock during this procedure or
01:23:48 that there -- that there is a recovery time
01:23:53 necessarily.
01:23:55 Q Have you considered the abnormal counting operation
01:24:00 that's explicitly referred to in part five?
01:24:04 MR. COSTAKOS: Objection. Form.
01:24:06 Objection. Mischaracterizes.
01:24:08 THE WITNESS: Okay. Again, that's
01:24:16 premised on what may or may not have happened
01:24:18 before. It's possible that the meter was not
01:24:26 counting in a normal or -- manner in which case the
01:24:51 slug flow board would not allow false or inaccurate
01:25:04 measurements that the meter was continuing to make
01:25:07 from being presented to the customer or
01:25:13 accumulating a total net flow. Leave it there.
01:25:32 BY MR. SIKORSKI:
01:25:32 Q The paragraph under No. 5 continues, quote, "The

amount of time required before the downstream valve can be fully opened is typically less than two minutes," and it continues. That's referring to two minutes of flow that's not counted, right?

MR. COSTAKOS: Objection. Form.

THE WITNESS: You are reading it -- You're reading something into it that I don't by making that statement.

BY MR. SIKORSKI:

Q Okay. Well, let me -- let me express to you where I'm -- how I'm interpreting it, and you tell me where you end up differing. Paragraph size -- Paragraph five begins, "Once the flowmeter begins counting in a normal manner, slowly open the downstream valve until it is fully open." You see that?

A Yes.

Q That implies that before opening the downstream valve, the flowmeter is counting in an abnormal manner, right?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I don't agree with that. Let me just make a statement.

BY MR. SIKORSKI:

Q I'd rather you answer my question, but if you want

to make a statement.
A I'm trying -- I'm not quite sure how to answer your question, but let me make a statement that hopefully will -- will answer the question in essence. Opening the valve slowly is a -- can be, depending on the situation, a prudent thing to do to minimize noise or shock that may affect the inaccuracy -- that may affect the accuracy of the flowmeter. So open the valve slowly, and then you're likely to have a better result. Shock can damage components in the system, and that's -- don't want to see that. That's a problem that's unrelated to or to accurate measurement of mass flow rate.
Q Paragraph five is telling us that under this recommended set-up for the start-up technique, the person can expect to have two minutes of flow not counted by the flowmeter?
MR. COSTAKOS: Objection. Form. Mischaracterizes.
BY MR. SIKORSKI:
Q And with that in mind, I wondered how you come to the conclusion that the slug flow supplement satisfies the final limitation of Claim 1 in the '646 patent which we saw toward the end of your

Declaration?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Okay. Well, I don't agree with the premise of your question that the flowmeter is producing inaccurate measurements for a full two minutes. I think it's just depending on the particular situation would be a prudent thing to slowly open that valve for reasons unrelated to measurement accuracy perhaps.

BY MR. SIKORSKI:

Q You would agree, of course, based on testimony that you presented before lunch, that the slug flow supplement -- Strike that. You would agree with me, of course, based on testimony you gave before lunch, that inaccurate flow measurements are being made until the point where the contents of the flowtube are greater than 0.5 specific gravity, right?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Okay. There is a potential for that, not a necessity, that inaccurate measurements may be made during two flow -- two-phase flow.

BY MR. SIKORSKI:

Q Do you know the method by which the slug flow board

01:29:59 prevents the or -- inhibits is the right verb the
01:30:08 output of flow pulses?
01:30:14 A Could I hear that question again, please?
(Last question read.)
01:31:45 THE WITNESS: While this document,
01:31:47 Exhibit 2020, describes the threshold by which
01:31:52 those pulses may be inhibited, it does not provide
01:31:56 an electronic schematic that would allow me to tell
01:32:00 you specifically what circuitry was used to make
01:32:04 that happen.
01:32:09 BY MR. SIKORSKI:
01:32:09 Q If you flip a little bit deeper into the slug flow
01:32:13 supplement document at Appendix B -- excuse me,
01:32:17 appendix -- Strike that. If you flip a little
01:32:21 deeper into the slug flow supplement document to
01:32:26 the description under Table 2, slug flow inhibit
01:32:31 standard switch settings --
01:32:34 MR. COSTAKOS: What page? Page 5?
01:32:36 MR. SIKORSKI: Page 5 of the exhibit,
01:32:38 yes.
01:32:42 BY MR. SIKORSKI:
01:32:42 Q Are you there?
01:32:43 A Just a second.
01:32:44 Q Sure.
01:32:45 A I'm there. Let me -- I haven't reviewed this

recently, so --
Q How about if you read the text below Table 2 through the bottom of the page, and let me know when you're done.
A Okay.
Q This references here to an indicator light on the slug flow inhibit board. Yes?
A It does mention that, yes.
Q And in the third, I guess the largest paragraph, it says, "The indicator light should be on when the sensor is full of fluid." Do you see that?
A Yeah. I do.
Q It also says, "When the sensor is empty or partially empty, flow pulses should be inhibited, and the indicator light should be off." Do you see that?
A I do.
Q Is it fair to say that the mode of operation described here inhibits flow pulses in the measurement of flow rate when the flowtube is anything but full?
MR. COSTAKOS: Objection. Form.
THE WITNESS: My understanding of the way this thing works is that there is a threshold point between those points determined by a switch setting

that specifies that threshold in units of specific gravity, so inhibition occurs somewhere between full and empty. Where it occurs, it depends on the switch setting.

BY MR. SIKORSKI:

Q And of course, here it says explicitly that the flow pulses should be inhibited not only when the sensor's empty but when it's also partially empty, right?

MR. COSTAKOS: Objection. Form.

THE WITNESS: That's what it says, so when the -- when the flowmeter is partially empty, the specific gravity as measured by the flowmeter will be below the threshold where inhibition of pulses occurs. That's how I interpret that paragraph.

BY MR. SIKORSKI:

Q If flow pulses are inhibited, how is a flow rate even determined?

MR. COSTAKOS: Objection. Form.

THE WITNESS: It's determined in the same manner the Model D transmitter would determine it without the inhibit board present.

BY MR. SIKORSKI:

Q Although you just admitted you don't know the

circuitry the slug board uses to inhibit the Model D flow pulses, right?

MR. COSTAKOS: Objection. I'm sorry. Objection. Form.

THE WITNESS: Well, I don't know the specific embodiment that's used in this instance. In general, a logic designer might use a simple AND gate to accomplish that. It's a very simple concept of inhibiting pulses. It's common, well-known to logic design engineers.

BY MR. SIKORSKI:

Q Right. You didn't see that AND gate in any of the documents that you looked at, right? You're just making that up right now?

A I'm not --

MR. COSTAKOS: Objection to form.

THE WITNESS: I'm not making it up. That would be how I would design it if I were designing this thing at the time. There's nothing unusual about that approach, and there are other approaches that use other types of logic gates to accomplish the same.

(Exhibit No. 2021 was marked.)

BY MR. SIKORSKI:

Q Dr. Sidman, we handed you Exhibit 2021 which is a

01:40:17 U.S. Patent to Lindenbaum, U.S. 5,224,387. I
01:40:26 assume you've seen that before today?
01:40:28 A I have.
01:40:38 MR. COSTAKOS: I'm sorry. What was the
01:40:39 exhibit number you used on this? 2021. Okay.
01:40:45 BY MR. SIKORSKI:
01:40:47 Q Wait one second. I'll get my copy. It was your
01:41:42 opinion, was it not, that Lindenbaum anticipates
01:41:49 several claims of the '646 patent, right -- excuse
01:42:01 me '761 patent?
01:42:11 A That's correct. And also, in combination with
01:42:18 Romano, it's my opinion that the '761 is obvious in
01:42:28 addition to that anticipation ground.
01:42:35 Q Right.
01:43:24 MR. SIKORSKI: Let's go off the record
01:43:25 one second. I think --
01:43:27 THE VIDEOGRAPHER: We are off the record
01:43:28 at 1:43 p.m.
01:44:04 (Discussion off the record.)
01:45:11 THE VIDEOGRAPHER: We are back on the
01:45:13 record at 1:45 p.m.
01:45:18 BY MR. SIKORSKI:
01:45:18 Q Dr. Sidman, you've had a chance to flip through the
01:45:21 Lindenbaum patent while we were taking a
01:45:24 couple-minute break there? Yes?

01:45:25 A Just very briefly, yes.
01:45:28 Q When is the last time you looked at the Lindenbaum patent before today?
01:45:34 A Yesterday.
01:45:35 Q Great. So you're all dialed in, I assume?
01:45:39 A Well, of course, I would prefer to have my marked-up version, but I'm sure we can navigate through this.
01:45:49 Q Lindenbaum is cited by you for the proposition of operating certain aspects of its operation during two-phase flow, right? If you want to refer to one of your Declarations, you should probably bring the one in front of you for the '761 patent, and I think you're looking at the right one. Great.
01:46:28 A I think I was looking at the '761. Looking at ground 6 beginning on page 88. Okay. So one place I could refer you to is the claim chart beginning on page 89 relating to Claim 5 of the '761 patent and more specifically to the -- the clause, "Maintaining oscillation of the flowtube during an onset of liquid flow through the substantially empty flowtube." And I have some description of what Lindenbaum discloses related to that in the right hand -- corresponding right-hand column.
01:49:29 Q Right. That's in your Declaration. Thank you.

01:49:31 A That's correct.
01:49:33 Q So let's talk about Lindenbaum. Lindenbaum uses
01:49:45 pulses to measure mass flow rate, right?
01:50:09 A Okay. So he describes -- I'm looking in column
01:50:14 two, the paragraph beginning at line 32. He
01:50:18 describes a measuring instrument which he
01:50:25 designates MG which produces pulses corresponding
01:50:41 to mass flow measurement.
01:50:46 Q What produces those pulses?
01:50:50 A Measurement instrument MG. By the way, I think
01:50:56 that the G is missing from this figure here.
01:51:03 Q You're pointing to Figure 4?
01:51:05 A Yeah, Figure 4. I think that M should be MG, if I
01:51:08 recall correctly.
01:51:16 Q Thank you for that.
01:51:17 A I think that clarifies that paragraph in the
01:51:19 context of Figure 4.
01:51:20 Q Other than being a box with the letters N and
01:51:26 potentially MG in it, what is it that's producing
01:51:30 these pulses that Lindenbaum is using for flow rate
01:51:36 measurement?
01:51:37 A As he describes in his abstract, for example, he
01:51:44 talks about a measuring device in accordance with
01:51:47 the Coriolis principle.
01:51:52 Q What's your understanding of the sensor that's

producing these pulses or whatever it might be if not a sensor?

MR. COSTAKOS: Objection. Form.

THE WITNESS: A Coriolis flow, mass flowmeter having a flexible conduit, oscillating conduit.

BY MR. SIKORSKI:

Q Every single Coriolis flowmeter has a flexible and oscillating conduit, right? So my question for you is what is Lindenbaum using in his flowmeter to generate these pulses used to evaluate flow rate?

A Lindenbaum is talking or disclosing an arrangement for flow measurement that is used in combination with a Coriolis mass flowmeter. That instrument, measuring instrument, is designated as MG, and he proposes circuitry that follows the output measurement of that existing Coriolis flowmeter.

Q I'm going to go back to my previous question. What is it in Lindenbaum that's producing these pulses? If you like, I'm not hearing an answer.

MR. COSTAKOS: Objection. Form. Move to strike.

THE WITNESS: He discloses measurement instrument MG that performs that operation.

