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

MICRO MOTION, INC.,

Petitioner,

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

-vs-

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.

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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

Examination:	Page
By Mr. Sikorski.....	5
By Mr. Heintz.....	124

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
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20
21
22
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I N D E X

Exhibit Identified:	Page
No. 2014 - Notice Of Deposition In '178.....	5
No. 2015 - Notice Of Deposition In '179.....	5
No. 2016 - Summary Of Claim Constructions From The Various PTO Orders.....	6
No. 2017 - Document That Lists By Each IPR Order What Grounds Were Accepted By The Patent Board For The Purpose Of These IPRs With Page Numbers And Paragraphs And Outline Of The Background Sections Of The IPRs	7
No. 2018 - Dr. Sidman's Declaration To U.S. Patent No. 7,124,646.....	23
No. 2019 - Dr. Sidman's Declaration To U.S. Patent No. 7,136,761.....	23
No. 2020 - Model D Meter Supplement, Slug Flow And Loading/Unloading, Instruction Manual Dated September 1987.....	55
No. 2021 - U.S. Patent No. 5,224,387 To Lindenbaum.	96
No. 2022 - U.S. Patent No. 4,934,196 To Romano.....	118
No. 2023 - Dr. Sidman's Expert Declaration Concerning The '854 Patent In The 167 IPR.....	124
No. 2024 - Institution Decision, Paper No. 10 In IPR2014-00167.....	128
No. 2025 - U.S. Patent No. 5,009,109 To Kalotay....	135
No. 2026 - Patient Trial And Appeal Board's Decision With Respect To U.S. Patent No. 6,311,136 In IPR2014-00170.....	138
No. 2027 - U.S. Patent No. 7,505,854 To Henry.....	170
No. 2028 - U.S. Patent No. 4,679,947 To Miller.....	177

* * * * *
Disposition Of Original Exhibits:
Returned To DLA Piper LLP.
* * * * *

1

TRANSCRIPT OF PROCEEDINGS

09:16:50

2

(Exhibit Nos. 2014 and 2015 were marked.)

09:16:50

3

THE VIDEOGRAPHER: We are officially on

09:16:54

4

the record at 9:16 a.m. Today's date is

09:16:58

5

August 6th, 2014. This is Disk No. 1 in the

09:17:02

6

deposition of Dr. Michael Sidman.

09:17:05

7

This deposition is being taken in the

09:17:06

8

matter Micro Motion, Incorporated, Petitioner,

09:17:10

9

versus Patent Owner Invensys Systems, Incorporated.

09:17:14

10

This matter is pending before the Patent Trial and

09:17:16

11

Appeal Board, United States Patent and Trademark

09:17:21

12

Office, Case Nos. IPR2014-169, 2014-170, 2014-178

09:17:31

13

and 2014-179.

09:17:34

14

This deposition is being taken at the

09:17:36

15

offices of Foley & Lardner located at 777 East

09:17:40

16

Wisconsin Avenue, Milwaukee, Wisconsin. My name is

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17

John Spohnholtz, videographer for U.S. Legal, and

09:17:46

18

the court reporter is Jennifer Schmaling. Will

09:17:49

19

counsel please state their appearances and whom

09:17:52

20

they represent, beginning with petitioner's

09:17:53

21

counsel, and then the reporter will swear in the

09:17:56

22

witness.

09:17:56

23

MR. COSTAKOS: Jeff Costakos, Foley &

09:17:58

24

Lardner, for Micro Motion and for the witness.

09:17:59

25

MR. SIKORSKI: Edward Sikorski of DLA

09:18:01 1 Piper on behalf of Invensys Systems, Inc., the
09:18:03 2 patent owner.

09:18:05 3 MR. HEINTZ: James Heinz, also from DLA
09:18:07 4 Piper, also on behalf of Invensys Systems, Inc.,
09:18:10 5 the patent owner.

09:18:13 6 MR. JOHNSON: Jeffrey Johnson from DLA
09:18:16 7 Piper, also on behalf of Invensys Systems, Inc.

8 MICHAEL D. SIDMAN, Ph.D., called as a
9 witness herein, having been first duly sworn on
09:18:26 10 oath, was examined and testified as follows:

09:18:26 11 EXAMINATION

09:18:27 12 BY MR. SIKORSKI:

09:18:28 13 Q Good morning, Dr. Sidman.

09:18:30 14 A Good morning.

09:18:30 15 Q I've marked for the record, just for formality
09:18:33 16 sake, the first two exhibits, Deposition Exhibits
09:18:35 17 2014 and 2015. They're the Notice of Deposition in
09:18:40 18 two of the four IPRs. You can glance at them.

09:18:43 19 MR. COSTAKOS: Do you have copies for me?

09:18:44 20 MR. SIKORSKI: I do.

09:18:47 21 MR. COSTAKOS: Great. Not that I really
09:18:48 22 need those particular ones, but --

09:18:51 23 MR. SIKORSKI: You asked for them, you
09:18:52 24 get them. There you go.

09:19:02 25 MR. COSTAKOS: Okay. Just so I have them

09:19:05 1 correctly, which one is which now? 2014 is '178.

09:19:10 2 Okay. Got it.

09:19:13 3 BY MR. SIKORSKI:

09:19:14 4 Q For the record, these Notices and Notices for the

09:19:16 5 other two IPRs were already in the public PTO

09:19:18 6 record, so we'll dispense with entering the other

09:19:20 7 two Notices. Dr. Sidman, I noticed that counsel as

09:19:24 8 we were preparing for the deposition dropped a

09:19:26 9 couple of documents in front of you. Do you mind

09:19:27 10 telling me what those documents are?

09:19:32 11 A One page consists of a list of claimed

09:19:38 12 constructions that the --

09:19:41 13 Q Mind if I look at that?

09:19:43 14 A Sure.

09:19:43 15 MR. COSTAKOS: I have one if you want for

09:19:45 16 your own copy.

09:19:47 17 THE WITNESS: Set forth by the Patent

09:19:51 18 Office in their rulings, orders on these four IPRs.

09:19:54 19 BY MR. SIKORSKI:

09:19:54 20 Q So this sheet, I assume, and, counsel, you're free

09:19:57 21 to answer if you want, they're a summary of claim

09:20:01 22 constructions from the various PTO orders?

09:20:04 23 MR. COSTAKOS: Yeah. That's what it's

09:20:05 24 meant to be.

09:20:06 25 MR. SIKORSKI: We'll mark that as 2016,

09:20:15 1 please.

09:20:15 2 (Exhibit No. 2016 was marked.)

09:20:19 3 BY MR. SIKORSKI:

09:20:19 4 Q There's another document in front of you that

09:20:20 5 counsel gave you?

09:20:21 6 A And that's a document that consists of four pages,

09:20:30 7 one page per IPR, that lists by the -- each IPR

09:20:40 8 order what grounds were accepted by the Patent

09:20:49 9 Board for the purpose of these IPRs and give us

09:20:58 10 page numbers and paragraphs.

09:21:00 11 Q I believe you said that your copy is four pages.

09:21:03 12 The copy that counsel handed me is five.

09:21:11 13 A Okay. And the fifth page, right, is just a -- an

09:21:22 14 outline of the background sections of my IPRs.

09:21:30 15 Q Sort of table of contents or index, so to speak?

09:21:34 16 A Correct, of the introductory of background sections

09:21:41 17 that were common to each of the four IPRs that

09:21:44 18 we're discussing today.

09:21:45 19 Q And just so I'm clear, the four IPRs received four

09:21:51 20 separate Declarations from you, right?

09:21:54 21 A One for each, correct.

09:21:56 22 Q And this fifth page is simply identifying the

09:21:58 23 portions of those Declarations that are common

09:22:00 24 among -- among them?

09:22:02 25 A Right.

09:22:02 1 MR. COSTAKOS: Object to the form.

09:22:05 2 THE WITNESS: That pertain to the -- as

09:22:07 3 it says, "The introduction or background sections."

09:22:11 4 MR. SIKORSKI: Okay. Why don't we mark

09:22:14 5 your copy of this as Exhibit 2017, if you don't

09:22:18 6 mind.

09:22:24 7 (Exhibit No. 2017 was marked.)

09:22:30 8 BY MR. SIKORSKI:

09:22:31 9 Q Dr. Sidman, you have a website, right?

09:22:35 10 A I have sidman.com, yes.

09:22:37 11 Q That's a website dedicated to your engineering

09:22:41 12 consulting practice?

09:22:42 13 A That's a fair statement. Yes.

09:22:44 14 Q On that website, you list -- excuse me -- you

09:22:48 15 dedicate a page to expert services for the legal

09:22:50 16 profession. Do you recall that?

09:22:52 17 A I -- I recall it. I haven't looked at it recently,

09:22:55 18 but yes.

09:22:56 19 Q And it indicates that you are an expert for hire or

09:23:01 20 for various legal topics such as expert reports,

09:23:05 21 deposition, trial, et cetera. Do you recall that?

09:23:08 22 A Generally, I recall that.

09:23:10 23 Q So you --

09:23:11 24 A It's not a complete statement, but yes.

09:23:13 25 Q You've been deposed how many times?

09:23:20 1 A I can't give you an accurate answer to that, but I
09:23:23 2 would say more than a dozen times over a 25-year
09:23:29 3 period.

09:23:30 4 Q Do you recall when your first deposition was, give
09:23:33 5 or take?

09:23:34 6 A I honestly don't.

09:23:36 7 Q So several years ago?

09:23:39 8 A It was, I'm sure, decades ago.

09:23:45 9 Q Have you testified at trial?

09:23:46 10 A I have.

09:23:47 11 Q How many times?

09:23:52 12 A I've testified as an expert five times over the
09:24:02 13 past 25 years, approximately.

09:24:08 14 Q Now, you indicated that you testified as an expert.
09:24:11 15 Were those all patent cases?

09:24:13 16 A No.

09:24:14 17 Q Which were -- Can you just break them up, which
09:24:17 18 were patents, which were something else?

09:24:20 19 A Well, I have to think offhand. But I mean,
09:24:25 20 generally, it's -- the cases I'm involved in relate
09:24:33 21 to patent disputes of patent infringement,
09:24:40 22 sometimes trade secret disputes or breach of
09:24:45 23 contract. I can't -- I'd have to think about how
09:24:54 24 to answer your question specifically for the cases
09:24:57 25 that I testified at trial at, but that's -- maybe

09:25:03 1 that suits your purpose.

09:25:04 2 Q That's fine. If I need more detail, I'll revisit
09:25:06 3 it. Thank you. You understand that the parties in
09:25:10 4 this case include not only Emerson Electric but
09:25:15 5 also Micro Motion, Inc.?

09:25:16 6 A Yes.

09:25:16 7 Q Are you familiar with those two companies' names?

09:25:20 8 A Yes.

09:25:20 9 MR. COSTAKOS: Objection to form.

09:25:21 10 BY MR. SIKORSKI:

09:25:22 11 Q Have you prior to this case, and I'll put an
09:25:26 12 umbrella over this case, as to the current dispute,
09:25:28 13 the patent dispute between the parties, did you do
09:25:31 14 any previous work for Emerson Electric?

09:25:35 15 MR. COSTAKOS: Objection to form.

09:25:37 16 THE WITNESS: I don't recall doing any
09:25:40 17 previous work for Emerson Electric.

09:25:43 18 BY MR. SIKORSKI:

09:25:44 19 Q How about for Micro Motion?

09:25:45 20 A Yes, I have done some work for them. I taught a
09:25:49 21 technical course, MATLAB and SIMULINK training,
09:26:00 22 more than 16 years ago to their design engineers in
09:26:07 23 Boulder. It's a course that I teach, a course that
09:26:11 24 I teach to industry, generally, to design engineers
09:26:14 25 and scientists.

09:26:16 1 Q How is it that you recall giving this program to
09:26:23 2 Micro Motion some 16 years ago?

09:26:25 3 A Well --

09:26:26 4 MR. COSTAKOS: Objection to form.

09:26:28 5 THE WITNESS: -- they're obviously a
09:26:30 6 party to this case, and I recall having taught that
09:26:34 7 course and having developed specific examples for
09:26:43 8 the course based on Coriolis flowmeter technology.

09:26:52 9 BY MR. SIKORSKI:

09:26:52 10 Q Were there any students in the course that you
09:26:54 11 recall from that time that are involved in the
09:26:57 12 current dispute?

09:27:00 13 A I'm not sure how to answer that question. I mean,
09:27:07 14 if you were to name names, maybe I could recall.

09:27:10 15 Q I'm wondering, do you recall whether there were any
09:27:13 16 Micro Motion employees or other people affiliated
09:27:17 17 with Micro Motion that you taught 16 years ago that
09:27:20 18 you are now seeing either in person or by name in
09:27:23 19 the present dispute?