BY MR. SIKORSKI:

01:54:17 Q What do you understand the letters "MG" to refer to
01:54:22 in terms of sensors, devices, circuitry? What?
01:54:26 What's inside MG?
01:54:28 MR. COSTAKOS: Objection. Form.
01:54:58 THE WITNESS: A Coriolis flowmeter
01:55:01 measurement instrument.
01:55:02 BY MR. SIKORSKI:
01:55:03 Q Such as what?
01:55:04 A Such as what's described in many of the patents at
01:55:10 issue and in the prior art as well.
01:55:14 Q What do these pulses correspond to? Does
01:55:20 placement, position, velocity, acceleration? And
01:55:23 in answering that, please point me where in
01:55:26 Lindenbaum you find that answer.
01:55:28 A Okay.
01:55:29 MR. COSTAKOS: Objection. Form.
01:55:29 THE WITNESS: So let me begin by just
01:55:35 pointing out column 2, line -- the sentence
01:55:39 beginning at line 33 which reads, in this figure,
01:55:43 MG designates the measuring instrument within the
01:55:46 arrangement for mass flow measurement, dot, dot,
01:55:53 dot. So that instrument MG is making a mass flow
01:55:58 measurement.
01:56:00 BY MR. SIKORSKI:
01:56:00 Q And it's producing pulses, right?

01:56:04 A He goes on to say, the measurement signal -- since
01:56:11 this measurement signal, dot, dot, dot, consists of
01:56:15 pulses, dot, dot, dot, so yes.
01:56:19 Q What does each pulse represent in Lindenbaum?
01:56:45 A The passage of mass through the Coriolis flowmeter
01:56:50 measurement instrument.
01:56:51 Q Is it -- Is it coming from a displacement sensor,
01:56:56 location sensor, velocity sensor or acceleration
01:57:00 sensor? What?
01:57:22 A It could be any of those. He doesn't restrict the
01:57:26 scope of his disclosure to any -- any one of those
01:57:35 particular methods of measuring mass flow.
01:57:39 Q You say he doesn't restrict, but does he identify
01:57:43 what he's using to generate these pulses?
01:57:46 A I would just answer the question the same way I did
01:57:51 earlier which is a mass flow measuring instrument
01:57:57 which he designates MG.
01:58:00 Q Why is it that the frequency of Lindenbaum's
01:58:09 pulses -- What physically causes the frequency of
01:58:13 his pulses to be unacceptably high?
01:58:38 A I'd refer you to the claim chart on page 91 of my
01:58:45 Declaration in Exhibit 2019. I'll just read a
01:58:55 portion of it, "Lindenbaum further discloses
01:58:58 measurement during the time when fluid begins to
01:59:01 flow as the tube fills with raw material." For

example, Lindenbaum discloses, quote, "Minimizing the measurement and accuracies during the time in which a heterogenous two-phase mixture flows through the metering tube," unquote. There's more in there, but I think that may answer your question.

MR. SIKORSKI: Why don't we read back my question, and let's find out.

(Following question read.)

Q Why is it that the frequency of Lindenbaum's pulses -- What physically causes the frequency of his pulses to be unacceptably high?

BY MR. SIKORSKI:

Q I'm going to ask that question again, please.

MR. COSTAKOS: Objection to form.

THE WITNESS: The inaccuracies occur during a time in which a heterogenous two-phase mixture flows.

BY MR. SIKORSKI:

Q What's causing the inaccuracies during the time in which the heterogenous two-phase mixture flows?

A Because Lindenbaum's methodology is independent, how -- how those measuring inaccuracies may occur, he doesn't disclose them.

02:00:50 Q Right. He doesn't disclose it, does he?
02:00:53 A He recognizes that they do exist during these
02:00:58 conditions.
02:00:58 Q Isn't it true that the frequency of pulses in
02:01:03 Lindenbaum corresponds to the frequency of
02:01:07 vibration of his flowtube?
02:01:12 MR. COSTAKOS: Objection. Form.
02:01:27 THE WITNESS: I -- I don't know where you
02:01:28 get that from. I -- I disagree with it. If you
02:01:32 want to direct me to something that indicates that,
02:01:35 I can discuss that.
02:01:36 BY MR. SIKORSKI:
02:01:36 Q I'll ask you a different question. Is there a
02:01:38 correlation between the vibrating frequency of his
02:01:41 flowtube and the frequency of the -- what he calls
02:01:46 pulses used to measure mass flow rate?
02:01:51 MR. COSTAKOS: Objection. Form.
02:01:56 THE WITNESS: Could I have the question
02:01:57 again?
02:02:10 (Last question read.)
02:02:42 THE WITNESS: I don't know why there
02:02:43 should be any correlation, and Lindenbaum doesn't
02:02:46 state that there is any.
02:03:09 BY MR. SIKORSKI:
02:03:09 Q If you flip to column 3 in Lindenbaum at line 34,

there's a paragraph. Can you read that to yourself? I'll read it into the record. "Accordingly, there is no flow measurement for the time in which a heterogenous two-phase mixture flows through the metering tube within the arrangement for mass flow measurement M since this measurement is too inaccurate. Instead, a synthesized signal is fed to the counter for analysis," end quote. You see that, right?

A I do, yes.

Q And you would agree, of course, that during two-phase flow, Lindenbaum isn't capable of accurately measuring flow --

MR. COSTAKOS: Objection to form.

BY MR. SIKORSKI:

Q -- right?

A Okay. I can't agree with that question as you've asked it, but let me make a statement that hopefully will clarify the matter. There is a possibility, and this -- that no flow measurement may occur during a time in which a heterogenous two-phase mixture flows through the metering tube of the Coriolis flow metering device. And that is -- that possibility is -- is what Lindenbaum's disclosure deals with. He's not stating that it

has to happen. It may happen.
Q So you -- You read the unequivocal sentence that appears in the Lindenbaum reference that, quote, "There is no flow measurement for the time in which a heterogenous two-phase mixture flows to the metering tube," end quote, as being simply a possibility and not what the sentence actually says?
MR. COSTAKOS: Objection. Form.
THE WITNESS: Okay. The context in which this statement is made is assuming that that flowmeter produces no flow measurement during this period in which a heterogenous two-phase mixture flows. He's not making a statement about flowmeters in general under all operating conditions. He's just talking about the conditions under which this might happen.
BY MR. SIKORSKI:
Q Those conditions are, without question, heterogenous two-phase flow, right?
MR. COSTAKOS: Objection to form.
BY MR. SIKORSKI:
Q Seems pretty unequivocal to me.
MR. COSTAKOS: Objection to form.
THE WITNESS: I'm not sure I'm -- I'm

02:06:52 disagreeing with you, but Lindenbaum discloses the
02:07:01 possibility that no flow measurement may occur
02:07:04 during this particular condition. Potentially may
02:07:10 happen. Not necessarily happens. I think to read
02:07:13 that in would be inappropriate, and I don't.
02:07:19 BY MR. SIKORSKI:
02:07:20 Q Wow. Okay.
02:07:22 MR. COSTAKOS: Move to strike.
02:07:29 BY MR. SIKORSKI:
02:07:29 Q When Lindenbaum is not making any flow measurement,
02:07:33 whether it be because there's two-phase flow or for
02:07:35 other reasons -- Let me rephrase that. Without
02:08:11 measuring -- Hmmm. How do I put that question?
02:08:58 What property of the flowing liquid is Lindenbaum
02:09:02 capable of determining during the time when, for
02:09:08 whatever reason, be it two-phase flow or something
02:09:11 else, Lindenbaum is making no flow measurement?
02:09:15 MR. COSTAKOS: Objection. Form.
02:09:23 THE WITNESS: Okay. So to begin with,
02:09:25 Lindenbaum is an inventor. He's not a measurement
02:09:30 device. He's disclosing a mass flow measurement
02:09:39 instrument and how it may respond to a heterogenous
02:09:53 two-phase mixture.
02:10:05 BY MR. SIKORSKI:
02:10:05 Q In your claim chart in your Declaration, page 91,

at the bottom there's a box. On the left, it says, "Determining based on sensor signals from a sensor -- sensor connected to the flowtube, a property of the flow, fluid flow." See that?

A I do.

Q And you refer to Lindenbaum's ability to measure fluid flow. I'm paraphrasing, obviously.

A Right. I say he discloses an apparatus for measuring fluid flow --

Q Right.

A -- dot, dot, dot.

Q If as stated in column 3, line 34 of Lindenbaum he is not making -- During the time at which he is not making a fluid flow measurement, is it possible for Lindenbaum to be determining a property of the fluid flow?

MR. COSTAKOS: Objection. Form.

MR. SIKORSKI: Let's read that one back.

(Last question read.)

THE WITNESS: I can't answer the question as you've asked it, but the Coriolis mass flowmeter instrument is making a measurement. It doesn't stop making a measurement. If you look, for example at Figures 2 and 3, the instrument is active in producing pulses at the -- at the

beginning of the time of metering and in Figure 3 at the time or the end of metering. It never stops operating in making a determination.

BY MR. SIKORSKI:

Q Okay.

A Whether those determinations are accurate or not, that's what Lindenbaum tries to address with his art.

Q For the time period when Lindenbaum's flow measurements are inaccurate, what property of the fluid is being determined?

A He discusses a flow -- mass flow measurement instrument so that the property would be mass flow.

Q Even though it's an inaccurate measurement?

A It may be inaccurate. It may not be inaccurate.

Q My question, sir -- Sorry. Go ahead.

A He tries to deal with his art with making the best of a situation when it's apparent that the measurement instrument is producing an inaccurate mass flow measurement.

Q My question was, during the time when the mass flow measurement is indeed inaccurate, what property is being determined of the fluid flow, if any?

A Its mass flow, the rate at which mass is passing through the Coriolis mass fluid measurement device,

02:14:15 conduit or conduits.
02:14:17 Q So you're saying inaccurate measurements of mass
02:14:20 flow -- inaccurate measurements of mass flow tell
02:14:23 you mass flow of the actual fluid?
02:14:27 MR. COSTAKOS: Objection to form.
02:16:44 BY MR. SIKORSKI:
02:16:44 Q You seem to be reading a lot of out of your
02:16:46 Declaration. A couple minutes have gone by after a
relatively simple question, so let's read it back
02:16:49 so we're not --
02:16:49 A I was about to answer your question.
02:16:51 Q Great.
02:17:05 A I direct you to page 91 of my -- of Exhibit 2019,
02:17:14 my Declaration, where it discusses a property of
02:17:21 the fluid flow, property of the fluid flow
02:17:30 identified in Lindenbaum as the movement of flow
02:17:44 through the conduit indicative of the flow rate of
02:17:50 the fluid through the conduit. It's making a
02:17:54 determination of a property of the fluid flow as
02:17:59 opposed to a property of the fluid. That's mass
02:18:08 flow rate.
02:18:09 Q But if the -- If the mass flow rate is acknowledged
02:18:13 to be inaccurate, how is it that you're determining
02:18:17 the fluid flow rate?
02:18:22 A The measure -- Coriolis mass flow measurement

instrument continues to make estimates of the mass flow rate at all times. They may be inaccurate at times due to the conditions which, for example, Lindenbaum illustrates. But measurement instrument -- the Coriolois flow -- mass flow -- The Coriolis mass flow instrument never stops making measurements or estimates of the mass flow rate.

Q Now, the claim that you were just referring to on page 91 of your Declaration, that's Claim 5, I believe, out of the '761 patent. You'll see, of course, that it says, "Determining based on sensor signals from a sensor connected to the flowtube, comma, a property of the fluid flow," end quote, do you see that?

A What page are you on?

Q Sure. Your Declaration, page 91, bottom where your left hand is on the left-hand side.

A Okay. Yep. I see it.

Q All right. So this determining clause is from Claim 5 of the '761, right, and it doesn't talk about estimating anything. It says, "Determining based on sensor signals from a sensor connected to the flowtube, a property of the flowtube." And my question again is, what property of a flowtube

comes from, admittedly, inaccurate flow measurements in the Lindenbaum reference?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Okay. I don't know how to answer that question as you've asked it, so I'll just make a statement that I think is relevant and may answer your question, whatever that exactly may be. So Lindenbaum discusses a measuring device operating in accordance with the Coriolis principle, and then that's in his abstract, then later in column 2, about line 35, discusses it in the context of making a mass flow measurement. That technology is well-known and referenced by Lindenbaum.

BY MR. SIKORSKI:

Q I'm going to ask you a quick question. We've got two minutes before a disk change.

A Okay.

Q For the time period during which Lindenbaum knows its flow measures to be wrong and inaccurate, what property, if any, do you believe comes out of those measurements, property of the fluid flow?

MR. COSTAKOS: Objection. Form.

THE WITNESS: The instrument that he discloses is attempting to continuously make

02:22:03 determinations as to mass flow.
02:22:12 MR. SIKORSKI: Take a break to switch
02:22:13 disks.
02:22:14 THE VIDEOGRAPHER: We are off the record
02:22:15 at 2:22 p.m. This is the end of Disk No. 2 in the
02:22:19 deposition of Michael Sidman.
02:22:22 (Recess taken.)
02:35:59 THE VIDEOGRAPHER: We are back on the
02:36:02 record at 2:35 p.m. This is the beginning of Disk
02:36:07 No. 3 in the deposition of Michael Sidman.
02:36:11 BY MR. SIKORSKI:
02:36:11 Q Dr. Sidman, you have the Lindenbaum, excuse me,
02:36:19 reference in front of you?
02:36:19 A Yes, I do.
02:36:21 Q If you turn to Figure 6, you can -- feel free to
02:36:33 refer to the specification if you want. Figure 6
02:36:37 shows a situation that Lindenbaum calls "purging"
02:36:43 when you've got fluid in the pipes and you're
02:36:49 slowly emptying it as opposed to start-up which is
02:36:53 shown in Figure 5 and what we've been talking for
02:36:56 the most part today of going from empty to full?
02:36:59 A Okay. I need to re-read that paragraph --
02:37:01 Q Sure, sure.
02:37:02 A -- there.
02:41:58 Q Dr. Sidman, the description of Figure 6 is all of

three lines long.
A Oh, I was reading the paragraph beginning at the end of column 3 and onto 4 that relates to Figure 6 and trying to make sense of that.
Q All right. Well, let me know when you do.
A Is there -- Is there some question you'd like me to address? Maybe I can go to the heart of it.
Q I have nothing but questions. I'm just waiting for you to sort of acknowledge and understand for your sake.
A Right.
Q There are a couple of questions waiting in the wings.
A Right. I wish I had my marked-up copy that would aid me, so --
Q You could have brought it.
A I could have.
Q So how about if I ask my questions and if you need to refer to this text to move things along, fair?
A Good idea.
Q Okay. Great. So in Figure 6, we have essentially the reverse of start-up. Instead of going from empty to full, the conduit is going from full to empty, right?
A Yes.

02:43:28 Q Pretty simple. Great. So on the left side of
02:43:37 Figure 6, we have what I'll call normal operation
02:43:43 where the Coriolis flowmeter is oscillating the
02:43:49 conduit and some sort of measurement pulses are
02:43:53 being produced, and a mass flow rate from those
02:43:56 pulses is being determined, right?
02:43:58 A That's correct.
02:44:00 Q Great. And to the right in Figure 6, we have a
02:44:07 situation where some of those measurement pulses
02:44:10 become untrustworthy, right?
02:44:14 MR. COSTAKOS: Objection. Form. Go
02:44:18 ahead.
02:44:18 THE WITNESS: Their frequency increases
02:44:21 beyond what would physically be possible --
02:44:30 BY MR. SIKORSKI:
02:44:30 Q Right.
02:44:31 A -- for that particular pump.
02:44:35 Q So taking into account for the time being the left
02:44:39 side of Figure 6, there's presumably a drive
02:44:44 mechanism that is oscillating the flowtube, right?
02:44:50 A There is. Not presumably. There is.
02:44:53 Q Great. And that flowtube is being driven at or
02:45:00 about its resonant frequency, right?
02:45:04 A Ideally, it would be. I would not have any basis
02:45:10 to believe that Lindenbaum is discussing at that

point where it would not, at least on the left-hand side of that Figure 6.

Q So we can accept that ideally to the left side of Figure 6, the flowtube is being driven at its resonant frequency, right?

A We can make that assumption.

Q Great. To the right in Figure 6 is when the fluid begins to empty out of that conduit, right?

A Yes.

Q If the drive system were able to keep oscillating the flowtube at its resonant frequency, understanding that the resonant frequency is probably changing as the flowtube empties of fluid, if Lindenbaum's drive system were able to keep oscillating the flowtube at the then resonant frequency, are you with me so far?

A Okay. Let me listen to what you have to say, but --

Q Let me ask a question.

A I'm not -- I'm not totally agreeing where I think you're going with the premise. Why don't you finish the question.

Q Right. I'll ask it in full. If the drive system for Lindenbaum's flowtube were capable of driving that tube at its then resonant frequency as that

flowtube is emptying of liquid, wouldn't the flow pulses be entirely accurate? In other words, put another way, isn't the source of inaccuracy in his pulse -- pulse frequency the fact that he's incapable of oscillating the flowtube at its resonant frequency?

MR. COSTAKOS: Objection. Form.

THE WITNESS: It doesn't state the basis for inaccurate measurement in Figure 6 other than he -- other than Lindenbaum discloses a heterogenous two-phase mixture. It doesn't describe that oscillation is occurring, not occurring, whether it's tracking the resonant frequency, whatever that may be as -- as conditions change within the flowtube.

BY MR. SIKORSKI:

Q Wouldn't your expectation be that if the flowtube were kept oscillating at its resonant frequency that the flow pulses would be output at an accurate frequency?

MR. COSTAKOS: Objection. Form.

THE WITNESS: It would certainly increase the likelihood of that, not necessarily but increase the likelihood, certainly.

BY MR. SIKORSKI:

02:49:08 Q And likewise, for start-up, if the flowtube were
02:49:13 driven at its -- Let me backtrack. Figure 5 is the
02:49:19 start-up sequence that sort of mirrors Figure 6.
02:49:27 With reference to Figure 5 if that helps, if the
02:49:30 flowtube were oscillated at its then-appropriate
02:49:37 resonant frequency as the flowtube fills with
02:49:40 liquid, wouldn't your expectation be that
02:49:46 Lindenbaum's flow pulses would be accurate?
02:49:52 MR. COSTAKOS: Objection to form.
02:49:57 THE WITNESS: I think -- Let me hear that
02:50:08 question again.
02:50:35 (Last question read.)
02:51:03 THE WITNESS: My response to that would
02:51:04 be similar to what I had to say about Figure 6.
02:51:09 BY MR. SIKORSKI:
02:51:09 Q And what is that?
02:51:11 MR. COSTAKOS: Objection. Form.
02:51:15 THE WITNESS: First of all, the resonant
02:51:19 frequency changes as the flowtube is filling. It's
02:51:30 not an instantaneous change. Having -- if -- If
02:51:35 there was at any one instant in time a resonant
02:51:43 frequency related to the density of material in --
02:51:53 in the flowtube, certainly, having the tube
02:52:02 oscillate at that hypothetical natural frequency
02:52:10 would greatly increase the chances of the flowmeter

instrument producing accurate measurements.

MR. SIKORSKI: One second.

(Exhibit No. 2022 was marked.)

BY MR. SIKORSKI:

Q Dr. Sidman, we've handed you Exhibit 2022 to your deposition which corresponds to Micro Motion 1006. It's the U.S. Patent to Romano 4,934,196. You recognize this patent? Yes?

A I do. I haven't verified it's complete, but I would presume that it is.

Q It's intended to be. But if you spot anything missing, let me know.

A Sure.

Q If you could flip in the Romano reference to page 49 of the exhibit which is columns 25 and 26, please.

MR. COSTAKOS: Which ones?

THE WITNESS: 25 and 26.

MR. COSTAKOS: 25 and 26.

THE WITNESS: I'm there. I haven't read it, but I'm on that page.

BY MR. SIKORSKI:

Q You're familiar with this reference, right?

A Yes, I am.

Q It's set in your Declarations?

02:55:36 A What I mean is I haven't refreshed myself just now.
02:55:41 Q Okay. Well, I'm sure you recall that beginning at column 26, line 17 is where you cite in Romano for the proposition of initial vibration of -- of the tubes, right? And feel free to reference either of your Declarations.
02:56:08 A Which Declaration are you referring to, the '761 or the '646 right now?
02:56:13 Q It's going to be the '646 right now. You've got a claim chart at page 60 and some text that is before and after that.
02:57:25 A Just a moment. Okay. You're directing me to the claim chart on page 60 of the '646 Declaration.
02:57:57 Q Yeah. I mean, you're free to look at whatever you want in your Declaration. I'm just pointing out that page 60 is where you have a claim chart. Perhaps that's helpful. Perhaps that's not.
02:58:06 A Okay. So what was your original question?
02:58:12 Q At column 26, line 17 is where Romano talks about placing his flow tubes into laboratory motion. You see that?
03:00:37 A Okay. I don't see where I've cited to that section in this particular claim chart.
03:00:41 Q Okay. Perhaps I jumped a little bit ahead.
03:00:44 A Okay.

03:00:44 Q So your claim chart begins at about page 60 of your
03:00:49 Declaration, right?
03:00:50 A Claim 1, yes.
03:00:53 Q Yes. And on page 61 is a part of Claim 1 in the
03:00:57 '646 that talks about determining flow rate during
03:01:01 the transition from empty to full, right?
03:01:04 A It does.
03:01:08 Q And in the right column, you have one, two, three,
03:01:12 four, five, maybe six paragraphs that, if I
03:01:19 understand your claim chart correctly, purport to
03:01:22 meet this claim limitation, right?
03:01:29 A They do. Let me just re-read them briefly.
03:01:32 Q Sure.
03:02:07 A Okay.
03:02:07 Q Which of the paragraphs in the right side of your
03:02:10 claim chart do you rely on for the proposition of
03:02:17 determining flow rate during that transition from
03:02:20 empty to full?
03:02:26 A All of them.
03:02:27 Q All of them?
03:02:27 A All of the ones listed, yes.
03:02:29 Q I mean, the portions that you quote, none of them
03:02:33 talk about the transition from empty to full. They
03:02:34 just talk about determining flow rate?
03:02:39 MR. COSTAKOS: Objection. Form.

THE WITNESS: Okay. I don't -- I don't follow your question.
BY MR. SIKORSKI:
Q Sure. The claim requires determining a flow rate as the flowtube transitions from substantially empty to substantially full, correct?
A Yes.
Q Right. And none of the passages on the right side of your claim chart discuss the situation where the flowtube transitions from empty to full?
MR. COSTAKOS: Objection. Form.
THE WITNESS: Implicitly some of them do.
BY MR. SIKORSKI:
Q How so?
A Okay. So I'm looking at the third element or statement, quote, "A specific object is to provide such a meter which is substantially immune to noise regardless of whether that noise originates from harmonies, turbulent flow conditions, modal excitation or other noise sources such as," end quote, such as might occur during that transition from substantially empty to substantially full. So he's discussing noise there.
Then he talks -- Excuse me. The fifth statement in my claim chart states, "Varying the

sampling frequency in response to the ascertained face value in order to compensate for a change in the fundamental frequency caused by a substantially simultaneously-occurring variation in density of the fluid flowing through the meter such as would occur during a" -- end of quote, such as would occur in the transition from a condition where the flowtube is substantially empty to where it's substantially full.

And then lastly, the sixth quotation on the page -- top of page 62, quote, "In the event that the combined signals produced by both velocity sensors are too low, indicating that the flowtube are not vibrating over a sufficiently-large distance, then the power amplifier will increase its peak output to correspondingly increase the peak vibratory amplitude of the flow tubes," unquote, such -- such as may occur in the transition from when the flowtube is substantially empty to when it is substantially full.

Q So any discussion of a variation in density to you refers to the situation when the flow is starting from empty to full?

A I didn't say that, and I didn't mean to imply that.

Q Well, at the bottom of page 61, you just quoted a

sentence that talks about a variation in density, and you said you read that as referring to start-up.

MR. COSTAKOS: Objection. Form.

THE WITNESS: That would be a condition that would occur during that transition. I'm not saying that's the only way a variation in density of the fluid flowing through the meter may occur. This claim -- This claim clause relates to that specific condition. That's -- And these references are all pertinent to that.

BY MR. SIKORSKI:

Q If you look at column 26, line 17 --

A Okay.

Q -- read that paragraph beginning, "Whenever the flow tubes are to be initially placed into vibratory motion."

A Okay.

Q So here we have a description of initial vibration, right?

A The flow tubes are to be initially placed into vibratory motion --

Q Right.