09:27:24 20 MR. COSTAKOS: Objection to form.

09:27:31 21 THE WITNESS: I haven't -- First of all,
09:27:33 22 I haven't seen any Micro Motion employees by name
09:27:40 23 with respect to the current dispute. However, I do
09:27:46 24 recognize at least one name as being an inventor of
09:27:55 25 a prior art patent that's associated with this

09:28:03 1 case.

09:28:03 2 BY MR. SIKORSKI:

09:28:04 3 Q I'm sure you know what my next question is. Who is
09:28:06 4 that?

09:28:07 5 A I believe his name was Rick Maginnis attended my
09:28:13 6 course 16 years ago. I think it was in March of
09:28:20 7 '98, a three-day course at Micro Motion.

09:28:28 8 Q That's quite the recollection. You indicated that
09:28:32 9 the course that you taught 16 years ago, again,
09:28:35 10 correct me if I misunderstood, in your preparation
09:28:39 11 for that course, you created some sort of examples
09:28:44 12 using Coriolis flowmeters; is that right?

09:28:47 13 A Yes. I generally customize my MATLAB and SIMULINK
09:28:54 14 laboratory training courses for each set of
09:28:58 15 clients, so I did that for these -- this group of
09:29:05 16 engineers. It makes things more relevant for them,
09:29:12 17 and then they can hit the ground running using
09:29:15 18 MATLAB and SIMULINK.

09:29:16 19 Q Is there a particular model number or commercial
09:29:20 20 identifier associated with the Coriolis flowmeter
09:29:23 21 that you looked at 16 years ago?

09:29:25 22 A I don't remember anything specific like that. The
09:29:29 23 technology -- The examples that I remember offhand
09:29:34 24 developing for them related not to any specific
09:29:43 25 product but to a couple of technologies involved in

09:29:49 1 Coriolis flowmeters. For example, the resonant
09:29:56 2 dynamics of two driven vibratory tubes created --
09:30:06 3 created a SIMULINK model that not only modeled the
09:30:12 4 mechanical dynamics and the -- and how they operate
09:30:16 5 as being driven by a frequency or source that could
09:30:21 6 excite more than one flexible mode. And also, I
09:30:29 7 recall an example that demonstrates the operation
09:30:37 8 of synchronous demodulators. There may be other
09:30:45 9 things, but that's what I can recall offhand.

09:30:50 10 Q I'm sure you're aware that for some of these
09:30:56 11 IPRs -- I'm sorry. Do you need to take a break?
09:30:59 12 A I'm just trying to get comfortable, so go ahead.
09:31:03 13 Don't mind me.

09:31:03 14 Q That's fine. I'll give you a second. I'll think
09:31:05 15 about my next question.

09:31:06 16 A Sure.

09:31:09 17 Q You understand. You've been deposed enough. If
09:31:11 18 you need to take a break, just ask me.

09:31:14 19 A Okay. Thank you.

09:31:20 20 Q I'm sure you're aware that for some of the IPRs,
09:31:24 21 you cite to a purportedly commercial device that
09:31:29 22 I'll just refer to as the Model D flowmeter. Are
09:31:33 23 you familiar at least with that short reference?
09:31:35 24 A I -- I referred to a Model D Manual and the slug
09:31:41 25 flow document associated with that, yes.

09:31:45 1 Q Right. You've not personally used the Model D or
09:31:49 2 the slug flow --
09:31:51 3 A Board.
09:31:52 4 Q -- edition -- board? Thank you.
09:31:56 5 A No, I have not. I've reviewed those documents.
09:32:13 6 Q Prior to the dispute that brings us here today, did
09:32:16 7 you have any engagements, were you ever hired, I
09:32:19 8 should say, by the Foley law firm?
09:32:22 9 A I've never been hired previously by the Foley law
09:32:26 10 firm.
09:32:28 11 Q The Declarations that were submitted under your
09:32:35 12 signature in these IPRs no doubt took some time.
09:32:39 13 I'm wondering, what proportion of your work
09:32:41 14 nowadays is experting as opposed to other
09:32:45 15 engagements?
09:32:46 16 MR. COSTAKOS: Objection to form.
09:32:53 17 THE WITNESS: Well, it depends on your
09:32:55 18 time frame. Over the -- Since 1992, I've been an
09:33:02 19 independent engineering consultant. Most of my
09:33:07 20 business over all that period relates to technical
09:33:13 21 consulting, so that's teaching my courses. And
09:33:23 22 there's two basic sets of those courses which
09:33:25 23 include MATLAB/SIMULINK/Toolbox training courses,
09:33:31 24 also Digital Servo Design classes, courses.
09:33:38 25 That's -- Generally, that's also a three-day course

09:33:42 1 developing simulations of mechatronic systems which
09:33:50 2 include mechanical dynamics, electronic dynamics,
09:33:57 3 control system, digital control system, sensor and
09:34:01 4 actuated dynamics, nonlinearities, signal
09:34:06 5 processing, whether it be analog or digital.

09:34:10 6 And then I think the third broad
09:34:13 7 classification of my work as a technical consultant
09:34:19 8 relates to what I would call fire fighting, helping
09:34:23 9 companies resolve technical problems often
09:34:29 10 resulting from technical differences between
09:34:36 11 engineers who have different perspectives on the
09:34:42 12 design of mechanical systems, so electrical
09:34:45 13 engineers versus mechanical engineers. The goal is
09:34:49 14 to make the product work, and -- and there are
09:34:56 15 compromises involved.

09:34:57 16 BY MR. SIKORSKI:

09:34:57 17 Q Thank you.

09:34:58 18 THE VIDEOGRAPHER: I'm sorry. Counsel,
09:35:00 19 we need to go off for just a second.

09:35:02 20 MR. SIKORSKI: Hold your thought.

09:35:03 21 THE VIDEOGRAPHER: We are off -- If he's
09:35:04 22 done. I'm sorry.

09:35:05 23 MR. COSTAKOS: Well, he wasn't done, I
09:35:06 24 don't think.

09:35:07 25 MR. SIKORSKI: Let's go off the record.

09:35:08 1 THE VIDEOGRAPHER: Yeah. We're off the
09:35:10 2 record at 9:35 a.m.

09:37:06 3 (Discussion off the record.)

09:37:07 4 THE VIDEOGRAPHER: We are back on the
09:37:08 5 record at 9:37 a.m.

09:37:10 6 THE WITNESS: I didn't finish answering
09:37:11 7 your question --

09:37:12 8 BY MR. SIKORSKI:

09:37:12 9 Q You can answer. Thank you.

09:37:13 10 A -- because of the interruption. Over the past
09:37:18 11 years, especially since the recession, more and
09:37:21 12 more of my business has been associated with legal
09:37:27 13 consulting as an expert witness. And I would say
09:37:31 14 over the past several years, it's been mostly that.

09:37:35 15 Q Mostly or exclusively?

09:37:42 16 A I would say mostly.

09:37:51 17 Q In 2014, have you had any request for experting
09:37:56 18 engagements other than for the legal service
09:37:58 19 profession?

09:38:01 20 A I've had requests, yes.

09:38:02 21 Q Did you accept them or deny them?

09:38:05 22 A Most -- Most of them I deny --

09:38:09 23 Q Okay.

09:38:10 24 A -- for reasons other than -- other than whether
09:38:18 25 they are technical or not.

09:38:19 1 Q When did you first get hired to work on these IPRs?
09:38:25 2 And the IPRs are the four that we're here to
09:38:27 3 discuss today.

09:38:28 4 MR. COSTAKOS: Objection to form, but go
09:38:29 5 ahead.

09:38:29 6 THE WITNESS: You asked when was I hired?
09:38:32 7 BY MR. SIKORSKI:

09:38:32 8 Q Yes.

09:38:32 9 A About a year ago. I'm going to guess about mid
09:38:38 10 August of 2013.

09:38:41 11 Q And since that time, how many hours have you put in
09:38:44 12 to these four IPRs?

09:38:47 13 MR. COSTAKOS: Objection to form.

09:38:53 14 THE WITNESS: I can't give you a number,
09:38:55 15 an accurate number, offhand, but I would guess more
09:39:00 16 than 300 hours.

09:39:05 17 BY MR. SIKORSKI:

09:39:05 18 Q And each of those hours were billed at your current
09:39:07 19 rate of \$450; is that right?

09:39:09 20 A Yes.

09:39:10 21 Q Is there any other compensation that you've either
09:39:13 22 received or expect to receive from these four IPRs?

09:39:16 23 A None. I expect to receive nothing.

09:39:21 24 Q Other than hourly --

09:39:22 25 A Other than my hourly rate.

09:39:23 1 Q Understood. Thank you. Who at the Foley law firm
09:39:31 2 have you been working with on these four IPRs?
09:39:35 3 A Mr. Jeff Costakos, Ms. Angela Murch and Mr. Rick
09:39:47 4 Florsheim.
09:39:51 5 Q Anyone else?
09:39:55 6 A There might have been a paralegal, but those are
09:39:58 7 the only attorneys that I can recall.
09:40:03 8 Q How about at Emerson or Micro Motion? Are you
09:40:06 9 working or interacting with anyone there on these
09:40:08 10 IPRs?
09:40:09 11 A No.
09:40:14 12 Q You're aware that there's a litigation between
09:40:18 13 Invensys and Emerson and Micro Motion?
09:40:21 14 A Yes. That's what I presume this case is.
09:40:38 15 Q Other than working on these four IPRs, have you
09:40:41 16 done any projects for the Invensys versus Emerson
09:40:45 17 and Micro Motion litigation?
09:40:47 18 MR. COSTAKOS: Objection to form.
09:40:52 19 THE WITNESS: Well, I don't know what you
09:40:53 20 mean by "project." But I have, as I'm sure you're
09:40:58 21 aware, filed Declarations on three other IPRs that
09:41:02 22 I understand are not at issue today.
09:41:06 23 BY MR. SIKORSKI:
09:41:06 24 Q Right. For today we can put those to the side
09:41:10 25 unless some specific question addresses them.

09:41:12 1 Thank you. If you want me to give you a
09:41:20 2 Declaration, I'm glad to. And eventually, we will
09:41:22 3 today. But, for example, one of your Declarations
09:41:25 4 incorporates by reference something that was
09:41:26 5 submitted to the court or at least exchanged
09:41:29 6 between the parties in the patent litigation. And
09:41:31 7 I'm wondering -- Based on that and other
09:41:34 8 information that I see in your Declarations, I'm
09:41:36 9 wondering if you have any involvement in the
09:41:38 10 litigation as opposed to these IPRs?

09:41:41 11 MR. COSTAKOS: Objection to form.
09:41:43 12 Foundation.

09:41:51 13 THE WITNESS: I think -- I would say the
09:41:53 14 answer to that is "yes" in the form of the --
09:41:58 15 helping draft the invalidity contentions for these
09:42:04 16 seven patents at issue.

09:42:06 17 BY MR. SIKORSKI:

09:42:06 18 Q In other words, you helped to prepare the
09:42:08 19 invalidity contentions that were used by Emerson or
09:42:15 20 Micro Motion in the litigation?

09:42:17 21 A Right. They were filed by Foley & Lardner.

09:42:24 22 Q Have you had any involvement in the noninfringement
09:42:27 23 or infringement part of the patent litigation?

09:42:34 24 MR. COSTAKOS: You can answer "yes" or
09:42:35 25 "no" or "I don't know."

09:42:39 1 THE WITNESS: I would say the answer to
09:42:40 2 that is "yes."

09:42:43 3 BY MR. SIKORSKI:

09:42:43 4 Q And what has that involvement been to date?

09:42:48 5 MR. COSTAKOS: I think the -- the way
09:42:50 6 that question is phrased is privileged, so I'm not
09:42:53 7 going to allow him to answer that question.

09:43:00 8 MR. SIKORSKI: All right. If you're
09:43:01 9 going to stay on that privilege objection for that
09:43:03 10 line of questioning or topic, I'll move to
09:43:06 11 something else.

09:43:06 12 MR. COSTAKOS: The way you asked it, I
09:43:07 13 think, calls for privileged and work product
09:43:09 14 information, so --

09:43:11 15 MR. SIKORSKI: Work product makes a lot
09:43:12 16 more sense than privilege, but that's all right.

09:43:16 17 BY MR. SIKORSKI:

09:43:17 18 Q Okay. And based on your representation, counsel,
09:43:19 19 I'll not discuss that. I've asked you who at the
09:43:30 20 Foley law firm you've worked with on these IPRs,
09:43:34 21 and you kindly answered. Then I asked whether
09:43:36 22 you've had any contact with employees of Emerson or
09:43:41 23 Micro Motion, and you answered that as well. My
09:43:44 24 next question is, have you worked with any other
09:43:48 25 experts hired by either Foley, Emerson or Micro

09:43:53 1 Motion in this case?