A -- from a stationary position is what it says.

Q And having read this paragraph, I assume you read

from column -- column 26, line 17, to line 42?
A I did.
Q There's no description of two-phase flow here, right?
A I agree.
MR. SIKORSKI: All right. Why don't we take a break.
THE VIDEOGRAPHER: We are off the record at 3:11 p.m.
(Recess taken.)
(Exhibit No. 2023 was marked.)
THE VIDEOGRAPHER: We are back on the record at 3:26 p.m.
EXAMINATION
BY MR. HEINTZ:
Q Good afternoon, Doctor.
A Good afternoon.
Q Sir, I'm going to switch over now, and we're going to talk about the '854 patent, okay. Placed before you marked as Exhibit 2023 is a copy of what I believe is your expert report concerning the '854 patent in the 167 IPR; is that correct?
A That's my Declaration.
Q Okay. I'm sorry. Declaration.
A That's fine.

Q Sir, I'd like for you to turn your attention to paragraph 109.

MR. COSTAKOS: What'd you say, paragraph 109?

MR. HEINTZ: I did, paragraph 109.

BY MR. HEINTZ:

Q All right. This paragraph states that you understand that claims in an Inter Partes Review proceeding are given their broadest, reasonable construction that is consistent with the patent specification. Do you see that?

A I do.

Q Okay. Did your Declaration, what's been marked as Exhibit 2023, specifically construe any claims of the '854 patent?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I think in general I accepted how the Patent Office ended up construing the patents and claim terms after looking at my report. Does that answer your question?

BY MR. HEINTZ:

Q Do you mean your Declaration?

A My Declaration. Thank you.

Q I led you astray.

MR. COSTAKOS: Yes, you did.

BY MR. HEINTZ:
Q Well, Dr. Sidman, you filed your Declaration before the Patent Office construed any claim terms, correct?
A That's correct.
Q Okay. And so my question is, in Exhibit 2023 itself, and I think the answer's no, I'm just asking you to confirm, you didn't specifically set forth any constructions in the way you construed any of the claims of the '854 patent; is that correct?
MR. COSTAKOS: Objection. Form.
THE WITNESS: I'm not an attorney, but I don't think I did explicitly.
BY MR. HEINTZ:
Q Okay. Did you assist the petitioner in developing the petitioner's claim constructions?
A For the action in District Court, yes.
Q Do you remember which -- which terms of the '854 patent you helped petitioner construe? And if you need the patent, I can give it to you.
A There were -- There's a lot of material there. I don't recall which I may have helped them construe it specifically, but I did spend a lot of time helping them construe or helping them formulate

that document.
Q And have you reviewed the Board's construction in its institution decision, again, with respect to the '854 patent?
A I have.
Q Okay. Did you agree with the Board's constructions in that decision?
MR. COSTAKOS: Objection. Form.
MR. HEINTZ: What's the basis for the objection, counselor?
MR. COSTAKOS: I wouldn't -- I wouldn't say it was a construction. I would say it was a preliminary construction.
BY MR. HEINTZ:
Q Thank you. With that caveat, sir, did you agree with the Board's preliminary construction in its institution of this decision?
A For the most part, yes, but not completely.
Q Okay. What parts didn't you agree with?
A What I can think of off the cuff is how they construed the term "positive feedback mode" as, quote, "Drive signals generated on the basis of sensor signal analysis," unquote, wherein the drive signal, quote, "includes components of a sensor signal detected by the sensor and fed back to the

driver," unquote.
Q All right. Why don't we mark as Exhibit 2024 the Institution Decision, Paper No. 10 in IPR-2014-00167.
(Exhibit No. 2024 was marked.)
BY MR. HEINTZ:
Q Okay. Dr. Sidman, I'll ask you when you're ready, when you've reviewed this, to turn to page 9. Take your time, sir.
A Okay. I'm on page 9.
Q There on the top of page 9 under No. 4 is the term "positive feedback mode." Is that the construction with which you disagree as you indicated earlier?
A I disagree in part with that, yes.
Q Okay.
A That's -- That's what we're talking about here, so fine.
Q With which part of that construction do you disagree?
A The word "analysis."
Q That's the word "analysis" that appears at the end of petitioner's proposed construction; is that right?
MR. COSTAKOS: Objection. Form.
THE WITNESS: Which document are you

referring to?
BY MR. HEINTZ:
Q Yeah. We're referring to what's been marked as Exhibit 2024.
A Right.
Q This is the Board's institution decision.
A Right.
Q We're on page 9.
A Right.
Q And the second line reads, "Petitioner's proposed construction for this term is."
A Oh, okay. I understand that.
Q Okay. And I think you said you disagreed with the term "analysis."
A Right.
Q Okay. And that's petitioner's proposed construction?
MR. COSTAKOS: Objection. Form.
BY MR. HEINTZ:
Q Correct?
A All I said is it's petitioner's proposed construction. I'm not sure I'm differing with you at all.
Q Okay.
A I'm just trying to be careful.

03:35:12 Q All right. So what about the word "analysis" is --
03:35:18 do you disagree with?
03:35:29 A It adds an unnecessary restriction.
03:35:35 Q And what is the unnecessary restriction that it
03:35:38 adds?
03:35:42 A That the drive signals generated for positive
03:35:48 feedback mode need to be, quote-unquote,
03:35:55 "analyzed."
03:36:00 Q Well, the construction doesn't say that the drive
03:36:02 signals need to be analyzed. It says that the
03:36:04 sensor signal needs to be analyzed, correct?
03:36:06 A You're correct.
03:36:07 Q Okay.
03:36:08 A That the sensor signal needs to be analyzed.
03:36:10 Q And you disagree with that?
03:36:14 A I think that's an unnecessary -- that analyzing the
03:36:19 sensor signal is an unnecessary restriction.
03:36:26 Q What's your understanding of the meaning of the
03:36:28 word "analysis" in this context?
03:36:33 A Okay. So that question, I think, goes to the heart
03:36:38 of the problem. And that is what is analysis and
03:36:43 how -- and what it means to different people. So
03:36:53 if "analysis," for example, means or implies that
03:37:03 the sensor signal needs to be analyzed to the
03:37:08 extent that, for example, a parameter of it is

estimated, I disagree with that. If "analysis" means the signal is merely filtered, gain adjusted, offsetted, I don't have a problem with it. But I think that in its -- outside of the context of this litigation, "analysis" implies something more than just gain adjustment or filtering or the like. So I don't like that word "analysis." I think it presents an unnecessary restriction on positive feedback mode, and I don't think Henry's actually doing analysis anyways in the positive feedback mode.

Q Okay. Is that your answer? I don't want to cut you off.

A Yeah. That's it.

Q Okay. So I want to go back and cover a couple of points, so you said you -- At the end of your answer, you said you don't think Henry is doing analysis in the positive feedback mode. When you used the word "analysis" in that part of your answer, were you referring to analysis in the first sense in the example you gave me or the second sense?

A In the sense that, for example, a parameter may be estimated versus the signal, the sensor signal just filtered or gain adjusted.

Q And so you would say in the Henry patent it's not talking about the former. It's really talking about the latter. In other words, what Henry is talking about is, according to you, gain adjustment and filtering and offsetting any other kinds of things you -- you gave in your answer as to the second mode of analysis?

MR. COSTAKOS: Objection. Form.

THE WITNESS: That's correct.

BY MR. HEINTZ:

Q Okay. Now, in your answer, you also mentioned the term "filtered." What did you mean by "filtered"?

A Taking a signal and filtering it through analog signal filtering or digital signal filtering. An example would be low pass filtering, gain adjustment, integration as in a PI controller.

Q If he simply shifted the phase of a signal, would you consider that to be filtering?

MR. COSTAKOS: Objection to form.

THE WITNESS: As opposed to analysis?

BY MR. HEINTZ:

Q No. I'm just asking, you know, would a phase shift in your opinion be considered filtering?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Can I have the question one

more time, please?

(Following question read.)

Q No. I'm just asking, you know, would a phase shift in your opinion be considered filtering?

THE WITNESS: A filter could create a phase shift in a signal.

BY MR. HEINTZ:

Q Is that your answer?

A Yes. I'm not sure I answered your question.

Q It didn't, so --

A Okay. Ask it -- Ask it a different way perhaps.

Q I'll try. So if you had a circuit element that shifted the phase of a signal but did not affect the signal's amplitude and did not affect the signal's frequency, would you consider that element to have performed filtering on such a signal?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Could I have the question one more time?

(Last question read.)

THE WITNESS: Are you talking about a digital filter or a continuous filter?

BY MR. HEINTZ:

Q Either one.
A It's possible to create a phase shift through a filter.
Q Well, I'm sorry. Again, that doesn't answer the question. So I've described for you a circuit element that does nothing but shift the phase, has no other effect on the signal but a phase shift. So my question to you is, is that filtering the signal?
MR. COSTAKOS: Objection. Form.
THE WITNESS: It could be performed by filtering the signal in general.
BY MR. HEINTZ:
Q Is performing a phase shift on a signal without affecting any other property of the signal necessarily filtering the signal?
MR. COSTAKOS: Objection. Form.
THE WITNESS: I'd have to think about it. I haven't thought about that hypothetical question.
BY MR. HEINTZ:
Q Okay. As of right now, you don't have an opinion on that; is that correct?
A I haven't considered the possibilities that might be encompassed by -- all of the possibilities that might be encompassed by your general hypothetical

condition, so I'm reluctant to offer an opinion on that until I've had time to consider that in a way other than I've already expressed.

Q I'd like to have marked as Exhibit 2025 what's been previously marked as Micro Motion Exhibit 1008 which is U.S. Patent No. 5,009,109 to Kalotay.

(Exhibit No. 2025 was marked.)

BY MR. HEINTZ:

Q Dr. Sidman, I'll ask you if you're familiar with the Kalotay patent, what's been marked as Exhibit 2025.

A Yes. I refer to it with reference to the -- in my '136 IPR Declaration.

Q You do, sir. That's correct. I'd ask you to turn to Figure 3 of the Kalotay patent, and I'll ask you in particular to direct your attention to what's marked with reference numeral 431 which reads, "Inside the box 90-degree phase shift." Do you see that circuit element?

A I do.

Q Is that circuit element performing filtering of the left velocity sensor signal?

A Designated at .41, yes. It's also designated as VL in that figure.

Q I'm sorry. So does that mean that the circuit

element 431 in Figure 3 of the Kalotay patent is filtering the signal designated as VL at -- I don't know if the node is marked as 41, but --

A Well --

Q -- the signal marked as VL in any event, is the -- Let me restate this. Does the circuit element 431 filter the signal designated as VL in Figure 3 of the Kalotay patent?

A Okay. Yes, as described in column 9 in the paragraph beginning at line 29, it states: "Specifically, the left -- the sinusoidal left velocity signal, VL, produced by coil 160L, is applied, via lead 41, as input to the 90 degrees phase shifter 431. The sinusoidal output of the phase shifter is applied through amplifier 438," dot, dot, dot. So it's performing a filtering operation on the left velocity signal.

Q Sorry. Did you finish?

A Yep.

Q Thank you. Okay. And, again, with reference to Kalotay, this will help get to another question, there is a -- an amp 438 that accepts the output of the 90-degree phase shift circuit element 431. Do you see that?

A That's correct.