09:43:55 2 A The answer is "no."

09:43:56 3 Q I'm sorry?

09:43:57 4 A No. I'll try to speak up.

09:44:04 5 Q My apologies. I just happened to not catch your

09:44:07 6 word. You're otherwise speaking fine. Thank you.

09:44:35 7 Dr. Sidman, the website for your Sidman Engineering

09:44:38 8 Company I referenced earlier also has a page

09:44:40 9 dedicated to design projects. You, I assume,

09:44:45 10 recall that?

09:44:45 11 A Yes, generally. I haven't looked at it recently

09:44:50 12 but generally, yes.

09:44:50 13 Q And on that web page, there's a bullet point that

09:44:56 14 refers to dynamic simulation and animation of

09:45:00 15 vibrating Coriolis flowmeter. I'm wondering, other

09:45:04 16 than the description you gave earlier with respect

09:45:09 17 to your class 16 years ago, have you done any other

09:45:13 18 analysis of Coriolis flowmeters other than,

09:45:17 19 obviously, the topic that brings us here today?

09:45:21 20 A The -- Okay. So that bullet on that -- on that

09:45:27 21 list of representative design products relates

09:45:29 22 specifically and only to the examples that I

09:45:34 23 developed for that class and nothing else.

09:45:39 24 Q So is it fair to say that between the date of that

09:45:42 25 class 16 years ago and, give or take, August of

09:45:46 1 2013, you did no work on Coriolis flowmeters?

09:45:51 2 A As --

09:45:51 3 MR. COSTAKOS: Objection to form.

09:45:54 4 THE WITNESS: As opposed to mechatronic
09:45:58 5 systems in general?

09:46:00 6 BY MR. SIKORSKI:

09:46:00 7 Q Devices that are not Coriolis flowmeters?

09:46:08 8 A I think that's a fair statement.

09:46:09 9 Q And just because we've had an interaction, what's a
09:46:12 10 fair statement?

09:46:13 11 MR. COSTAKOS: Objection to form.

09:46:14 12 BY MR. SIKORSKI:

09:46:14 13 Q You're saying it's fair to say that you've had --

09:46:16 14 A Yeah. Really, my business relates to mechatronic
09:46:21 15 systems which is the intersection of mechanics or
09:46:25 16 mechanical engineering, electrical engineering,
09:46:29 17 control systems. Some people include software in
09:46:36 18 with that. And to the -- and that's really my
09:46:40 19 bread and butter, so that's -- Coriolis flowmeters
09:46:50 20 are well within that realm, so -- but to the extent
09:46:57 21 that I think -- to answer your question
09:47:01 22 specifically only to that extent and not beyond
09:47:04 23 that.

09:47:20 24 If you look at my website, it also
09:47:21 25 mentions motor motion control and servo systems, so

09:47:28 1 that's a set of technologies involved with
09:47:31 2 mechatronics, and I'm involved with that also.
09:47:37 3 And, again, Coriolis flowmeters fit within those
09:47:44 4 general descriptions.

09:48:58 5 (Exhibit Nos. 2018 and 2019 were marked.)

09:49:13 6 MR. SIKORSKI: Did I give you a copy of
09:49:14 7 the second one?

09:49:15 8 MR. COSTAKOS: No.

09:49:20 9 BY MR. SIKORSKI:

09:49:21 10 Q Dr. Sidman, I've handed you copies of Exhibits 2018
09:49:26 11 and 2019; is that right?

09:49:30 12 A That's correct.

09:49:30 13 Q Okay. And for the record, 2018 is also in the PTO
09:49:36 14 record as Micro Motion Exhibit 1002. It is a
09:49:41 15 Declaration of Dr. Michael D. Sidman with respect
09:49:45 16 to the 179. Let me grab this. There's too many
09:50:04 17 numbers going on. Let me start again. So Exhibit
09:50:10 18 2018 is the same as Micro Motion Exhibit 1002 which
09:50:15 19 is part of the record for IPR 179 that relates to
09:50:25 20 patent 7,124,646.

09:50:37 21 And Exhibit 2019 is already in the record
09:50:40 22 as Micro Motion 1002 in IPR 178 which corresponds
09:50:50 23 to Patent No. 7,136,761. Thanks, Dr. Sidman. Flip
09:51:27 24 through them 'til you're comfortable, but these are
09:51:30 25 Declarations prepared by you, correct?

09:51:33 1 A It appears that -- I haven't looked at each page,
09:51:36 2 but they appear to be complete versions of my
09:51:39 3 Declarations for the '646 and '761 --
4 Q And each of the --
09:51:46 5 A -- patent IPRs respectively.
09:51:47 6 Q I'm sorry. And each one of them bears your
09:51:51 7 signature. Yes?
09:51:59 8 A Yes. It's on the last page of each of those two
09:52:04 9 documents.
09:52:09 10 Q Did any of the attorneys from Foley, other than
09:52:13 11 those mentioned by you earlier today, help you in
09:52:16 12 preparing this or these Declarations, I should say?
09:52:22 13 A I think that would be a fair statement, that it was
09:52:26 14 a collaborative effort, yes.
09:52:36 15 Q In either of these Declarations, if you could flip,
09:52:41 16 please, to paragraph 34.
09:52:54 17 MR. COSTAKOS: I'm sorry. Paragraph 34?
09:52:56 18 MR. SIKORSKI: Yes.
09:52:56 19 MR. COSTAKOS: Okay.
09:53:01 20 MR. SIKORSKI: I believe the paragraphs
09:53:03 21 are the same between these two Declarations.
09:53:06 22 MR. COSTAKOS: Yeah. I was just looking
09:53:07 23 at the page as opposed to the paragraph. Okay.
09:53:15 24 BY MR. SIKORSKI:
09:53:15 25 Q Are you there?

09:53:16 1 A Yep.

09:53:16 2 Q So paragraph 34 cites to a reference book at the
09:53:20 3 end?

09:53:26 4 A I'm just going to refer to one of the documents,
09:53:30 5 not to both of them, since they should be the same
09:53:44 6 in that regard.

09:53:58 7 Q You see that it cites to a -- some sort of
09:54:02 8 publication in 1990 from Micro Motion, Inc.?

09:54:06 9 A Right. I don't think it's a textbook, but it's --
09:54:10 10 It is a Micro Motion 1990 publication entitled "How
09:54:15 11 the Micro Motion Mass Flow and Density Sensor
09:54:21 12 Works."

09:54:21 13 Q And, in fact, your Declaration has a bunch of
09:54:24 14 references. For example, if you flip to paragraph
09:54:28 15 50 on page 19 --

09:54:38 16 A Yes. I see that.

09:54:39 17 Q -- you see there's a reference to some sort of 1968
09:54:43 18 publication?

09:54:44 19 A That's a textbook, university textbook, that was
09:54:53 20 used in a control systems course, "Introduction to
09:54:56 21 Continuous and Digital Control Systems" by Saucedo
09:55:00 22 and Schering, 19 -- 1968.

09:55:03 23 Q On paragraph 52, the next page, there's a reference
09:55:06 24 to yet another citation?

09:55:10 25 A Right. That's Canfield's book, "Electromechanical

09:55:17 1 Control Systems and Devices," 1965, reprinted in
09:55:25 2 1977. That's also a textbook or reference book.
09:55:30 3 Q And that next page, page 21, there's a dictionary
09:55:33 4 in paragraph 54?
09:55:38 5 A Yes. That's also a book on my bookshelf entitled
09:55:43 6 "Dictionary of Mechanical Engineering, Fourth
09:55:45 7 Edition." 1996 is the publication date.
09:55:50 8 Q Right, and we can flip through this for the next
09:55:53 9 minutes or hours and find a list of citations. My
09:55:56 10 question for you is, are these books off of your
09:55:59 11 bookshelf, or were these books or citations that
09:56:02 12 were fed to you?
09:56:03 13 MR. COSTAKOS: Objection. Overbroad.
09:56:05 14 THE WITNESS: So far, all of those books
09:56:07 15 that we've discussed are on my bookshelf.
09:56:10 16 BY MR. SIKORSKI:
09:56:11 17 Q Okay.
09:56:11 18 A And there are others that are also on my bookshelf.
09:56:16 19 Q Including the Micro Motion document referred to --
09:56:20 20 MR. COSTAKOS: Objection to form.
09:56:20 21 BY MR. SIKORSKI:
09:56:21 22 Q -- in paragraph 34?
09:56:34 23 A I don't think I characterize that as being a
09:56:37 24 textbook, but I have that document. It's not
09:56:40 25 sitting on my bookshelf. It's someplace in my

09:56:43 1 office.

09:56:44 2 Q I guess my question is, did you have all of these
09:56:47 3 references, however you want to characterize them,
09:56:50 4 books, articles, whatever, before this case, or
09:56:53 5 were they supplied to you by the Foley law firm or
09:56:55 6 someone else involved in this case?

09:56:56 7 MR. COSTAKOS: Objection. Multiple.
09:56:57 8 Overbroad.

09:57:00 9 THE WITNESS: Of the references we've
09:57:02 10 discussed so far, the only one that was given to me
09:57:07 11 by the Foley law firm is the Micro Motion
09:57:12 12 publication, "How The Micro Motion Density and Mass
09:57:17 13 Sensor Works." All the others are books that I've
09:57:22 14 had on my bookshelf, and there are others as I've
09:57:25 15 mentioned.

09:57:49 16 BY MR. SIKORSKI:

09:57:50 17 Q If you could flip to paragraph 99, I'm looking at
09:57:57 18 the Declaration for your '646 patent, but I'm sure
09:58:00 19 the identical paragraph appears in the other.

09:58:17 20 A Yes, I see that.

09:58:18 21 Q Read it to yourself, and let me know when you're
09:58:21 22 done.

09:58:27 23 A I'm done.

09:58:31 24 Q In this paragraph, you indicate that the control --
09:58:39 25 Let me start again. To paraphrase this paragraph,

09:58:43 1 you indicate that processing and control systems
09:58:48 2 employed in the patents that we're dealing with in
09:58:51 3 this IPR were, quote, "known and used long prior to
09:58:55 4 any of the applications leading to those patents
09:58:59 5 were filed," end quote. You see that?

09:59:02 6 A Yeah. You left off the words "digital signal" in
09:59:09 7 your question.

09:59:09 8 Q Yeah.

09:59:10 9 A And so I would say digital signal processing and
09:59:13 10 control systems versus processing and control
09:59:15 11 systems.

09:59:16 12 Q When you refer to "known" and "used," I just want
09:59:19 13 to make sure that I'm not misunderstanding the
09:59:23 14 opinions that you express in this Declaration.
09:59:25 15 You're not -- Because earlier you testified that
09:59:29 16 you've not used any Coriolis flowmeters, I want to
09:59:34 17 make sure you're not relying on any actual devices
09:59:38 18 that were allegedly used long prior to the patent
09:59:42 19 applications in this case. I'm focusing on the
09:59:46 20 language that you decided to use in this paragraph.

09:59:49 21 MR. COSTAKOS: Objection to form.

09:59:52 22 THE WITNESS: I'm not sure I understand
09:59:54 23 your question.

09:59:54 24 BY MR. SIKORSKI:

09:59:54 25 Q Sure. I'll ask it again. The opinions you express

09:59:57 1 in these two Declarations are based on published
10:00:01 2 articles, textbooks, something in paper form,
10:00:05 3 correct?

10:00:06 4 MR. COSTAKOS: Objection. Form.

10:00:09 5 THE WITNESS: What I documented in here,
10:00:12 6 yes. Obviously, I have working experience in those
10:00:18 7 areas.

10:00:21 8 BY MR. SIKORSKI:

10:00:22 9 Q But --

10:00:22 10 A You know, where I have a specific reference or
10:00:27 11 basis, I tried to put that into these Declarations.

10:00:32 12 Q Understood. But the prior art, the pieces of prior
10:00:35 13 art that you rely on, are simply published
10:00:39 14 articles, et cetera, things that are on paper as
10:00:41 15 opposed to commercial products, right?

10:00:52 16 A For the basis of my report, I would say, yes,
10:00:56 17 that's generally true.

10:00:58 18 Q So --

10:00:58 19 A That is true.

10:00:59 20 Q So, in fact, you have no basis for saying that the
10:01:03 21 digital signal processing systems were, in your
10:01:08 22 words, used long prior to the patent applications
10:01:10 23 in this case, right?

10:01:12 24 MR. COSTAKOS: Objection to form.

10:01:18 25 THE WITNESS: I don't really understand

10:01:19 1 your question.

10:01:21 2 BY MR. SIKORSKI:

10:01:22 3 Q Do you have any basis for expressing an opinion
10:01:25 4 that the digital signal processing and control
10:01:27 5 systems disclosed in the Henry patents found
10:01:31 6 themselves in any commercial device before those
10:01:34 7 patent applications were filed?

10:01:36 8 MR. COSTAKOS: Objection to form.

10:01:45 9 THE WITNESS: That's my belief, that they
10:01:47 10 were.

10:01:47 11 BY MR. SIKORSKI:

10:01:47 12 Q Which commercial devices by product name and
10:01:53 13 number?

10:01:53 14 A Well, we would have to go through it technology by
10:01:56 15 technology.

10:01:57 16 Q Well, the fact that you earlier told me you've not
10:02:00 17 looked at any commercial devices has me wondering
10:02:03 18 what commercial devices you know used the digital
10:02:06 19 signal processing and control systems disclosed in
10:02:10 20 the Henry patent applications.

10:02:12 21 MR. COSTAKOS: Objection to form.

10:02:18 22 THE WITNESS: Okay. If you ask the
10:02:21 23 question explicitly, maybe I can help you on that.

10:02:25 24 BY MR. SIKORSKI:

10:02:25 25 Q Okay. I'm not sure where I'm losing you because I

10:02:27 1 thought I was pretty straightforward.

10:02:29 2 A Okay.

10:02:29 3 Q You indicated that the prior art that you're

10:02:31 4 relying on in these Declarations is printed

10:02:34 5 publications, right?

10:02:36 6 A Yes.

10:02:36 7 Q And earlier, you testified that you've never used

10:02:40 8 an actual commercial Coriolis flowmeter, right?

10:02:43 9 A That's correct.

10:02:45 10 Q So I just want to be clear that you have no opinion

10:02:50 11 that the digital signal processing and control

10:02:53 12 systems that are disclosed in the Henry patents

10:02:58 13 were found in any commercial devices before those

10:03:01 14 applications were filed, right?

10:03:03 15 MR. COSTAKOS: Objection to form.

10:03:09 16 THE WITNESS: Well, I don't think that's

10:03:11 17 correct. I mean, for example, one of the

10:03:15 18 publications that I provided and cited in here

10:03:19 19 relates to a prior art, Micro Motion model.

10:03:27 20 BY MR. SIKORSKI:

10:03:27 21 Q The Model D?

10:03:28 22 A The Model D Manual.

10:03:29 23 Q But you've never used the Model D device, right?

10:03:34 24 A And some of the prior art patents, I can think of

10:03:40 25 one offhand, describe specific commercial models of

10:03:49 1 Coriolis flowmeters that adopted the technology in
10:03:54 2 those patents.

10:03:55 3 Q They're purportedly commercial, but you've never
10:03:58 4 seen them on the shelf, purchased them or used
10:04:01 5 those commercial devices, right?

10:04:03 6 A I -- I think that's a fair statement. I'm
10:04:23 7 generally aware of Coriolis flowmeters outside of
10:04:27 8 the context of this litigation and having developed
10:04:36 9 a course specifically related to Micro Motion
10:04:40 10 technology, just in the electrical engineering and
10:04:45 11 product literature that I receive, trade
10:04:49 12 publications, for example.

10:04:52 13 MR. SIKORSKI: Reserve our right to
10:04:54 14 strike that as nonresponsive to any question.

10:04:57 15 BY MR. SIKORSKI:

10:04:57 16 Q Dr. Sidman, for -- Let's start with the '646
10:05:09 17 patent, and you can use anything in front of you,
10:05:11 18 your summary sheets or whatever. For the '646
10:05:22 19 patent, what claims were you asked to look at? And
10:05:27 20 I'm happy to pass you the patents if you need to
10:05:29 21 look at them as well.

10:05:32 22 A The claims that were at issue between the parties
10:05:39 23 in this case. I could give you the numbers if
10:05:54 24 that's what you're looking for.

10:05:55 25 Q Well, your cheat sheet, I believe, is what you're

10:05:57 1 looking at. It lists Claims 1, 2, 5, 9 through 12,
10:06:02 2 15 and 19; is that right?
10:06:03 3 A Right.
10:06:04 4 Q So those are the claims you were asked to look at
10:06:06 5 for this IPR?
10:06:08 6 A Yes. I can confirm that. If you'd like, I'll
10:06:11 7 confirm that that's the exact --
10:06:14 8 Q I believe that's the exact list.
10:06:16 9 A Those are the exact claims that I wrote about in my
10:06:22 10 report.
10:06:22 11 Q That's fine. Were you asked to look at any other
10:06:24 12 claims in the '646 patent?
10:06:29 13 MR. COSTAKOS: Objection. Form.
10:06:39 14 THE WITNESS: Well, I've reviewed the
10:06:42 15 entire specification which I understand technically
10:06:46 16 involves all of the claims, but I've only reviewed
10:06:52 17 this set of claims for invalidity.
10:07:01 18 BY MR. SIKORSKI:
10:07:02 19 Q Did you arrive at any opinion that any claim in the
10:07:06 20 '646 patent is valid?
10:07:09 21 MR. COSTAKOS: I'm sorry. Can you read
10:07:10 22 that question over?
10:07:18 23 (Last question read.)
10:07:18 24 MR. COSTAKOS: Objection to form.
10:07:27 25 THE WITNESS: The only thing I've opined

10:07:29 1 on or formed a conclusion about are the claims at
10:07:35 2 issue in this case. And of those, I've stated my
10:07:43 3 opinion that I do not believe they are valid.

10:07:48 4 BY MR. SIKORSKI:

10:07:48 5 Q So for the '646 patent, you agreed 100 percent
10:07:53 6 that -- Strike that. For the '646 patent, you
10:07:58 7 agreed that each of the patent claims you were
10:08:01 8 asked to look at by the Foley law firm is, in your
10:08:05 9 opinion, invalid, correct?

10:08:11 10 A My goal was not to agree or disagree. It was to
10:08:16 11 form an independent conclusion based on my reading
10:08:21 12 of the patent, its file history, the prior art and
10:08:31 13 state my opinions. And to the extent that that may
10:08:35 14 coincide with the opinions of one of the parties,
10:08:42 15 so be it.

10:08:47 16 Q Your Declarations obviously refer to certain prior
10:08:53 17 art against each of these claims in the -- in the
10:08:59 18 subset, right? My question is, who found that
10:09:04 19 prior art --

10:09:06 20 MR. COSTAKOS: Objection.

10:09:07 21 BY MR. SIKORSKI:

10:09:07 22 Q -- you, the Foley law firm or someone else?

10:09:10 23 MR. COSTAKOS: Objection to form.

10:09:16 24 THE WITNESS: It was a combination --

10:09:19 25 BY MR. SIKORSKI:

10:09:20 1 Q Do you remember what -- Oh, sorry if you're not
10:09:24 2 complete.

10:09:24 3 A -- of prior art information, patents or
10:09:29 4 publications provided by the Foley law firm and
10:09:33 5 other prior art that I found or was aware of.

10:09:39 6 Q For the '646 patent, do you recall what prior art
10:09:42 7 you found as opposed to being supplied by others?

10:09:48 8 A I can't tell you offhand, but I would say that the
10:09:53 9 material in the -- that's described in the
10:10:04 10 introduction or background sections either
10:10:13 11 principally came from me or exclusively came from
10:10:16 12 me.

10:10:17 13 Q Excepting, of course, the Micro Motion publications
10:10:20 14 that you've already referred to, right?

10:10:22 15 A That's the only -- We can go through, but that's
10:10:24 16 the only one I can recall offhand that doesn't fit
10:10:27 17 that mold.

10:10:28 18 Q How about for the '761 patent? Were you asked to
10:10:35 19 look at every claim in that patent or just a
10:10:38 20 subset?

10:10:52 21 A I think my answer would be the same, not only for
10:10:54 22 the '761 but for -- is what I've stated with
10:11:00 23 respect to the '646 or the '761.

10:11:08 24 Q In other words, with reference to your Exhibit
10:11:10 25 2017, you were asked by the Foley law firm to look

10:11:12 1 at Claims 1 through 4 and 9 through 12 of the '761
10:11:16 2 patent?

10:11:22 3 A I believe that's correct. I could confirm that in
10:11:25 4 my Declaration if you'd like, but I think off the
10:11:28 5 cuff, that's correct.

10:11:29 6 Q I believe that list is accurate as well as to the
10:11:32 7 ones that were identified in your report. My
10:11:36 8 question is, were there any -- any patent claims --
10:11:41 9 Strike that. For the '761 patent, as you sit here
10:11:44 10 today, do you have any opinion whether any claim in
10:11:48 11 the '761 patent is valid?

10:11:52 12 MR. COSTAKOS: Objection. Form.

10:11:55 13 THE WITNESS: My answer would be similar
10:11:59 14 or identical to the answer I've provided with
10:12:03 15 respect to the '646 patent.

10:12:10 16 BY MR. SIKORSKI:

10:12:10 17 Q Just so I understand, so outside of Claims 1
10:12:13 18 through 4 and 9 through 12 of the '761 patent, you
10:12:17 19 have no opinion one way or the other whether
10:12:19 20 they're valid or invalid? And we can --

10:12:26 21 A I think that's a fair statement, yes. I don't have
10:12:29 22 an opinion.

10:12:36 23 Q As to the prior art that your Declaration applies
10:12:39 24 against the '761 patent claims, do you recall
10:12:45 25 whether that prior art was found by you or supplied

10:12:47 1 to you?

10:13:36 2 MR. COSTAKOS: I'm sorry. For the '761,
10:13:38 3 did you say 1 through 4 and 9 through 12 because
10:13:43 4 there are other claims that are --

10:13:44 5 MR. SIKORSKI: I didn't say he --

10:13:45 6 MR. COSTAKOS: No. You said --

7 MR. SIKORSKI: I asked --

10:13:46 8 MR. COSTAKOS: You said it was an
10:13:46 9 accurate list.

10:13:47 10 MR. SIKORSKI: I -- I asked him what that
10:13:48 11 list is.

10:13:49 12 MR. COSTAKOS: Oh, for crying out loud.
10:13:51 13 Okay.

10:13:54 14 THE WITNESS: It sounds like I need to
10:13:56 15 confirm in my report --

10:13:58 16 BY MR. SIKORSKI:

10:13:59 17 Q I certainly didn't mean --
10:14:00 18 A -- the accuracy of that list.
10:14:01 19 Q If I in any way led you inaccurately, I apologize,
10:14:05 20 Dr. Sidman. I was simply asking what claims were
10:14:07 21 you asked to look at, which claims you arrived at
10:14:10 22 an opinion on and which claims you, I guess, didn't
10:14:16 23 either.

10:14:21 24 A To answer your question, I'll go through my report
10:14:23 25 to give you an accurate --

10:14:24 1 Q Okay.

10:14:25 2 A -- response.

10:14:39 3 Q And certainly, we can short-circuit this,
10:14:41 4 Dr. Sidman, if you can identify claims that you did
10:14:44 5 not look at, but feel free to answer it however you
10:14:48 6 wish.

10:15:43 7 A Okay. The way I'm trying to make this a little bit
10:15:46 8 more simple is to look at the conclusion page on
10:15:51 9 page, actually, 100 of the -- of my '761
10:15:58 10 Declaration where I state at paragraph 219, "I am,
10:16:05 11 therefore, of the opinion that Claims 1 through 12
10:16:09 12 of the '761 patent are invalid for the reasons
10:16:14 13 given above." I think that summarizes all of the
10:16:19 14 claims that I have formed an opinion of. This
10:16:25 15 cheat sheet only refers -- that is, 1 through 4 and
10:16:30 16 9 -- Claims 9 through 12 relate to particular
10:16:44 17 claims listed with respect to specific grounds. So
10:16:54 18 that -- I think -- I think the better place, the
10:16:57 19 more complete list, is in paragraph 219 of that --
10:17:02 20 of my Declaration.

10:17:06 21 MR. SIKORSKI: All right. We've been
10:17:08 22 going about an hour. Why don't we take a break.

10:17:10 23 THE VIDEOGRAPHER: We are off the record
10:17:11 24 at 10:17 a.m.

10:17:14 25 (Recess taken.)

10:27:11 1 THE VIDEOGRAPHER: We are back on the
10:27:12 2 record at 10:27 a.m.

10:27:20 3 BY MR. SIKORSKI:

10:27:20 4 Q Dr. Sidman, the patents at issue, the Henry
10:27:24 5 patents, generally relate to Coriolis flowmeters,
10:27:26 6 right?

10:27:30 7 A I think that's a fair statement, yes.

10:27:31 8 Q And one thing that Coriolis flowmeters do is
10:27:38 9 measure flow rate of a flowing liquid, right?

10:27:44 10 A They could measure mass flow rate. They could
10:27:52 11 measure density, volumetric flow rate, temperature.
10:27:59 12 Those are the things that come to mind off the
10:28:02 13 cuff. There are other things, too.