(Attorney Johnson leaves the room.)
BY MR. HEINTZ:
Q Okay. What does the amp 438 do to the -- I guess we've established it's a filtered left velocity sensor signal?
A Well, obviously, it -- it amplifies the output of that 90-degree phase shifter in some way.
Q And what does "amplify" mean?
A In this case, it might just mean presenting -- presenting a low impedence drive signal to linear inverter 439. It doesn't state explicitly how it's performing the amplification.
Q Is it correct to say that "amplification" means applying a gain to a signal?
MR. COSTAKOS: Objection. Form.
THE WITNESS: They're not necessarily synonymous, though introducing a gain higher than unity is often accomplished through the use of an amplifier.
BY MR. HEINTZ:
Q And let me just lay a little bit of groundwork here since we jumped into this figure. Figure 3 in Kalotay is a circuit that uses a positive feedback mode to generate a drive signal; is that correct? And again, I'm using positive feedback mode as

construed by the Board.
A Okay. Could I take a look at the decision of the Board with respect to the '136?
Q Sure. I think we're up to Exhibit 2026, so I'll have the Board's decision with respect to U.S. Patent No. 6,311,136 in IPR2014-00170 marked as 2026.
(Exhibit No. 2026 was marked.)
MR. COSTAKOS: Did you give him the '136 Declaration or not?
MR. HEINTZ: I did not.
MR. COSTAKOS: Oh, okay.
THE WITNESS: Oh.
BY MR. HEINTZ:
Q Just so we're clear, I'm asking you about the '854 patent.
A Oh.
Q And I asked -- Sorry. And earlier, I told you I'm using positive feedback mode in that question as construed by the Board in connection with the '854 patent, so Exhibit 2024 is the Board's decision.
A Okay.
MR. COSTAKOS: Well, then my objection is scope. It's beyond the scope.
MR. HEINTZ: Beyond the scope of what?

04:00:40 MR. COSTAKOS: I don't think Kalotay is
04:00:42 involved with the '854 patent. No, so it's beyond
04:00:49 the scope. That's my objection.
04:00:52 MR. HEINTZ: Okay.
04:00:53 BY MR. HEINTZ:
04:00:53 Q You can still answer the question if you're able
04:00:55 to, sir.
04:00:56 A I haven't considered Kalotay with respect to that
04:01:00 IPR.
04:01:01 Q You are familiar with the way in which the Kalotay
04:01:04 patent works, correct?
04:01:06 A Yes.
04:01:07 Q And you're familiar with the way that the drive
04:01:09 circuit in Figure 3 works, correct?
04:01:16 A Yes, of the Kalotay '109 patent, right.
04:01:21 Q Right. And you're familiar with the Board's
04:01:23 construction of positive feedback mode, correct, in
04:01:29 IPR2014-167?
04:01:34 MR. COSTAKOS: The '136 -- No, the '854?
04:01:37 MR. HEINTZ: For the '854 patent, yes.
04:01:40 MR. COSTAKOS: Okay.
04:02:14 THE WITNESS: Yes.
04:02:15 BY MR. HEINTZ:
04:02:15 Q Okay. So my question is, does the circuit shown in
04:02:21 Figure 3 of the Kalotay patent implement positive

feedback mode as that term was construed by the Board in connection with IPR2014-00167?

MR. COSTAKOS: Objection. Form and scope. And just so I don't have to say "scope" every time, I'm going to kind of just be continuing on scope as it relates to this issue.

MR. HEINTZ: I don't -- I don't mind the continuing objection. I disagree with you that there's anything improper about the scope, but we disagree.

MR. COSTAKOS: Obviously, you disagree. I'm not asking for your agreement.

MR. HEINTZ: I understand, but I don't have a problem with you objecting -- a continuing objection on scope if that's what you want to do.

MR. COSTAKOS: Fair enough.

THE WITNESS: I haven't considered that possibility, and I'm reluctant to answer your question in a way that might be speculative. I'd need time to consider that.

BY MR. HEINTZ:

Q Okay. Well, I'm just trying to get some vocabulary down. And, you know, you remember earlier when I asked you about the Board's construction of positive feedback mode in connection with the '854

patent, you told me that you disagreed with the word "analysis" in the Board's construction which is the same as petitioner's construction, correct?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I think it's an unnecessary restriction and opens up the possibility of misinterpretation.

(Attorney Johnson enters the room.)

BY MR. HEINTZ:

Q By the way, is the reason you didn't put any claim constructions in your Declaration in connection with the '854 patent because you disagreed with the petitioner over this construction of positive feedback mode?

MR. COSTAKOS: Objection. Form.

THE WITNESS: No. I didn't start worrying about the possible implications of the word "analysis" in that claim construction until recently.

BY MR. HEINTZ:

Q What caused you to start worrying about the implications recently?

A Just preparing for this deposition.

Q What implications are you concerned about?

A The ones that I described to you earlier.

04:06:54 Q Why -- Why is it then that you chose not to include
04:06:59 any constructions in your Declaration for the '854
04:07:02 patent?
04:07:04 MR. COSTAKOS: Objection. Form.
04:07:07 BY MR. HEINTZ:
04:07:07 Q Actually, let me lay a foundation. Did you decide
04:07:10 whether or not to include constructions in your
04:07:12 Declaration for the '854 patent?
04:07:23 A Having already helped Foley Lardner draft their
04:07:32 invalidity contentions, I didn't see any need for
04:07:35 that.
04:07:37 Q Did you understand that those invalidity
04:07:40 contentions that you helped Foley Lardner draft
04:07:42 were not -- Well, let me rephrase that. Which
04:07:46 invalidity contentions are you referring to in your
04:07:48 answer?
04:07:51 A Their claim charts.
04:07:54 Q Those in the petition for --
04:07:55 A The petition.
04:07:56 Q Okay. All right. You did include constructions in
04:08:03 some of your other Declarations, though, did you
04:08:06 not?
04:08:07 A I'm not sure which -- what you're referring to. If
04:08:10 you want to direct me to something, I can comment
04:08:13 on it.

04:08:14 Q That's all right. All right.
04:08:16 MR. COSTAKOS: And for the record, I don't think he did, but --
04:08:18 MR. HEINTZ: Okay.
04:08:19 MR. COSTAKOS: -- the record is whatever it is.
04:08:20 MR. HEINTZ: Fair enough.
04:08:20 MR. COSTAKOS: I mean, they say what they say.
04:08:22 MR. HEINTZ: All right.
04:08:27 BY MR. HEINTZ:
04:08:27 Q When you gave me your answer earlier and you used the word -- Sorry. You told me you disagreed with the word "analysis" in the construction of positive feedback mode, you mentioned the term "gain adjusted." Do you recall that?
04:08:45 A I believe that's one of the phrases I used.
04:08:48 Q What does "gain adjusted" mean?
04:08:52 A Changing the gain of a signal.
04:08:54 Q What is the gain of a signal?
04:09:03 A Well, signal in and of itself doesn't have a gain. Gain is an operation applied to a signal, applying a gain, multiplying it by five, for example.
04:09:18 Q Okay. How do you determine what the gain of a signal -- I'm sorry, what the gain that's applied

to a signal is?
A It could mean different things based on the context. For example, if we're talking about a voltage gain on an analog signal through an operational amplifier circuit, it would have generally what's understood as a fixed gain using fixed resistors as feedback.
Q All right.
A If the --
Q Sorry.
A In digital signal processing, the gain may be multiplication, arithmetic, within the microprocessor or digital signal processor or the like.
Q I'm actually -- Thank you, but I'm actually asking you a much simpler question than that. So let me redirect your attention to Figure 3 of the Kalotay patent, if you would. I'm going to again direct your attention to the amp -- the amp which I believe is an amplifier circuit element 438. Do you see that?
A I do.
Q Would it be correct to say that that amplifier applies a gain to the output of circuit element 431?

MR. COSTAKOS: Objection. Scope.

THE WITNESS: Kalotay does not disclose in his '109 patent that amplifier 438 produces, for example, a voltage gain on the signal coming out of phase shifter 431.

BY MR. HEINTZ:

Q Do you have an understanding as to whether the amplifier 438 produces a voltage gain on the signal coming out of 431?

A No.

Q All right.

A It may be just as I mentioned, a way to drive the following block which is linear inverter 439 from a layman's point of view.

Q Okay. The signal that comes out of circuit element 431 is an analog signal, correct?

MR. COSTAKOS: Objection. Scope.

THE WITNESS: I understand Kalotay's implementation of that block in Figure 3, i.e., is preferred embodiment to be analog.

BY MR. HEINTZ:

Q Okay. Would it be correct to say that it is a sinusoidal analog signal?

MR. COSTAKOS: Objection. Scope.

THE WITNESS: Which signal are you

04:13:44 talking about, VL?
04:13:47 BY MR. HEINTZ:
04:13:47 Q I am talking about the output of circuit element
04:13:52 431.
04:14:06 A Well, as I mentioned earlier, the motion of the
04:14:11 conduit, i.e., as reflected by sensor signals in
04:14:16 this case, left velocity sensor 160L, there's not
04:14:29 necessarily purely sinusoidal, so that's one of the
04:14:35 problems I have in answering your question in the
04:14:38 affirmative.
04:14:38 Q Okay. Let me ask you to assume for a second that
04:14:44 VL is a pure sinusoidal signal, okay. And I'll
04:14:51 ask, wouldn't that mean that the output of circuit
04:14:54 element 431 would also be a pure sinusoidal signal,
04:15:03 assuming there is no -- neglecting the effects of
04:15:07 any noise that might get implemented or impressed
04:15:07 on the signal by circuit element 431?
04:15:11 MR. COSTAKOS: Objection. Form.
04:15:16 MR. HEINTZ: You know, I'll withdraw the
04:15:18 question.
04:15:18 BY MR. HEINTZ:
04:15:18 Q I'll ask you to assume that the output of the
04:15:21 circuit element 431 is a pure sinusoid, okay?
04:15:25 A That the output --
04:15:26 Q The output is a pure sinusoid of 431.

04:15:31 A Okay.
04:15:31 Q All right. Now, I'll further ask you to assume that the amplifier 438 is a -- going to apply a
04:15:33 04:15:39 voltage gain to that signal, to the output of
04:15:43 circuit element 431, okay?
04:15:46 A Of something other than unity?
04:15:51 Q Something other than unity, yes.
04:15:54 A All right.
04:15:54 Q Okay. Now, how would I go about determining what
04:15:56 the gain was that was applied to the output of the
04:16:05 circuit element 431?
04:16:08 MR. COSTAKOS: Objection. Scope.
04:16:15 THE WITNESS: Are you asking me what kind
04:16:16 of instruments I would use --
04:16:18 BY MR. HEINTZ:
04:16:19 Q No.
04:16:19 A -- to determine that, or are you asking me how, for
04:16:21 example, I would determine it from a schematic? I
04:16:24 mean, I don't -- There's a whole range of possible
04:16:27 ways to answer your question.
04:16:30 Q I understand.
04:16:31 A Depending on the context, I would answer that
04:16:36 question in a variety of different ways.
04:16:38 Q All right. If the amplitude of the pure sinusoid
04:16:42 that was input to the amplifier 438 were one volt

and the amplitude of the sinusoid that was output by the amp 438 were two volts, what would be the gain, the voltage gain?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Assuming you're measuring both signals in the same way, i.e., zero to peak?

BY MR. HEINTZ:

Q Yes.

A Then I think it would be reasonable to say that that amplifier had a gain of two.

Q That would be the rate --

A That's what you asked me to assume. I'm not saying that that's what Kalotay says, nor is Kalotay indicating that it has any particular voltage gain.

Q I understand. I'm just trying to get vocabulary down. There's been some confusion because you talked about gain adjustment for a signal. Then we found out that signals don't have gain, so I'm just trying to figure out if it's correct to say that -- that gain means the ratio of the output signal to the input signal for whatever quantity you're defining gain?

MR. COSTAKOS: Objection. Form. Scope.

THE WITNESS: Okay. Depending on the context of your question, and there's a lot of

possibilities there, it's possible to understand that the ratio of those voltages are amplitudes as related to the voltage gain.

BY MR. HEINTZ:

Q Okay.

A But there are all kinds of caveats there.

Q Well, what are --

A So I'm -- I'm reluctant to make a blanket statement that general -- that generalizes an acceptance of the premise of your question.

Q Okay. What are those caveats?

MR. COSTAKOS: Same objections.

THE WITNESS: Could be a whole range of possibilities. For example, suppose the amplifier 438 has a nonlinearity --

BY MR. HEINTZ:

Q Okay.

A -- or it limits. There's a whole range of possibilities. I'd rather not speculate on all of the possibilities because I haven't really considered that in preparation of this IPR Declaration.

Q The fact that a -- an amplifier might have a nonlinear gain doesn't mean that there's a different definition to the word "gain," does it?