10:28:04 14 Q So -- And just to kind of set the stage, Coriolis
10:28:10 15 flowmeters include one or more flowtubes; is that
10:28:16 16 right?

10:28:16 17 A I believe that's a fair statement.

10:28:19 18 Q And --

10:28:20 19 A You need at least one. Many have two.

10:28:23 20 Q How would you characterize what it is -- Strike
10:28:27 21 that. How would you characterize a flowtube in a
10:28:30 22 Coriolis flowmeter?

10:28:32 23 MR. COSTAKOS: Objection. Form.

10:29:15 24 BY MR. SIKORSKI:

10:29:15 25 Q I see you're digging into your Declaration. Is

10:29:17 1 that something you need to look at in order to
10:29:19 2 answer the question?

10:29:19 3 A Well, I want to answer the question, your question,
10:29:24 4 in the most accurate way. And instead of providing
10:29:32 5 you with an answer that is most accurate, I would
10:29:41 6 go back to what I've stated in my Declaration. So
10:29:46 7 I'm looking for that page that describes that
10:29:49 8 topic. Okay. So on -- I'm looking in this case in
10:30:48 9 Exhibit 2019, my '761 Declaration. I have a
10:30:54 10 section there entitled "Introduction to Coriolis
10:31:00 11 Flowmeters." And I'm looking at the moment
10:31:07 12 specifically at paragraph 23 which is a partial
10:31:12 13 answer to your question which reads, "Coriolis
10:31:15 14 flowmeters is a measurement device that measures
10:31:18 15 the effect of Coriolis forces on a material flowing
10:31:21 16 through a rotating frame of reference, in
10:31:27 17 parentheses, (in particular an oscillating
10:31:31 18 conduit.)"

10:31:37 19 MR. SIKORSKI: Can you read back my last
10:31:39 20 question?

10:31:50 21 (Following question read.)

22 Q How would you characterize what it
23 is -- Strike that. How would you
24 characterize a flowtube in a
10:31:54 25 Coriolis flowmeter?

10:31:54 1 THE WITNESS: Okay. And then in
10:31:56 2 paragraphs 25 and 26 I describe the flowtubes, or I
10:32:08 3 call it -- in this Declaration I call them
10:32:15 4 conduits. I could read those for you. Coriolis --
10:32:19 5 This is paragraph 25 on page 8 of the Exhibit 2019.
10:32:25 6 "Coriolis flowmeters include one or two conduits
10:32:29 7 through which material flows. One conduit is
10:32:33 8 described for simplicity, but the discussions
10:32:36 9 herein are generally applicable to a system with
10:32:39 10 two conduits." And I cite patent '614 in that
10:32:46 11 paragraph.

10:32:47 12 Paragraph 26 states, "A material flowing
10:32:51 13 in the tube may be a single type of material,
10:32:53 14 paren, (single phase or multiple types of material
10:32:56 15 together mixed together multiphase.)" And then it
10:32:59 16 discusses various types of materials that might
10:33:07 17 flow through the conduit in a Coriolis flowmeter.
10:33:13 18 Of course, I'm not going to go through all of that.

10:33:16 19 MR. SIKORSKI: Can you read back my
10:33:17 20 question, please?

10:33:27 21 (Following question read.)

22 Q How would you characterize a
10:33:27 23 flowtube in a Coriolis flowmeter?

10:33:27 24 BY MR. SIKORSKI:

10:33:28 25 Q Dr. Sidman --

10:33:28 1 MR. COSTAKOS: Objection to form.

10:33:29 2 BY MR. SIKORSKI:

10:33:29 3 Q -- can you just give me an answer to my question,
10:33:32 4 please? I'm still struggling to see how what you
10:33:34 5 read answers my question.

10:33:34 6 MR. COSTAKOS: Objection. Form.

10:33:40 7 THE WITNESS: Can I hear the question one
10:33:41 8 more time, kindly?

10:33:43 9 (Following question read.)

10 10 Q How would you characterize a
10:33:51 11 flowtube in a Coriolis flowmeter?

10:33:51 12 MR. COSTAKOS: Objection. Form.

10:34:02 13 THE WITNESS: This is not a complete
10:34:04 14 answer to your question. But generally, it's a
10:34:08 15 conduit through which material passes whose
10:34:11 16 properties the flowmeter may measure such as mass
10:34:22 17 flow rate.

10:34:27 18 BY MR. SIKORSKI:

10:34:27 19 Q Thank you. How would you define "mass flow rate"?
10:34:42 20 Strike that. Let me back up. Is it fair to say
10:34:45 21 that when you say -- Strike that. This conduit or
10:34:52 22 flowtube, I assume those two terms are synonymous
10:34:57 23 to you?

10:34:57 24 A I use them synonymously. I think the art does
10:35:04 25 also.

10:35:05 1 Q The conduit is a pipe, right, in simple terms?

10:35:09 2 A You could think of it as a pipe, not necessarily a
10:35:12 3 straight pipe, mind you, but a pipe.

10:35:16 4 Q And through this pipe passes material as you just
10:35:18 5 stated, right?

10:35:19 6 A Correct.

10:35:21 7 Q Sometimes the material is, I believe you indicated
10:35:25 8 earlier, described as single phase, right?

10:35:28 9 A Correct.

10:35:29 10 Q And "single phase" means, correct me if I'm wrong,
10:35:33 11 just one substance such as liquid or air, right?

10:35:37 12 A Right. So it could be a gas, a liquid or a solid.

10:35:50 13 Q Not a true solid of course, right?

10:35:52 14 A No, no, a mixture --

10:35:59 15 Q And --

10:36:00 16 A -- as I mentioned in paragraph 26, for example.

10:36:06 17 Q And this mixture you also referred to as
10:36:13 18 multiphase; is that right?

10:36:14 19 MR. COSTAKOS: Objection to form.

10:36:18 20 BY MR. SIKORSKI:

10:36:19 21 Q Or strike that. Earlier, you referred to
10:36:21 22 multiphase. In simple terms, what is multiphase in
10:36:24 23 the context of a Coriolis flowmeter?

10:36:31 24 A Well, I cite an example of a multiphase material in
10:36:33 25 that paragraph as being a gas/liquid mixture or a

10:36:37 1 liquid/solid mixture or combination of the three,
10:36:42 2 gas, liquid and solid mixture.

10:36:58 3 Q The substance inside the flowtube or conduit flows
10:37:04 4 during operation of the Coriolis flowmeter,
10:37:07 5 correct?

10:37:09 6 A Not necessarily.

10:37:16 7 Q Why not?

10:37:18 8 A Well, it may not be flowing for a number of
10:37:21 9 reasons. For example, a valve might be closed.

10:37:26 10 Q Okay. In normal operation, mass flow rate is
10:37:30 11 measured while the content of the flowtube is
10:37:33 12 flowing, correct?

10:37:37 13 A I would not agree with that in general. It could
10:37:43 14 either be flowing or not flowing --

10:37:45 15 Q Okay.

10:37:46 16 A -- while measurement is going on.

10:37:58 17 Q How would you characterize or design the flow rate
10:38:00 18 of a flowing liquid through a Coriolis flowmeter's
10:38:04 19 conduit?

10:38:06 20 MR. COSTAKOS: Objection. Form.

10:38:12 21 THE WITNESS: You could describe it in
10:38:14 22 terms of units such as grams per minute or
10:38:19 23 kilograms per minute or pounds per minute depending
10:38:24 24 on the scale in the system of units that you're
10:38:29 25 using.

10:38:31 1 BY MR. SIKORSKI:

10:38:31 2 Q Assuming this flowing liquid is actually flowing,
10:38:36 3 okay, assuming the flowing liquid is actually
10:38:39 4 flowing through the conduit, is it fair to say that
10:38:44 5 at any given instant of time that fluid has one,
10:38:49 6 and only one, flow rate?

10:38:56 7 MR. COSTAKOS: Objection. Form.

10:39:00 8 MR. SIKORSKI: We can read that back,
10:39:01 9 please.

10:39:15 10 (Last question read.)

10:39:19 11 MR. COSTAKOS: Same objection.

10:39:27 12 THE WITNESS: Do you mean as measured by
10:39:29 13 the device?

10:39:31 14 BY MR. SIKORSKI:

10:39:31 15 Q Yes.

10:39:36 16 A I think that's a fair statement. But if you didn't
10:39:40 17 add that restriction, I wouldn't agree with that
10:39:43 18 statement.

10:39:54 19 Q I'll try to ask the same question a little
10:39:56 20 differently. At any given moment in time and
10:40:01 21 assuming that the fluid is flowing through the
10:40:06 22 Coriolis flowmeter's conduit, is it fair to say
10:40:10 23 that the flowmeter measures one, and only one, flow
10:40:15 24 rate for that flowing fluid?

10:40:20 25 MR. COSTAKOS: Objection. Form.

10:40:29 1 BY MR. SIKORSKI:

10:40:29 2 Q And we can have that read back.

10:40:30 3 A I can't think of one that would measure anything
10:40:33 4 other or report more than one flow rate at any
10:40:36 5 instant in time, either as described in the prior
10:40:41 6 art or any commercial devices I might be aware of.

10:40:47 7 Q And that's true whether the flowing substance
10:40:52 8 through the conduit is single phase or
10:40:57 9 multiphase -- multiphase, correct?

10:41:00 10 MR. COSTAKOS: Objection. Form.

10:41:02 11 THE WITNESS: It'll -- What is true?

10:41:06 12 BY MR. SIKORSKI:

10:41:06 13 Q That the -- Is it also true, is it not, that the
10:41:10 14 Coriolis flowmeter will measure one, and only one,
10:41:13 15 flow rate regardless whether the flowing fluid is
10:41:17 16 single phase or multiphase?

10:41:24 17 A I would say "yes" given my knowledge of the prior
10:41:28 18 art in commercial products that I'm aware of.

10:41:42 19 Q Does flow rate have the same meaning for single
10:41:46 20 phase and multiphase substances --

10:41:53 21 MR. COSTAKOS: Objection.

10:41:53 22 BY MR. SIKORSKI:

10:41:54 23 Q -- given the context of Coriolis flowmeters?

10:41:57 24 MR. COSTAKOS: Objection. Form.

10:42:05 25 THE WITNESS: Do you mean mass flow rate

10:42:09 1 or volumetric flow rate? What do you -- I'm not
10:42:12 2 sure what -- If you could ask your question more
10:42:15 3 specifically.

10:42:15 4 BY MR. SIKORSKI:

10:42:15 5 Q Sure.

10:42:15 6 A Maybe I could --

10:42:16 7 Q Glad to. Does mass flow rate have the same meaning
10:42:22 8 in the context of Coriolis flowmeters for
10:42:27 9 single-phase substances as it does for multiphase
10:42:31 10 substances?

10:42:33 11 MR. COSTAKOS: Objection to form.

10:42:40 12 THE WITNESS: All I can do is answer that
10:42:41 13 question in a general way which is ideally it
10:42:46 14 would.

10:42:50 15 BY MR. SIKORSKI:

10:42:50 16 Q Do you have --

10:42:51 17 A So -- So much mass passes through the conduit,
10:42:56 18 whether it be gas, liquid or some multiphase
10:43:02 19 combination, and that's what the Coriolis
10:43:11 20 flowmeters ideally would measure.

10:43:13 21 Q Sitting here today, do you think -- can you think
10:43:16 22 of a circumstance where flow rate would have a
10:43:19 23 different meaning for single phase as opposed to
10:43:23 24 multiphase substances?

10:43:52 25 A In the context of Coriolis flowmeters measuring

10:44:00 1 mass flow rate, I can't.

10:44:04 2 Q I'm sorry. You cannot?

10:44:05 3 A I cannot.

10:44:06 4 Q Thank you. Coriolis flowmeters, and specifically
10:44:37 5 the flowtube of a Coriolis flowmeter, is driven to
10:44:41 6 oscillate, correct?

10:44:47 7 A I think in general that's true. That's what
10:44:51 8 we're -- That's the technology that we're
10:44:53 9 discussing in this -- in these IPRs.

10:44:58 10 Q And the frequency of that oscillation, again,
10:45:02 11 specifically referring to the conduit or flowtube,
10:45:06 12 the frequency of oscillation is preferably at a
10:45:12 13 resonant frequency, right?

10:45:14 14 MR. COSTAKOS: Objection. Form.

10:45:20 15 THE WITNESS: I think we have to add a
10:45:22 16 bunch of statements just to put it into context.
10:45:30 17 But in general, in the context of the Coriolis
10:45:43 18 flowmeters and art that are at issue -- I should
10:45:48 19 say the technology that is at issue, I think that's
10:45:52 20 a fair statement. I'm not making any of these
10:45:58 21 statements for any particular device or patent but
10:46:04 22 just in general.