04:19:52 MR. COSTAKOS: Objection. Form. Scope. Relevance.
04:19:56
04:20:07 THE WITNESS: Could I hear that question one more time, please?
04:20:08
04:20:18 (Following question read.)
Q The fact that a -- an amplifier might have a nonlinear gain doesn't mean that there's a different definition to the word "gain," does it?
04:20:25
04:20:25 THE WITNESS: I don't know what you mean by "nonlinear gain."
04:20:26
04:20:29 BY MR. HEINTZ:
04:20:30 Q Well, what did you mean when you told me that the nonlinearity in an amplifier was one of the caveats?
04:20:32
04:20:36
04:20:44 A Well, inherently, a nonlinearity implies a nonlinear relationship between the input and output of the amplifier as we're discussing here.
04:20:57
04:20:59
04:21:02 Q And regardless of -- I'm sorry.
04:21:04 A Okay. Continue.
04:21:04 Q No. I didn't want to cut you off. I didn't realize you weren't done, so please finish your answer.
04:21:06
04:21:09
04:21:09 A Now I've forgotten my response, so why don't you

04:21:12 ask your next question.
04:21:13 Q Okay. I'll try to wait a little longer. So you
04:21:15 talked about a nonlinear gain.
04:21:18 A No, I didn't.
04:21:20 Q I'm sorry?
04:21:21 A I didn't say that.
04:21:21 Q What did you say, sir?
04:21:23 A I said I don't know what you mean by "a nonlinear
04:21:28 gain."
04:21:28 Q I'm sorry. A nonlinear amplifier.
04:21:31 A Okay. What's your question?
04:21:50 Q Okay. Let me go back a little bit here. Okay.
04:21:51 You told me that nonlinearity meant a nonlinear
04:21:54 relationship between the input and the output?
04:21:57 A Right. That's what it could mean in the context of
04:22:01 this amplifier, for example.
04:22:03 Q Okay. The fact that there's a nonlinear
04:22:06 relationship between the input and the output
04:22:09 doesn't mean that the definition of "gain" is
04:22:12 somehow different, does it?
04:22:15 A It means that the term "gain" cannot be applied in
04:22:20 a blanket manner.
04:22:21 Q In each instance, for each value of the input
04:22:30 signal and the output signal, I can calculate a
04:22:33 gain, and that gain would be the ratio of the

output signal to the input signal, would it not?
A Okay.
MR. COSTAKOS: Objection. Form. Scope.
THE WITNESS: I don't want to simplify it like that, and I'll just give you an example or two as to why I don't want to do that.
BY MR. HEINTZ:
Q Okay.
A So an electronic circuit, for example, could have a small signal gain or a large signal gain -- large signal gain which are different, in part, due to a nonlinearity within the device. So I don't want to oversimplify something that is commonly understood is a real issue, for example, in amplifiers.
Q Okay. Is that your answer?
A Yep.
Q All right.
A It is.
Q So you gave an example of a small signal gain and a large signal gain for a single amplifier, correct?
MR. COSTAKOS: Objection. Form. Scope. Relevance.
BY MR. HEINTZ:
Q Would you like to hear your answer read back?
A No.

04:24:43 Q Okay.
04:25:01 A There are different ways of measuring gain
04:25:07 depending on, for example, the magnitude of an --
04:25:20 of an input signal, its offset into a system that
04:25:24 has a -- that has nonlinear behavior, so that's a
04:25:32 caveat. I don't see how any of that is relevant to
04:25:39 the issues of invalidity in this case. So any
04:25:47 answer that I give you like that to a hypothetical
04:25:54 situation like what you proposed would be
04:26:00 incomplete because I haven't considered all of the
04:26:03 nuances of responding to that question.
04:26:09 Q Okay. You said that there would be different ways
04:26:12 to determine the gain depending on the magnitude of
04:26:18 the input signal, correct?
04:26:21 A Um-hum.
04:26:21 Q So what are the different ways of determining a
04:26:23 gain based on the magnitude of the input signal?
04:26:27 MR. COSTAKOS: Same objections.
04:26:31 THE WITNESS: Could be lots of different
04:26:32 ways, just, for example, the small signal gain of
04:26:52 the amplifier about an operating point, a reference
04:26:57 level, the magnitude of the signal, and I think
04:27:07 you're talking about sinusoidal signals here,
04:27:11 correct?
04:27:16 BY MR. HEINTZ:

Q I am, yes.
A And that in combination with its offset, those are just a few examples that I can think of off the cuff.
Q Okay. I was asking you for different ways to determine the gain or measure the gain, and you told me one of the ways is a small signal gain about an operating point, correct?
A Right.
Q Does that mean you would -- I'm sorry. By "small," what do you mean?
MR. COSTAKOS: Same objections.
THE WITNESS: That would have different meanings depending on the type of nonlinearity, for example.
BY MR. HEINTZ:
Q Are we talking about the amplitude?
MR. COSTAKOS: Objection. Form.
THE WITNESS: I don't know what you're talking about at this point. You have to be more specific in your question. Then I could help you.
BY MR. HEINTZ:
Q Well, you told me you could measure the small signal gain of an amplifier -- Sorry. You can measure the gain of an amplifier using a small

signal gain about an operating point I think is what I wrote down that you said. Okay. "Small signal" means something, I presume, and I'm just asking you what it means.

A Oh.

MR. COSTAKOS: Objection. Form. Scope. Relevance.

BY MR. HEINTZ:

Q Let me give you an answer that I think what you're getting at. You tell me if I'm just off base, okay. When you say "small signal" and "large signal," I think what you might mean is if we're talking about a gain for the amplitude, by "small signal" you mean signals with small amplitudes as compared to large signals which are signals with larger amplitudes, and it's just some relative measure; is that correct?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Okay. So I think this discussion is going down the rat hole, but there's a whole area of engineering theory relating to gain of systems in the presence of nonlinearities. And those -- And that area is generally described as "describing functions," quote-unquote. So I don't see the need to go down that path, and I certainly

haven't been considering describing functions, nonlinear behavior of amplifier 438, in formulating my Declaration or Declarations for these IPRs.

BY MR. HEINTZ:

Q Okay. Well, you understand I get to ask the questions. So even if you don't understand why I'm asking, you have to answer if you're able. You get that, right?

A Well, I'm trying to be -- I'm trying to -- I'm trying to illustrate that the subject as you've asked in a hypothetical way, in a very general way, could be subject to a whole range of issues or complications that are really beyond the scope of the patents at issue.

Q Okay. Let's see if we can get to a simpler answer then. If we have a linear amplifier, right, and I take the gain at one value of an input signal and I look at the gain of another value of the input signal, I can draw a line between those two points, correct?

MR. COSTAKOS: Can you read that back again?

(Last question read.)

THE WITNESS: I don't know how to answer your question as asked, but let me just make a

statement.
BY MR. HEINTZ:
Q Go right ahead, sir.
A If the amplifier is truly linear, then it should have the same gain independent of the amplitude or operating point. That's a theoretical, ideal, linear amplifier.
Q Okay. So if I had an input signal, we talked earlier about a sinusoid with a one-volt, peak-to-peak amplitude and the gain were two, the output signal would be two volts peak to peak, correct?
A I think that would be fair, yes.
Q And when it's linear, that means that ratio, two-to-one, is going to hold regardless of what the input signal is. So if I go to a four-volt input signal, I'm going to get an eight-volt output signal, again, in both instances peak to peak for a linear amplifier, correct?
MR. COSTAKOS: Objection. Form. Scope.
THE WITNESS: Again, you're asking me to make assumptions in answering that question. For example, the dynamic behavior of the amplifier, if it has a voltage gain, let's say, of 4 at DC, what is the voltage gain at a hundred hertz or 10

04:33:46 kilohertz, 10 gigahertz? It's likely to be
04:33:50 different.
04:33:52 BY MR. HEINTZ:
04:33:52 Q Okay. But if this were an ideal linear
04:33:56 amplifier --
04:33:56 A Right.
04:33:56 Q -- would my question be correct? Would the answer
04:33:59 to my question be "yes"?
04:34:04 MR. COSTAKOS: Same objections.
04:34:06 THE WITNESS: Could I hear the --
04:34:08 BY MR. HEINTZ:
04:34:09 Q I'll just ask it again.
04:34:11 A Thank you.
04:34:11 Q If the gain were two and I had an ideal linear
04:34:16 amplifier --
04:34:17 A Yes.
04:34:17 Q -- if I put in a signal with a peak-to-peak value
04:34:20 or peak-to-peak amplitude of four, I'm going to get
04:34:23 out a signal with a peak-to-peak amplitude of
04:34:26 eight?
04:34:27 A That would be --
04:34:27 MR. COSTAKOS: Objection. Scope.
04:34:30 THE WITNESS: Within what I -- I think
04:34:34 your assumptions might be, I would say, "Yes."
04:34:43 BY MR. HEINTZ:

04:34:44 Q Okay. And if I had a nonlinear amplifier, right, I could put in an input signal of one volt peak to peak, get an output signal of two volts peak to peak. But then when I put in the input signal of four volts peak to peak, I wouldn't get eight volts peak to peak because the linear -- sorry, because the amplifier is nonlinear, correct?

MR. COSTAKOS: Objection. Form. Scope.

THE WITNESS: So I can't answer that in the affirmative, and let me just give you an example as to why.

BY MR. HEINTZ:

Q Okay.

A Okay. Just one that comes to mind off the cuff, and this is the problem in trying to respond to your line of questions which are hypothetical and general, suppose the amplifier can't provide an output greater than plus or minus X volts.

Q Um-hum.

A Okay. So you put in a sine wave, but the output is a clipped sine wave because the output can't exceed the amplitude of the voltage limits of the amplifier, so then what's the amplitude?

Q Okay.

A Okay. That's where the problems begin to arise.

04:36:07 Q So why is it you can't determine what the gain
04:36:14 is -- I'm sorry. Are you able to determine what
04:36:16 the gain is if the output signal is clipped?
04:36:19 MR. COSTAKOS: Objection. Form. Scope.
04:36:21 Relevance.
04:36:23 THE WITNESS: Okay. This discussion, I
04:36:27 think, is in the context of something other than
04:36:32 these patents. So we're talking about some
04:36:39 hypothetical, theoretical ideal situation in which
04:36:43 different measures could apply. So, for example,
04:36:49 the gain of this nonlinear clipped sine wave could
04:36:59 be expressed through a set of describing functions.
04:37:07 Some people might say that in that context that's a
04:37:12 gain, but that's not what the small signal gain
04:37:17 might be at some operating point. Might be zero.
04:37:21 Might be, what did you say, four. So it gets
04:37:25 complicated to answer your question in a general
04:37:27 way like that. If you want to ask me about
04:37:30 something specific in Kalotay, for example, I can
04:37:37 help you with that.
04:37:39 MR. HEINTZ: All right.
04:37:40 MR. COSTAKOS: We've been going about an
04:37:42 hour and ten or so, so let's take a break.
04:37:45 MR. HEINTZ: We need to change the tape.
04:37:46 THE VIDEOGRAPHER: We are off the record

04:37:47 at 4:37 p.m. This is the end of Disk 3 in the
04:37:55 deposition of Michael Sidman.
04:37:58 (Recess taken.)
04:45:40 (Attorney Sikorski now present.)
04:45:40 THE VIDEOGRAPHER: We are back on the
04:45:42 record at 4:45 p.m. This is the beginning of Disk
04:45:46 No. 4 in the deposition of Michael Sidman.
04:45:49 BY MR. HEINTZ:
04:45:49 Q Okay, Dr. Sigmund -- sorry, Dr. Sidman, before the
04:45:53 break, we were talking about gains, and you were
04:45:56 explaining to me that gains can be linear. They
04:45:59 can be nonlinear. They can be characterized, I
04:46:06 think, by something you called a describing
04:46:11 function; is that correct?
MR. COSTAKOS: Objection to form.
04:46:12 THE WITNESS: That's not exactly what I
04:46:13 said, the first two parts of your question.
04:46:19 BY MR. HEINTZ:
04:46:19 Q Okay. I see my mistake. An amplifier can have a
04:46:25 linear gain, correct?
04:46:28 A It could have a linear gain.
04:46:30 Q It could have a nonlinear gain, correct?
04:46:37 A Theoretically, "gain" means a proportionate
04:46:42 relationship -- proportional relationship between
04:46:45 input and output, for example, in an amplifier.