10:46:05 23 BY MR. SIKORSKI:

10:46:06 24 Q Yeah. We're just --

10:46:07 25 A There may be exceptions that will occur to me later

10:46:09 1 on.

10:46:09 2 Q Okay. And if --

10:46:12 3 A But if that's all you're seeking, it's a general

10:46:14 4 response, then let it be.

10:46:19 5 Q Again, I'm just doing general questions.

10:46:21 6 A Okay.

10:46:21 7 Q But certainly, if something comes to mind later in

10:46:23 8 the deposition that you want to clarify, feel free.

10:46:26 9 A Okay. Thank you.

10:46:42 10 Q So, again, in a Coriolis flowmeter that's

10:46:47 11 understood to be the technology that we're here to

10:46:50 12 discuss, the flowtube is affirmatively driven by

10:46:57 13 some external source to vibrate or oscillate,

10:47:02 14 right?

10:47:03 15 MR. COSTAKOS: Objection. Form.

10:47:06 16 MR. SIKORSKI: I'll ask that again.

10:47:08 17 BY MR. SIKORSKI:

10:47:08 18 Q In Coriolis flowmeters, some entity external to the

10:47:12 19 flowtube drives that flowtube to oscillate, right?

10:47:16 20 MR. COSTAKOS: Objection to form.

10:47:20 21 THE WITNESS: I would say generally but

10:47:22 22 not exclusively.

10:47:24 23 BY MR. SIKORSKI:

10:47:24 24 Q The pipe doesn't drive itself. There's an external

10:47:28 25 driver, generally speaking, right?

10:47:31 1 MR. COSTAKOS: Objection to form.

10:47:43 2 THE WITNESS: Generally, Coriolis
10:47:46 3 flowmeters include an actuator that drives the tube
10:48:03 4 or flowtube or conduit into oscillatory motion.
10:48:09 5 I'm not saying that's the only way that oscillatory
10:48:16 6 motion could arise, but I think that's what you're
10:48:18 7 asking about in general.

10:48:21 8 BY MR. SIKORSKI:

10:48:22 9 Q In your answer, you used the term "oscillatory
10:48:26 10 motion." What's that?

10:48:28 11 A Motion of the flowtube that is oscillatory. An
10:48:46 12 example of oscillatory motion, for example, would
10:48:52 13 be sinusoidal motion of the flowtube at its
10:49:00 14 resonant frequency or first other -- frequency of
10:49:06 15 its first flexible mode. That's not the only
10:49:11 16 possibility but just an example.

10:49:15 17 Q And this oscillatory motion that you speak of is
10:49:18 18 periodic, right?

10:49:20 19 MR. COSTAKOS: Objection to form.

10:49:29 20 THE WITNESS: Well, I would say, and
10:49:30 21 these statements I'm making are all in general.
10:49:48 22 The motion of the flowtube consists of motion of
10:49:56 23 a -- Let me strike that. Could I have the question
10:50:18 24 one more time, please?

10:50:41 25 (Following question read.)

1 Q And this oscillatory motion that you
10:50:42 2 speak of is periodic, right?

10:50:42 3 THE WITNESS: Ideally or in theory,
10:50:48 4 oscillatory motion is a sinusoidal time component.
10:50:58 5 However, the world isn't perfect, and motion
10:51:07 6 consists of a number of components, could have
10:51:13 7 more -- I'm just thinking off the cuff here, could
10:51:15 8 have more than one vibratory frequency excited in a
10:51:20 9 particular structure at a given time, and the
10:51:25 10 motion doesn't have to be the result of the
10:51:35 11 driven -- of the drive signal or a sinusoidal drive
10:51:42 12 signal. There are other disturbances that can
10:51:45 13 excite oscillatory motion in a Coriolis flowtube.

10:52:23 14 BY MR. SIKORSKI:

10:52:24 15 Q You refer to the drive signal for the conduit as
10:52:29 16 having a sinusoidal shape, right?

10:52:33 17 A It could have a sinusoidal shape, not necessarily.

10:52:38 18 Q When the drive signals are sinusoidal and if that's
10:52:44 19 the only input to the flowtube, then you would
10:52:47 20 agree, would you not, that the oscillatory motion
10:52:50 21 is, I guess by definition, periodic, right?

10:53:11 22 A I would agree to that to the extent that that would
10:53:13 23 be a general statement about long-term behavior of
10:53:23 24 the flowtube but only in the ideal sense, not
10:53:33 25 necessarily in the practical world, in the real

10:53:37 1 world.

10:53:41 2 Q I'm going to a little different topic. In a

10:53:49 3 real-life Coriolis flowmeter, you would agree,

10:53:52 4 would you not, that the resonant frequency of the

10:53:55 5 conduit depends on a number of factors, including,

10:54:00 6 for example, the material of the conduit itself,

10:54:05 7 conduit itself and the substance that's flowing

10:54:10 8 through it, right?

10:54:14 9 A I think you're asking about the first flexible mode

10:54:24 10 of the structure.

10:54:25 11 Q What's "first flexible mode"?

10:54:28 12 A Its first resonant frequency, so structures like

10:54:34 13 flowtubes can resonate at more than one frequency,

10:54:40 14 could resonate, for example, the harmonic of the

10:54:44 15 first flexible mode. So you used the word "the"

10:54:48 16 versus "a," so I'm just trying to narrow it down to

10:54:52 17 what I think you're concerned about which is the

10:54:58 18 first flexible mode of the structure.

10:54:59 19 Q Okay. If I refer to resonant frequency, I'm going

10:55:02 20 to refer to this first flexible mode. And if I

10:55:06 21 stray from that, I'll try to make that known. I'm

10:55:08 22 just thinking of the, sort of, predominant resonant

10:55:12 23 frequency of the tube, okay?

10:55:15 24 A Right.

10:55:16 25 Q So my question is a little bit different. The

10:55:19 1 resonant frequency of a conduit will be different
10:55:22 2 when it's empty as opposed to when it's full of
10:55:25 3 some sort of flowing substance, correct?
10:55:31 4 A That's correct.
10:55:31 5 Q Is it also fair to say that the resonant frequency
10:55:34 6 of an empty flowtube is going to be faster than the
10:55:38 7 resonant frequency of a flowtube carrying liquid or
10:55:43 8 something heavier having more mass, so to speak,
10:55:46 9 than air?
10:55:48 10 A I think generally that's true.
10:56:13 11 Q The -- If you want to refer to a diagram in your
10:56:24 12 Declaration at paragraph 34, actually, page 14,
10:56:47 13 and, again, the same drawings appear in either
10:56:49 14 Declaration, so it doesn't matter which one you're
10:56:51 15 referring to, but you're on page 14?
10:56:53 16 A I am of the '761 Declaration, Exhibit 2019.
10:56:58 17 Q Great. And you see some diagrams there, right?
10:57:01 18 A I do.
10:57:02 19 Q You can use these if you want. You don't need to.
10:57:04 20 My question is, for a vibrating conduit that's
10:57:11 21 oscillating at its resonant frequency, is there
10:57:15 22 such thing as a node and an anti-node in that
10:57:19 23 resonant vibration?
10:57:20 24 MR. COSTAKOS: Objection. Form.
10:57:49 25 THE WITNESS: I don't think those terms

10:57:50 1 are used in the prior art patents or in Henry's
10:57:57 2 patents at issue. But the term "node," for
10:58:04 3 example, could be used in a general mechanical
10:58:05 4 engineering sense that -- in a way to describe
10:58:13 5 vibration of a structure.

10:58:14 6 BY MR. SIKORSKI:

10:58:14 7 Q Would a node be shown in any of the drawings on
10:58:17 8 page 14 of your Declarations?

10:58:19 9 A Nothing explicitly designated as a node in there.

10:58:23 10 Q Designated or not, is it identifiable?

10:58:28 11 MR. COSTAKOS: Objection. Form.

10:58:33 12 THE WITNESS: Do you mean node --
10:58:35 13 what's -- In what context are you describing nodes?

10:58:40 14 BY MR. SIKORSKI:

10:58:40 15 Q A location that does not move when it's subjected
10:58:43 16 to the resonant vibration of a structure.

10:58:46 17 A Okay. So in that context, for example, Figure 1
10:58:53 18 shows the ends of the tube being held at a
10:59:03 19 relatively fixed position.

10:59:07 20 Q To the left?

10:59:08 21 A Compared --

10:59:09 22 Q To the left?

10:59:10 23 A To the left, yeah.

10:59:11 24 Q Okay. Is it fair to say the location where the
10:59:14 25 up-and-down arrow appears, can we refer to that as

10:59:18 1 an anti-node of vibration, or is that
10:59:21 2 inappropriate?

10:59:21 3 MR. COSTAKOS: Objection. Form.

10:59:24 4 THE WITNESS: If you want to use it,
10:59:25 5 that's fine. That's not a term that I would
10:59:27 6 generally use, but that's -- I'd rather not
10:59:37 7 think -- I'd rather not describe it in that term
10:59:40 8 because that's not a term that's used either in
10:59:46 9 Henry's patents at issue or in the prior art
10:59:50 10 patents that I'm aware of.

11:00:01 11 MR. SIKORSKI: Okay. Then we won't.

11:00:41 12 (Exhibit No. 2020 was marked.)

11:00:47 13 BY MR. SIKORSKI:

11:00:47 14 Q Dr. Sidman, we just handed you what I marked as
11:00:51 15 Exhibit 2020. It corresponds, however, to Micro
11:00:55 16 Motion Exhibit 1014. Flip through that to your
11:01:05 17 heart's content. It is a Model D Meter Supplement,
11:01:12 18 comma, Slug Flow and Loading/Unloading, Instruction
11:01:18 19 Manual, purportedly dated September 1987. Have you
11:01:22 20 seen this before?

11:01:23 21 A Yes, I have.

11:01:24 22 Q Now, your two Declarations each cite to this
11:01:32 23 instruction manual, right?

11:01:35 24 A I believe this is the version. I can confirm the
11:01:38 25 date if you'd like. To the best of my

11:01:42 1 recollection, I think it is.

11:01:43 2 Q Great. Thank you. For -- You've got several
11:01:51 3 opinions in your Declarations that cite to this.
11:01:53 4 It's fair to say that each of those opinions
11:01:59 5 combine, I will use as a verb, this Model D
11:02:03 6 Supplement with a much thicker document for the
11:02:06 7 actual Model D device, correct?

11:02:14 8 A Right. This is a supplement to what I call in
11:02:21 9 short -- in short terms the Model D Manual.

11:02:24 10 Q Right. For the '646 patent, you cite to this Slug
11:02:40 11 Flow Manual for purposes relating to the transition
11:02:50 12 of a conduit or flowtube from substantially empty
11:02:55 13 to substantially full, right?

11:02:59 14 MR. COSTAKOS: Objection. Form.

11:04:13 15 BY MR. SIKORSKI:

11:04:13 16 Q And, again, Dr. Sidman, if you want me to hand you
11:04:15 17 the '646 patent, I can. I just don't want to
11:04:19 18 clutter the table if we don't need to.

11:04:21 19 A Okay. I'm just looking at my '646 Declaration,
11:04:31 20 Exhibit 2018, page -- it actually starts on top of
11:04:33 21 page 94 where I make reference to the Slug Flow
11:04:41 22 Supplement or Loading/Unloading Instruction Manual.
11:04:51 23 So if I could hear the question again, maybe I'll
11:04:55 24 offer a more complete answer.

11:05:12 25 (Following question read.)

1 Q For the '646 patent, you cite to
2 this Slug Flow Manual for purposes
3 relating to the transition of a
4 conduit or flowtube from
5 substantially empty to substantially
11:06:57 6 full, right?

11:06:57 7 THE WITNESS: Yes. There are a number of
11:07:01 8 places I could direct you to in my Declaration, for
11:07:15 9 example, the claim chart that ends on page 102 --

11:07:25 10 BY MR. SIKORSKI:

11:07:25 11 Q Well, let's --

11:07:27 12 A -- the last entry there where it says, "The
11:07:31 13 supplement further discloses measurement when,
11:07:33 14 quote, 'the flowmeter is filled with fluid from an
11:07:37 15 initially empty state.'" The one above it
11:07:43 16 discusses states, that is, the slug flow supplement
11:07:48 17 discloses monitoring, quote, "during loading or
11:07:51 18 unloading of fluids from such places as tanker
11:07:54 19 transports, batching tanks or holding tanks." And
11:07:59 20 I have more to say about that issue, for example,
11:08:08 21 in paragraph 223 on page 103 of my Declaration.

11:08:13 22 Q So let's flip to 10 -- page 102 in your Declaration
11:08:19 23 since you pointed us in that direction. Are you
11:08:21 24 there?