Q Okay.
A So --
Q I understand that as a practical matter the relationship between the input signal and the output signal of a practical device is going to be somewhat complex. But when you talk about the gain of that device, isn't it correct to say that regardless of how you characterize the gain you are talking about some relationship between the output signal and the input signal?
MR. COSTAKOS: Objection. Form. Foundation. Scope. Relevance.
THE WITNESS: You used the word "device."
BY MR. HEINTZ:
Q I did.
A I'm not sure what you mean by "device."
Q Let's just say --
A That changes, potentially, the scope, for example.
Q Let's just say "amplifier."
MR. COSTAKOS: Same objections.
THE WITNESS: Okay. So could I have the question one more time with that instruction?
BY MR. HEINTZ:
Q I'll give it a try.
A Sure.

04:47:55 Q When we talk about the gain of an amplifier, regardless of whether the gain is linear or nonlinear -- No. Okay. I'm sorry. You're right.
04:48:04 A I'm shaking my head.
04:48:06 Q Yes. I understand. When we talk about the gain of an amplifier, we are talking about some relationship between the output signal of the amplifier and the input signal of the amplifier; is that correct?
04:48:28 MR. COSTAKOS: Same objections.
04:48:42 (Attorney Johnson leaves the room.)
04:48:42 THE WITNESS: I think if we were having a conversation in the classroom about that outside of the scope of this -- these patents at issue, I'd say, "Sure."
04:48:59 BY MR. HEINTZ:
04:48:59 Q How is it different inside the scope of the patents that are at issue here?
04:49:02 A I'd have to -- I'd have to consider how you're going to apply the term "gain" to -- I don't know what questions you're going to ask, so I'm reluctant to make general statements outside of an ideal theoretical basis based on some set of assumptions that haven't been stated that may not apply to something, for example, in the Kalotay

patent. So I think -- honestly, I think it would be more helpful to the Board to ask --

Q Dr. Sidman, I'm going to -- I'm going to cut you off here. I really don't care what you think is helpful for the Board. You have to understand, this is my deposition. I get to answer (sic) the questions. You have to answer them if you're able to. We don't need your opinion on what you think is going to be helpful, okay?

MR. COSTAKOS: Well, I mean, you asked him why he couldn't answer the question, and he gave you -- he answered that, so I think his answer was entirely appropriate. And so -- And with all due respect, I don't think you get to ask him whatever you want to ask him. There are rules that govern this deposition just like any other. And you're obliged to follow them, too.

MR. HEINTZ: And one of those rules is against speaking objections, is it not, sir?

MR. COSTAKOS: I don't think I made a speaking objection. After his answer was given, I said to you why your attempt to cut him off -- not your attempt, your successful attempt to cut him off was improper. That's not a speaking objection. That's a criticism of you, and that I think I'm

entitled to make.

MR. HEINTZ: We disagree.

BY MR. HEINTZ:

Q All right. Dr. Sidman, can you give me any instance in which it would not be correct to say that a gain is some relationship between an input signal and an output signal in the context of any of the patents that we've discussed today?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Gain is an aspect of a multitude of parameters that can be used to characterize the input/output relationship of an amplifier.

BY MR. HEINTZ:

Q And I think you told me earlier today that a signal does not have a gain, correct?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Generally, no.

BY MR. HEINTZ:

Q Is there any time a signal has a gain?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I'm hesitant to answer that question in a general way considering that there are multitude -- multiple -- a multitude of ways to measure signals, for example, in radio frequencies

which aren't related to these -- these patents at all. So I don't want to make a general statement that encompasses the whole range of, for example, electrical engineering. If you put it in a more narrow context, perhaps I can help you.

BY MR. HEINTZ:

Q In the context of Coriolis flowmeters.

A Okay. So let me hear your question again.

MR. HEINTZ: Madam reporter, if you would.

(Following question read.)

Q Is there any time a signal has a gain?

MR. COSTAKOS: Objection. Form.

THE WITNESS: That's not generally a way to describe a signal in the context of the technology we're talking about here.

BY MR. HEINTZ:

Q Thank you. Sir, let me ask you to direct your attention back to Exhibit 2024, and that's the decision of the Board in the 167 IPR, and that's for the '854 patent. Should be a thin one, sir.

A Okay. What page?

Q 2024. We're looking for the IPR decision. You've got it, Dr. Sidman?

04:56:05 A Yes. What page are you referring to?
04:56:08 Q Well, we were on page 9.
04:56:09 A Right.
04:56:09 Q But the question is, you told me you disagreed with the Board's construction of positive feedback mode in some respects. Is there any other construction in this decision, Exhibit 2024, with which you disagree, in whole or in part?
04:56:27 A No, there is not. Let me just add, I think the word "analysis" is reading something into the claim construction that's unnecessary and ambiguous and confusing depending on the context.
04:57:25 Q Did you voice any of those concerns to petitioner prior to the institution decision?
04:57:37 A I didn't start worrying about it until recently, so no.
04:57:40 Q I'm sorry. You did tell me that. I forgot. Okay. Let me ask you to turn your attention to page 7 of Exhibit 2024. That's the institution decision.
04:57:54 A Did you say page 7 or paragraph 7?
04:57:56 Q I said "page."
04:57:58 A Okay.
04:58:03 MR. COSTAKOS: Are we -- I'm sorry. What page are we on?
04:58:06 MR. HEINTZ: Page 7.

BY MR. HEINTZ:
Q All right. I'll direct your attention to the drive signal generating mode construction. You see that, sir?
A Yes. Let me review that briefly.
Q Sure. And I'll just tell what you my question is. Maybe that'll help you. I just want to know, confirm, if you agree with the Board's construction which actually appears later on in this document of a way of generating a drive signal. And that construction actually appears on page 9.
A Right. In the first full paragraph there, the Board ruled, "In summary, for" -- excuse me, "for purposes of this decision, we construe, quote, 'drive signal generating mode,' end quote, as a way of generating a drive signal." And I don't disagree with that.
Q And is that the construction you used in preparing your Declaration in IPR2014-00167?
A My opinions are consistent with the Board's interpretation of drive signal generating mode.
Q So you would agree then that merely changing the parameters in a method for generating a drive signal is not changing the mode of generating the drive signal?

05:01:29 MR. COSTAKOS: Objection. Form.
05:01:56 THE WITNESS: I believe their
05:01:57 construction is reasonable and appropriate.
05:02:01 BY MR. HEINTZ:
05:02:01 Q So is the answer to my question "yes" or "no"?
05:02:04 MR. COSTAKOS: Objection. Form.
05:02:10 THE WITNESS: I'm not disagreeing with
05:02:13 them in the context of their construction for this,
05:02:18 for the purposes of interpreting these claims.
05:02:24 BY MR. HEINTZ:
05:02:24 Q So does that mean that merely changing the
05:02:28 parameters and a method for generating a drive
05:02:32 signal is the same as drive -- I'm sorry, is the
05:02:35 same as changing the drive signal generating mode?
05:02:39 MR. COSTAKOS: Objection. Form.
05:02:43 THE WITNESS: Okay. I'm getting
05:02:45 confused, and I think part of it is because I'm not
05:02:47 an attorney. And I think you're asking me to parse
05:02:50 something that might have legal implications, so --
05:03:01 BY MR. HEINTZ:
05:03:01 Q Let's -- sorry.
05:03:02 A I'm just speaking as an engineer in the context of
05:03:08 these claims and what the Patent Office ruled.
05:03:11 Q All right. Let's go to page 8 of Exhibit 2024.
05:03:18 I'll direct your attention to the second full

paragraph. It begins, "Patent owner argues." Do you see that?
A I do.
Q Okay. My question to you is, do you agree that merely changing the parameters in a method for generating a drive signal is not changing the mode of generating the drive signal?
MR. COSTAKOS: Objection. Form.
THE WITNESS: I agree --
BY MR. HEINTZ:
Q Thank you.
A -- that that's a reasonable interpretation.
Q I'll have the reporter mark the next Exhibit 2026, U.S. Patent No. 7,505,854.
MS. REPORTER: 2027.
MR. HEINTZ: I'm sorry, 2027.
(Exhibit No. 2027 was marked.)
BY MR. HEINTZ:
Q All right. Sir, when you're ready, I'll ask you to direct your attention to Claim 7 which appears in column 34.
A Just hold on a second.
Q Okay.
A Thank you. Okay.
Q You're familiar with this patent, are you not, sir?

05:06:06 A I am.
05:06:06 Q Okay. I'll ask you to turn your attention to Claim
05:06:12 7 which appears at column 34, line 22.
05:06:47 A Okay.
05:06:49 Q All right. Do you see the words "digital synthesis
05:06:53 mode" in Claim 7?
05:07:02 A Yes.
05:07:06 Q What's your understanding of that term?
05:07:35 A That Board ruled, "Digital synthesis mode,"
05:07:39 quote-unquote, is, quote, "drive signals generated
05:07:42 on the basis of sensor signal analysis," end quote,
05:07:45 wherein the drive signal is, quote, "synthesized by
05:07:48 control and measurement system based on an analysis
05:07:52 of the sensor signal."
05:07:55 Q Now --
05:07:57 A And I agree.
05:07:58 Q Okay. Now, earlier today, you told me that there
05:08:03 were two different senses that could be used in
05:08:06 connection with the word "analysis." Do you
05:08:09 remember that, in connection with the positive
05:08:11 feedback mode? Is there any qualification to your
05:08:15 agreement with the Board's construction in this
05:08:17 case for "digital synthesis mode"?
05:08:27 A I -- I think the word "analysis" is appropriate in
05:08:31 the -- in their interpretation and ruling of the

phrase "digital synthesis mode."
Q Okay. And what is your understanding of what the word "synthesized" here means? I'm sorry. Let me make this clear. In Claim 7 on the third line, we have the words "signal is digitally synthesized." Do you see that?
A I do.
Q What is is your understanding of the meaning of "synthesized" --
MR. COSTAKOS: Objection. Form.

BY MR. HEINTZ:
Q -- in the context of Claim 7?
MR. COSTAKOS: Sorry. Objection to form.
THE WITNESS: Like it says, that the drive signal is digitally synthesized, i.e., in a microprocessor or computer or signal processor of the like based on an analysis of the sensor signal. Examples of that might be determining a parameter of the sensor signal like as accomplished by a DFT analysis of a time-based sensor signal.

BY MR. HEINTZ:
Q You think determining a parameter of a sensor signal is what's meant by "digitally synthesizing a drive signal"?

MR. COSTAKOS: Objection to form.
THE WITNESS: I don't think I said that.
BY MR. HEINTZ:
Q Okay. Well, my question was, when we're talking about digitally synthesizing a signal, in the words of the claim, "a drive signal is digitally synthesized," what does "synthesized" mean in that context?
MR. COSTAKOS: Objection to form.
THE WITNESS: In the context of the '854 patent, synthesis of a sine wave occurs based on calculated parameters. Digitally is an ideal sine or cosine wave.
BY MR. HEINTZ:
Q Sorry. Does that complete your answer, or are you still thinking?
A I'm still thinking, but let that suffice for now.
Q Okay. Is that something like digitally creating the signal?
MR. COSTAKOS: Objection. Form.
(Attorney Johnson enters the room.)
THE WITNESS: I think that's fair, as opposed to developing the signal or generating it based on some filtering operation of the sensor signal.