11:08:21 25 A Yes.

11:08:22 1 Q At the top of that page, there's a box which
11:08:24 2 includes the final paragraph of Claim 1 of the '646
11:08:30 3 patent, right?

11:08:37 4 A The block on the left-hand side, yes.

11:08:40 5 Q And that portion of Claim 1 can be paraphrased, I'm
11:08:45 6 not going to quote it, but paraphrased, it's
11:08:48 7 determining the flow rate of the flowing liquid
11:08:51 8 during the transition of the conduit or flowtube
11:08:56 9 from a substantially empty state to a substantially
11:09:01 10 full state, right?

11:09:06 11 A Based on the sensor signal is what it says.

11:09:08 12 Q Right.

11:09:09 13 A Yes.

11:09:09 14 Q And if I understand your claim chart correctly, for
11:09:14 15 that claim limitation, you believe that the slug
11:09:18 16 flow supplement, Exhibit 2020, also identified as
11:09:24 17 Micro Motion Exhibit 1014, satisfies that claim
11:09:29 18 limitation, right?

11:09:46 19 A It satisfies it, and I also cite Ruesch on that
11:09:56 20 claim section.

11:09:59 21 Q Well, you say Ruesch for the fact that he measures
11:10:03 22 the flow rate of the flowing liquid. You don't
11:10:05 23 seem to say Ruesch for measuring the flow rate
11:10:10 24 during that transition from substantially empty to
11:10:14 25 substantially full, right?

11:10:19 1 MR. COSTAKOS: Objection to form.

11:10:32 2 THE WITNESS: Okay. The three documents
11:10:34 3 are connected to the extent that Ruesch makes
11:10:39 4 reference to the Model D Manual and that that
11:10:53 5 manual is supplemented by the slug flow supplement.
11:11:04 6 I guess it would be -- I think it would be a fair
11:11:06 7 statement to say that it does. To the extent that
11:11:11 8 it's a separate and independent document, no.

11:11:16 9 BY MR. SIKORSKI:

11:11:17 10 Q So just so I understand what you just said, if I
11:11:19 11 were to give you the Ruesch document, would you be
11:11:22 12 able to identify within its four walls any
11:11:25 13 disclosure of determining flow rate as the conduit
11:11:29 14 transitions from a substantially empty state to a
11:11:33 15 substantially full state?

11:11:35 16 MR. COSTAKOS: Objection. Form.

11:11:39 17 THE WITNESS: I'd have to look at that --
11:11:43 18 at that patent. I think it describes a
11:11:55 19 measuring -- I would say I'd need to look at it.
11:11:58 20 But offhand, I would say it does not if you were
11:12:02 21 just asking me about my recollection of that. If
11:12:07 22 it had, I would have put it in here, so I'm not
11:12:12 23 sure if that answers your question.

11:12:14 24 BY MR. SIKORSKI:

11:12:14 25 Q It does. And just understand from my point of

11:12:16 1 view, all I have before today is your Declarations.
11:12:21 2 And my understanding of this box on page 102 of
11:12:25 3 your Declaration points to the slug flow
11:12:30 4 supplement, Exhibit 2020, for alleged disclosure of
11:12:34 5 this flow rate determination during the transition
11:12:37 6 from empty to full.

11:12:39 7 A Right.

11:12:39 8 Q If I'm misunderstanding your claim chart, please
11:12:42 9 let me know.

11:12:42 10 A I think you -- I think you have it exactly right.

11:12:45 11 Q Okay. Great. So now --

11:12:46 12 A And it's only to the -- I'm not an attorney. I'm
11:12:48 13 an engineer, so -- But only to the extent that
11:12:51 14 these documents might be linked by reference would
11:12:58 15 it be referenced within Ruesch. But outside of
11:13:02 16 that, it's only disclosed in the slug flow
11:13:12 17 supplement.

11:13:12 18 MR. SIKORSKI: Thank you. I'm told we're
11:13:14 19 supposed to change video, so why don't we take a
11:13:17 20 break.

11:13:18 21 THE VIDEOGRAPHER: We are off the record
11:13:19 22 at 11:13 a.m. This is the end of Disk No. 1 in the
11:13:24 23 deposition of Michael Sidman.

11:13:27 24 (Recess taken.)

11:22:55 25 THE VIDEOGRAPHER: We are back on the

11:23:01 1 record at 11:22 a.m. This is the beginning of Disk
11:23:06 2 No. 2 in the deposition of Dr. Sidman.

11:23:11 3 BY MR. SIKORSKI:

11:23:11 4 Q Dr. Sidman, when we left off, we were referencing
11:23:16 5 Exhibit 2020 which is Micro Motion 1014, the slug
11:23:19 6 flow document.

11:23:22 7 A I have it, yes.

11:23:24 8 Q And, again, where we left off, I believe you rely
11:23:27 9 on this slug flow supplement, I believe you call
11:23:32 10 it, for the proposition of determining the flow
11:23:34 11 rate as the flowtube transitions from a
11:23:42 12 substantially empty to a substantially full state;
11:23:48 13 is that right?

11:23:48 14 MR. COSTAKOS: Objection. Form.

11:23:55 15 THE WITNESS: Well, I also rely on Ruesch
11:23:58 16 as I show on -- in the chart, for example, on page
11:24:02 17 102 of my Declaration.

11:24:05 18 BY MR. SIKORSKI:

11:24:05 19 Q I don't want to revisit the last few pages of this
11:24:08 20 transcript. We just kind of left off before the
11:24:10 21 last break with you agreeing that Ruesch discloses
11:24:14 22 and incorporates the Model D but does not within
11:24:17 23 its own four walls disclose determining the flow
11:24:21 24 rate during the relevant transition from empty to
11:24:23 25 full, right?

11:24:24 1 A From substantially empty to substantially full,
11:24:30 2 that's correct. Yes.

11:24:31 3 Q Right. And, again, just so we're on the same page,
11:24:34 4 for that specific claim limitation in the '646
11:24:37 5 patent, Claim 1, you cite this slug flow
11:24:43 6 supplement, right?

11:24:44 7 A That's correct.

11:24:46 8 Q If you could look, please, at page 2 of the
11:24:52 9 supplement, there's several sections, among them
11:24:56 10 2.0, Principle of Operation. Do you see that?

11:25:01 11 A I see that section, yes.

11:25:06 12 Q In that second paragraph there that begins, "In
11:25:09 13 some" -- excuse me, "In some instances," do you see
11:25:11 14 that?

11:25:11 15 A I see that paragraph. I haven't read through it,
11:25:13 16 but go ahead.

11:25:15 17 Q In the middle there starting around line 4, there's
11:25:17 18 a sentence that begins, "If the signal out
11:25:24 19 voltage." Do you see that?

11:25:25 20 A I see that.

11:25:25 21 Q So I'll read that sentence in the record, and I'll
11:25:27 22 ask you a question. Quote, "If the signal out
11:25:31 23 voltage exceeds 3.5V, comma, the board will inhibit
11:25:37 24 the output of flow pulses," period, end quote. My
11:25:41 25 question for you, sir, is, what flow pulses are

11:25:46 1 being referred to in this slug flow supplement?

11:25:56 2 A I think you'd have to go look first at the Model D
11:26:03 3 Manual. It may be mentioned in here, but that
11:26:05 4 might be a better place to look.

11:26:07 5 Q At a very high level, sitting here today, you don't
11:26:10 6 recall what kind of flow pulses are being measured
11:26:13 7 by the Model D or this slug flow supplement?

11:26:16 8 MR. COSTAKOS: Objection. Form.

11:26:47 9 THE WITNESS: Well, many of these meters
11:26:49 10 have more than one type of output, analog, digital.
11:26:58 11 So I'd have to look through, for example, the Model
11:27:02 12 D catalog to answer that question with certainty.

11:27:05 13 BY MR. SIKORSKI:

11:27:05 14 Q You would agree, would you not, that these flow
11:27:08 15 pulses are an indication that the Model D device is
11:27:11 16 used to measure mass flow rate?

11:27:16 17 MR. COSTAKOS: Objection. Form.

11:27:20 18 THE WITNESS: Could I hear that question
11:27:22 19 again, please?

11:27:33 20 (Last question read.)

11:27:52 21 THE WITNESS: Again, I need to go look at
11:27:54 22 that Model D Manual to answer that question
11:27:59 23 accurately.

11:28:01 24 BY MR. SIKORSKI:

11:28:01 25 Q All right. We'll do that in a second, but why

11:28:03 1 don't we flip to the next page of the slug flow
11:28:07 2 supplement, and you can walk me through how this
11:28:10 3 device works, okay? Are you on page 3?
11:28:18 4 A I'm on page 3.
11:28:19 5 Q At the top, there's a heading, 3.2,
11:28:25 6 Loading/Unloading. See that?
11:28:26 7 A Yes.
11:28:26 8 Q Is it your opinion that this section of the slug
11:28:31 9 flow supplement is relevant to your opinion on
11:28:35 10 determining flow rate between the transition of a
11:28:38 11 conduit from empty to full?
11:28:59 12 A I think it's relevant.
11:29:02 13 Q The operation during the loading/unloading
11:29:05 14 operation is described with these numbered sections
11:29:12 15 one through five. Do you see that?
11:29:15 16 A I see that, yes.
11:29:16 17 Q Okay. Let's walk through that.
11:29:22 18 A If you can just give me a second to read through
11:29:24 19 this again.
11:29:25 20 Q Yeah. Read the page, and let me know when you're
11:29:27 21 done.
11:31:28 22 A Okay. I've read through it.
11:31:38 23 Q Let's start with the second paragraph on this page.
11:31:42 24 I assume you read the entire page?
11:31:44 25 A No. I just read Section 3.2.

11:31:49 1 Q I'm referring to the second paragraph in Section
11:31:57 2 3.2.
11:31:57 3 MR. COSTAKOS: The one that begins,
11:31:58 4 "Loading/unloading applications"?
11:32:01 5 MR. SIKORSKI: Yes.
11:32:01 6 MR. COSTAKOS: Okay.
11:32:01 7 THE WITNESS: Let me look at that one
11:32:03 8 more time. I was looking further down.
11:32:05 9 BY MR. SIKORSKI:
11:32:06 10 Q Read the entire page from top to bottom, and let me
11:32:08 11 know when you're done.
11:32:10 12 A Okay.
11:32:10 13 Q Thank you.
11:35:37 14 A Okay. I've read it.
11:35:40 15 Q So forgive me. That took a couple of minutes to go
11:35:42 16 through one piece of -- You are familiar with this
11:35:44 17 document, right?
11:35:45 18 A Yes. I just wanted -- I don't know what question
11:35:49 19 you're going to ask, so I'm trying to --
11:35:52 20 Q Today's not the first -- Today's not the first day
11:35:54 21 you've seen this document, right?
11:35:56 22 A Absolutely not.
11:35:56 23 Q Okay. Good.
11:35:58 24 MR. COSTAKOS: You did ask him to read
11:35:59 25 it, so --

11:36:00 1 MR. SIKORSKI: Yeah. You read it,
11:36:02 2 counsel, in about 30 seconds. Anyway --
11:36:03 3 MR. COSTAKOS: Well, I'm not being asked
11:36:05 4 questions.
11:36:06 5 MR. SIKORSKI: Great.
11:36:06 6 MR. COSTAKOS: I'm just sitting here.
11:36:07 7 BY MR. SIKORSKI:
11:36:08 8 Q Dr. Sidman, on Section 3.2, the second paragraph,
11:36:12 9 you recall it starts, "In loading/unloading
11:36:17 10 applications"?
11:36:18 11 A Yeah. I do see that.
11:36:19 12 Q There it states that, quote, "The meter is
11:36:21 13 typically empty on start-up," end quote. You see
11:36:24 14 that?
11:36:24 15 A I do.
11:36:25 16 Q Okay. Great. That sentence continues by saying
11:36:28 17 that the batch is run, and the meter is purged of
11:36:34 18 liquid at the end of the run. See that?
11:36:36 19 A I do.
11:36:36 20 Q I assume that sentence is relevant to your opinion
11:36:39 21 that this slug flow determines a flow rate during
11:36:42 22 the relevant empty-to-full transitions of the
11:36:45 23 flowtube?
11:36:55 24 MR. COSTAKOS: Objection to form.
11:36:56 25 THE WITNESS: I think it is relevant.

11:36:59 1 BY MR. SIKORSKI:

11:36:59 2 Q Okay. Well, in the numbered paragraphs one through
11:37:03 3 five, there's a description of how this
11:37:07 4 loading/unloading operation is preferably
11:37:09 5 implemented, right?

11:37:11 6 MR. COSTAKOS: Objection. Form.

11:37:18 7 THE WITNESS: It describes one way of a
11:37:29 8 start-up technique for starting a loading process.