BY MR. HEINTZ:
Q All right. Is that your answer?
A That's fine.
Q Okay. Sir, let me ask you to direct your attention now back to Exhibit 2023, and that's your expert report for the '854 patent -- I'm sorry, your expert Declaration of the '854 patent. All right. And I'll ask you to turn your attention to paragraph 114. Okay. The second sentence reads, "As noted in above," and then proceeds. What does "as noted in above" refer to? And I'll suggest it might refer to paragraph 104. I'm just trying to get confirmation.
A I don't think that's the most -- that's a good reference for that comment, "as noted in above."
Q I'm sure you can anticipate my next question, so what does "above" refer to?
A I take it back. I misread that. "As noted above" which relates to '104 which states, "U.S. Patent 7,505,854 is directed to a Coriolis-type flowmeter," dot, dot, dot, which may be a mass flow rate meter or a densitometer.
Q I'm sorry. I'm having trouble figuring out when you're stopping.
A Okay. So in 114, "As noted above," that sentence

reads, "As noted in above, a densitometer is one type of flowmeter that uses vibration of a flowtube." In 104, the '854 is -- I state, "The '854 is directed to a Coriolis-type flowmeter which may be a mass flow -- flow rate meter or a densitometer," dot, dot, dot.

Q Anything further?

A That's --

Q Okay.

A That's my initial response. I don't know what else you'd like me to comment on.

Q I'm just -- just trying to figure out when you're done, so maybe if you would look up when you -- when you -- to give me a signal that it's time to ask the next question.

A Okay.

Q Okay. And I'm not trying to rush you. Just for the mechanics of this, I'd like to not waste time if we can avoid it. All right. Is the only thing you're citing to for your conclusion that Miller's densitometer is a flowmeter the '854 patent?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I'm looking for a copy of Miller. I don't think I have that in front of me yet.

BY MR. HEINTZ:
Q Well, you don't, but I just want to make sure we're clear. My question to you is, in your expert report, is the only thing that you cite to for your conclusion that Miller discloses a flowmeter the '854 patent?
A I think Miller itself aids me in that respect.
Q All right.
A And I don't -- I thought I had a copy of it in front of me. I don't, so that would be helpful.
Q Okay. I'll have you -- I'll hand you Miller in just a moment. But in your expert report, do you have any analysis of Miller that shows that Miller is a flowmeter?
MR. COSTAKOS: Objection. Form.
BY MR. HEINTZ:
Q I'm just asking you to identify it if it's in your expert report -- I'm sorry, your expert Declaration.
MR. COSTAKOS: Objection to form.
THE WITNESS: There is one thing I can see off the cuff. It's paragraph 114 on page 52 of Exhibit 2023 which makes reference to Miller's abstract. I'll read the last sentence in paragraph 114. Miller discloses a, quote, "flow-through

densitometer," end quote, that includes, quote, "a vibrator for causing the tubes to vibrate," unquote.

BY MR. HEINTZ:

Q Is there anything else, sir?

MR. COSTAKOS: Objection. Form.

BY MR. HEINTZ:

Q Sorry. Anything else in your expert report?

A That relates to?

Q Whether or not you did an analysis of Miller to determine whether or not Miller discloses a flowmeter?

MR. COSTAKOS: Objection to form.

THE WITNESS: I think it's restricted to Miller's abstract.

BY MR. HEINTZ:

Q Okay. Let's mark as Exhibit 2028 U.S. Patent No. 4,679,947.

(Exhibit No. 2028 was marked.)

MR. COSTAKOS: Is this 2028? I've forgotten.

MS. REPORTER: Yes.

THE WITNESS: I'd like to append my last answer.

BY MR. HEINTZ:

Q Okay.
A Now that I have Miller in front of me --
Q All right.
A -- I'd direct you to Figure 3 of Miller -- the 469 -- 4,697,947 patent.
MR. COSTAKOS: 679.
THE WITNESS: Okay. Excuse me, 4,679,947. Thank you. So this Figure 3 illustrates that Miller's densitometer measures the density of the fluid flowing through it as denoted by these arrows. Let's see here. There's an upward arrow -- two upward arrows, a downward arrow and a -- an arrow to the left which capture the flow through the main conduit to which the densitometer is attached.
BY MR. HEINTZ:
Q And when you say --
A It's not just capturing -- It's not just measuring the density of an isolated sample. It's measuring the density of the fluid or gas or steam that's flowing through the densitometer as a result of being attached to the main conduit.
Q Does Miller measure any flow rate?
MR. COSTAKOS: Object to the form.
THE WITNESS: Even though Miller's

abstract discloses a, quote, "flow-through densitometer," end quote, it doesn't describe measuring flow rate.

BY MR. HEINTZ:

Q Is Miller's circuit capable of measuring flow rate?

MR. COSTAKOS: Objection. Form.

THE WITNESS: Which circuit are you referring to?

BY MR. HEINTZ:

Q Let's start with the one in Figure 3.

A I don't see a circuit in Figure 3.

Q Fair enough. Is Miller's device capable of measuring a mass flow rate?

A Although Miller's descriptions of his system include many of the components that would be found in a mass flow rate measuring device, it doesn't describe measurement of mass flow rate. It's concerned with density measurement.

Q Let me refer you to Figure 3 of Miller. Can you identify for me where the sensors are in Figure 3? And again, just to help, I'm not trying to make this into a test. 90 and 92, I believe, are the sensors, but please confirm that for yourself. And if you want to take a look at column 11 and around line 40.

A So at line 40, Miller states, quote, "The magnitude and frequency of the vibration of tube 62 is detected by the strain gauges 90 and 92." He also describes further down another sensor, temperature probe 94. That's lines 43 or 4.

THE REPORTER: Lines what?

THE WITNESS: Lines 43 to 44.

BY MR. HEINTZ:

Q Okay. With the strain gauges 90 and 92 positioned as they are shown in Figure 3, is it possible for Miller's devices depicted in Figure 3 to calculate the mass flow rate or to measure the mass flow rate?

MR. COSTAKOS: Objection. Form.

THE WITNESS: I don't believe strain gauges 90 and 92 depicted in Miller's Figure 3 are situated in the densitometer assembly ideally to measure flow rate, nor do I think he situated them in a way to measure mass flow rate. That's it.

BY MR. HEINTZ:

Q Okay. Thank you for looking up. I noticed you qualified your answer with the word "ideally." I want to find out if there's any way you can think of that the device depicted in Miller Figure 3 or any other figure in Miller would be capable of

measuring mass flow rate.

MR. COSTAKOS: Objection. Form. Scope.

BY MR. HEINTZ:

Q And if you don't know, that's fine, too. I just want to understand whether you have an opinion with respect to this or not.

A Well, I haven't considered that possibility in analyzing Miller's '947 patent. However, Micro Motion, for example, has straight tube flowmeters that might -- whose technology might make use of those signals. I don't think they're -- I don't think they're ideally situated even for that application, but that is a possibility that I don't want to exclude in answering your hypothetical question.

Q Are you familiar with the Micro Motion straight tube flowmeters you just mentioned?

A The art described in their patents that I've referenced in my Declarations.

Q If I use the term "central axis" for the tube in those -- for the flowtube in those meters, does that make sense to you?

A Yes. I'm not -- I don't recall if that's a term that they're using in one of those prior art patents.

05:44:14 Q I understand.
05:44:15 A It just makes sense.
05:44:16 Q Okay.
05:44:16 A I don't think these sensors are -- in Miller are intended by Miller's disclosure to be used to measure flow rate, only density.
05:44:31 Q And that's because if they were intended to do that, they would be displaced with respect to each other along the central axis of the flowtube, right?
05:44:38 A Ideally.
05:44:39 Q Okay. On the Micro Motion flowmeters, straight tube flowmeters you referred to earlier, are, in fact, the sensors displaced with respect to each other along the central axis?
05:44:56 A Did displace longitudinally in the embodiments that they describe.
05:45:04 Q And --
05:45:05 A But I don't want to exclude the possibility in responding to your hypothetical question, which I haven't really considered a priority to this question, whether or not those sensors might be capable of making some sort of flow rate measurement. Again, I don't think that was the intention, that that was the intention of the '947

patent, because it didn't disclose flow rate measurement.

Q Other than not wanting to exclude the possibility, you have no opinion then, is it true, as to whether or not Miller's device as depicted in Figure 3 could measure mass flow rate?

MR. COSTAKOS: Objection. Scope. Foundation.

THE WITNESS: I don't have an opinion at this time without considering your proposition.

BY MR. HEINTZ:

Q And you certainly -- And you certainly didn't do that in your expert Declaration, correct? You expressed no such opinion in your expert Declaration?

A That?

MR. COSTAKOS: Objection. Form.

BY MR. HEINTZ:

Q That Miller's device as depicted in Figure 3 could measure mass flow rate.

A I did not offer an opinion on that.

MR. HEINTZ: All right. Thank you. We can stop for the day if that's all right with you.

MR. COSTAKOS: It's okay with me provided that you don't intend to go more than seven hours

tomorrow. In other words --

MR. HEINTZ: I understand.

MR. COSTAKOS: -- we're not going to stop today and then go eight or nine hours tomorrow or however much time is left over.

MR. HEINTZ: Okay. My understanding was you wanted to wrap up early today, and so I'm trying to accommodate that. If you want to -- I think that's correct, all right, assuming nothing strange happens with cooperation of the witness. So if that's going to be okay, we can stop now. If we need to keep going, we'll just keep going.

MR. COSTAKOS: And I have no need to wrap up early. I just -- I think -- Let's just go off the record, and we'll talk about this.

THE VIDEOGRAPHER: We are off the record at 5:47 p.m.

(Discussion off the record.)

THE VIDEOGRAPHER: We are back on the record at 5:48 p.m.

BY MR. HEINTZ:

Q Okay. Dr. Sidman, after a discussion with Mr. Costakos, we've agreed to go off the record today. I just want to remind you that this deposition is continuing. And during any breaks,

including overnight, prior to our start tomorrow, you should not be discussing any of the subject matter of this -- I'm sorry, this deposition and cross-examination with anybody else. Do you understand that, sir?

A I understand, and I agree.

MR. HEINTZ: Okay. Thank you. We can go off the record.

MR. COSTAKOS: Well, and just to be clear, the discussion off the record was that tomorrow your questioning would be limited to seven hours. Now, you've said that you didn't think that would be a problem, but I just want to make sure that that's clear on the record.

MR. JOHNSON: I just want to make one caveat to that. If we go five hours tomorrow and then you take two hours, we're still entitled to our extra one hour.

MR. COSTAKOS: Of course. Of course.

MR. JOHNSON: That could run into eight hours.

MR. COSTAKOS: I understand that. I'm just talking about the cross-examination part. Of course you're right.

MR. JOHNSON: I do not believe that we

will take the full seven hours tomorrow with the remainder of our cross.

MR. COSTAKOS: Okay. Fine. That's perfect.

MR. HEINTZ: With that, we can go off the record.

THE VIDEOGRAPHER: Then that concludes today's testimony. We're off the record at 5:49 p.m. This is the end of Disk No. 4 in the deposition of Dr. Sidman.

(Proceedings concluded at 5:49 p.m.)

STATE OF WISCONSIN)
) SS:
COUNTY OF MILWAUKEE)

I, JENNIFER L. SCHMALING, a Registered Merit Reporter, Certified Realtime Reporter, Certified Broadcast Captioner and Notary Public in and for the State of Wisconsin, do hereby certify that the above deposition of MICHAEL D. SIDMAN, Ph.D., was recorded by me on August 6, 2014, and reduced to writing under my personal direction.

I further certify that I am not a relative or employee or attorney or counsel of any of the parties, or a relative or employee of such attorney or counsel, or financially interested directly or indirectly in this action.

In witness whereof I have hereunder set my hand and affixed my seal of office at Milwaukee, Wisconsin, this 11th day of August, 2014.

_____
Notary Public
In and for the State of Wisconsin

My Commission Expires: December 28, 2014.

STATE OF)
) SS:
COUNTY OF)

I, MICHAEL D. SIDMAN, Ph.D., do hereby certify that I have read the foregoing transcript of proceedings, taken on August 6, 2014, at Foley & Lardner, 777 East Wisconsin Avenue, Milwaukee, Wisconsin, and the same is true and correct, except for the list of corrections noted on the annexed page.

Dated at _____
this _____day of _____, 2014.

_____
MICHAEL D. SIDMAN, Ph.D.

Subscribed and sworn to before me
this_____day of _____ 2014.

_____
Notary Public

My Commission Expires:

C O R R E C T I O N S

PAGE NO.	LINE NO.	DESCRIPTION

F

G