11:37:37 9 BY MR. SIKORSKI:

11:37:37 10 Q Are you not relying on these steps one through five
11:37:39 11 in your opinion relevant to Claim 1 of the '646?

11:38:25 12 A Well, to the extent that these steps indicate a
11:38:32 13 practice for start-up or a start-up technique, it
11:38:39 14 is related. To -- I'm not sure about the -- what
11:38:47 15 the context of your question is. That's the reason
11:38:51 16 I'm having trouble answering it.

11:38:57 17 Q Well --

11:38:58 18 A This does not relate -- These steps don't relate
11:39:02 19 specifically to how the slug flow board operates.
11:39:07 20 It just suggests a start-up technique. As it says,
11:39:15 21 it's worked well for loading and unloading.

11:39:17 22 Q Well --

11:39:18 23 A So I'm not quite sure how to answer your question.

11:39:21 24 Q Well, let's look at these five steps and see how
11:39:23 25 this slug board operates, okay?

11:39:25 1 A Sure.

11:39:26 2 Q So -- I'm not going to read them all into the
11:39:30 3 record, but you've just read them. Step three
11:39:37 4 talks about slowly filling up the conduit, right?
11:39:44 5 It says, "Open the downstream valve to allow
11:39:47 6 one-quarter or less of the normal fluid flow. This
11:39:51 7 will minimize the amount of fluid missed on
11:39:54 8 start-up." Do you see that?

11:39:55 9 A Right.

11:39:56 10 Q All right. So you would agree, would you not, that
11:39:59 11 this item three admits that the slug flow
11:40:06 12 supplement misses fluid, misses measuring fluid
11:40:11 13 flow, on start-up, right?

11:40:14 14 MR. COSTAKOS: Objection. Form.

11:40:37 15 THE WITNESS: It may or may not --

11:40:38 16 BY MR. SIKORSKI:

11:40:39 17 Q It says it.

11:40:41 18 A -- depending on -- depending on the situation. So,
11:40:47 19 for example, if the fluid is single phase and the
11:40:56 20 meter is already powered up, it ought not to miss
11:41:02 21 anything in substance.

11:41:07 22 Q Right, but the relevant claim limitation is the
11:41:10 23 transition of the flowtube from a substantially
11:41:14 24 empty state to a substantially full state. So
11:41:17 25 inherently, there's two-phase flow, right?

11:41:29 1 A The slug flow board deals with the situation when
11:41:34 2 there is two-phase flow. This -- These steps here
11:41:40 3 describe basically how to fill the meter or the
11:41:46 4 conduit, a priority to measurement. I'm not sure
11:41:55 5 where -- I'm not sure I really understand your
11:41:58 6 question or what you're trying to get at.

11:42:03 7 Q Well, the way I interpret the slug flow supplement
11:42:08 8 to be describing is, among other things, this
11:42:12 9 start-up mode. You see the start-up mode? It's
11:42:19 10 been mentioned on this page and specifically in
11:42:20 11 item No. 3 on page 3.

11:42:30 12 A Right. I see that.

11:42:31 13 Q And the start-up mode is, in fact, the mode when
11:42:35 14 the pipe transitions the conduit of the flowmeter
11:42:38 15 transitions from substantially empty to
11:42:41 16 substantially full; isn't that right?

11:42:44 17 MR. COSTAKOS: Objection. Form.

11:42:49 18 THE WITNESS: I don't think I can make
11:42:50 19 that as a -- agree with that as a general
11:42:54 20 statement. All I can agree with is that during --
11:43:03 21 using this start-up technique and depending on the
11:43:24 22 fluid composition at the time within the meter,
11:43:32 23 fluid may -- fluid may or may not be missed by the
11:43:41 24 Coriolis flowmeter.

11:43:44 25 BY MR. SIKORSKI:

11:43:44 1 Q The fact that this sentence says, quote, "This will
11:43:47 2 minimize the amount of fluid missed on start-up,"
11:43:51 3 end quote, does that sentence not tell you that the
11:43:53 4 slug flow supplement invariably misses the
11:43:57 5 measurement of flow during that transition from
11:44:00 6 empty to full?

11:44:01 7 MR. COSTAKOS: Objection to form.

11:44:05 8 THE WITNESS: Okay. If you go back to
11:44:09 9 page 1, it's actually the slug flow manual page 2,
11:44:20 10 principle of operation, describes how if the gas --
11:44:31 11 if the -- the density, the specific gravity, that
11:44:35 12 is, drops below a certain level, then the slug flow
11:44:41 13 board inhibits reporting of whatever is being
11:44:47 14 measured. So I'm not quite sure how to answer your
11:44:50 15 question other than that's -- this is what it does.
11:44:55 16 I think it's clear -- clearly describes that. And
11:45:03 17 on the other hand, Section 3.2 just describes a way
11:45:07 18 to manually start up flow during a batching or
11:45:16 19 loading and unloading operation.

11:45:18 20 BY MR. SIKORSKI:

11:45:19 21 Q So let's --

11:45:19 22 A We're talking about two different things here.

11:45:22 23 Maybe that's -- that's the problem.

11:45:25 24 Q There's some disconnect because I feel as though
11:45:30 25 your reference to Section 2.0 just admitted that

11:45:33 1 this device is incapable of measuring flow rate
11:45:37 2 between the full transition of empty to full --
11:45:43 3 MR. COSTAKOS: Objection.
11:45:44 4 BY MR. SIKORSKI:
11:45:44 5 Q -- in the conduit?
11:45:45 6 MR. COSTAKOS: Objection to form.
11:45:55 7 THE WITNESS: Could I hear that question
11:45:57 8 one more time?
11:45:58 9 BY MR. SIKORSKI:
11:45:58 10 Q Sure. Why don't we take a step back. The last
11:46:03 11 paragraph of Claim 1 that's in your Declaration on
11:46:06 12 page 102 --
11:46:07 13 A Right.
11:46:08 14 Q -- that claim limitation, again, Claim 1 of the
11:46:12 15 '646 patent, talks about determining the flow rate
11:46:17 16 of the flowing liquid during the transition of the
11:46:21 17 flowtube from a substantially empty state, which I
11:46:26 18 read to be generally air or gas, agreed --
11:46:31 19 A That's fine.
11:46:31 20 Q -- to a substantially full state, which I read, but
11:46:35 21 please correct me if you have a different
11:46:37 22 interpretation, to be substantially full of the
11:46:39 23 fluid. Yes?
11:46:41 24 A The fluid, or -- or it could be a two-phase
11:46:46 25 mixture.

11:46:47 1 Q Right. Now, your opinion, again, correct me if I'm
11:46:50 2 wrong, is that the slug flow supplement satisfies
11:46:54 3 that portion of Claim 1 in the '646 patent?

11:47:01 4 A Okay. The word "satisfy" needs to be defined. I
11:47:13 5 don't want to make a statement that might be taken
11:47:16 6 out of context.

11:47:17 7 Q Um-hum.

11:47:17 8 A So the word, I think, "satisfy" needs to be --

11:47:22 9 Q Do you prefer a different verb?

11:47:26 10 A You're the one asking the question. The slug --
11:47:36 11 Let me just make a statement. Maybe it'll clarify
11:47:39 12 it. The slug flow board in and of itself doesn't
11:47:51 13 perform the measurement. It inhibits reporting of
11:47:56 14 the measurement when the specific gravity sensed by
11:48:01 15 the Coriolis flowmeter drops below a specific
11:48:07 16 threshold as discussed in the second paragraph on
11:48:09 17 page 2 of the slug flow and unloading instruction
11:48:17 18 manual.

11:48:23 19 Q I wasn't sure if you were finished. Okay.

11:48:26 20 A That's all I have to --

11:48:27 21 Q Okay.

11:48:28 22 A -- say on that.

11:48:29 23 Q When the flowtube is substantially empty, in other
11:48:33 24 words, full of air, would you agree that the
11:48:36 25 specific gravity of the flowtube's content is below

11:48:42 1 0.5?

11:48:43 2 A I think that's probably the case in a practical
11:48:47 3 sense, yes.

11:48:47 4 Q Right. So when a flowtube begins the transition
11:48:53 5 from being substantially empty to substantially
11:48:56 6 full, this slug flow board inhibits, in your words,
11:49:03 7 the reporting of flow measurements until the
11:49:07 8 specific gravity exceeds 0.5, correct?

11:49:13 9 A I think that's correct. The Coriolis flowmeter
11:49:17 10 itself continues making the measurement
11:49:23 11 irregardless of the specific gravity. It's
11:49:28 12 operating continuously. It's making measurements,
11:49:38 13 and it's determinating -- determining based on the
11:49:43 14 sensor signal the flow rate of the flowing liquid
11:49:46 15 during that transition.

11:49:48 16 Q Well, isn't --

11:49:50 17 A But the slug flow supplement board inhibits
11:49:54 18 reporting of that determination or measurement
11:50:05 19 under a very specific condition, that is, when the
11:50:09 20 specific gravity drops below a threshold --

11:50:16 21 Q So if I --

11:50:17 22 A -- which can occur during loading and unloading.

11:50:21 23 Q So the -- The Model D device, the basic device, in
11:50:26 24 your view calculates the flow rate, forwards that
11:50:31 25 in whatever form to the slug flow supplement, and

11:50:36 1 the slug flow supplement inhibits that measurement
11:50:41 2 from being forwarded downstream to whatever device
11:50:44 3 is supposed to receive the flow rate measurement?

11:50:47 4 MR. COSTAKOS: Objection. Form.

11:50:47 5 BY MR. SIKORSKI:

11:50:48 6 Q Is that what you're saying?

11:50:49 7 A Well, the slug flow board plugs into the Model D
11:50:57 8 transmitter. So whether the flow rate signal
11:51:06 9 itself passes through the board or on its way to
11:51:14 10 however it's being reported to the customer or
11:51:17 11 whether the slug flow board just inhibits or sends
11:51:23 12 an inhibit signal into some other portion of the
11:51:26 13 meter to prohibit the communication of that
11:51:28 14 determination or measurement to the customer, I
11:51:31 15 don't know, but its net effect is to block that --
11:51:38 16 to block that reporting.

11:51:45 17 Q What's your understanding as to why the slug flow
11:51:52 18 board inhibits the reporting of flow rate when the
11:51:56 19 contents of the conduit or flowtube is below 0.5
11:52:01 20 specific gravity?

11:52:04 21 A Okay. One more time.

11:52:18 22 (Last question read.)

11:52:29 23 BY MR. SIKORSKI:

11:52:29 24 Q I'll ask that -- Sure. Go ahead.

11:52:48 25 A It's to, in general, prohibit the reporting of what

11:52:55 1 may be inaccurate determinations of mass flow rate
11:52:58 2 by the Coriolis flowmeter to the customer.

11:53:08 3 Q Because the measurements by the Model D meter when
11:53:13 4 the specific gravity is below 0.5 are not
11:53:16 5 trustworthy, correct?

11:53:19 6 MR. COSTAKOS: Objection. Form.

11:53:30 7 THE WITNESS: I wouldn't make that as a
11:53:31 8 general statement, but I think in the context of
11:53:35 9 this discussion it's to -- it's to accomplish that
11:53:45 10 under certain conditions.

11:53:50 11 MR. COSTAKOS: Hold on a second while
11:53:57 12 I --

11:53:59 13 (Mr. Costakos leaves the room.)

11:54:03 14 MR. SIKORSKI: Why don't we go off the
11:54:04 15 record.

11:54:06 16 THE VIDEOGRAPHER: We are off the record
11:54:07 17 at 11:53 a.m.

11:54:09 18 (Discussion off the record.)

11:54:34 19 THE VIDEOGRAPHER: We are back on the
11:54:38 20 record at 11:54 a.m.

11:54:42 21 BY MR. SIKORSKI:

11:54:42 22 Q Dr. Sidman, this slug flow supplement talks about
11:54:47 23 two -- I don't know if modes of operation is the
11:54:53 24 right word, but it talks about slug flow operation
11:54:56 25 on the one hand and loading/unloading on the other;

11:55:02 1 is that fair?

11:55:02 2 A I think that's fair, yes.

11:55:05 3 Q And generally speaking, slug flow operation is when
11:55:08 4 there's an expectation for unwanted bubbles to be
11:55:13 5 in the flowing substance; is that fair?

11:55:16 6 MR. COSTAKOS: Objection. Form.

11:55:19 7 THE WITNESS: Well, they may be wanted or
11:55:22 8 unwanted, but they may occur.

11:55:23 9 BY MR. SIKORSKI:

11:55:24 10 Q Fair enough. And loading/unloading is something
11:55:26 11 different. Instead, loading and unloading is, I
11:55:34 12 guess, generally speaking, moving fluid from one
11:55:38 13 location to a destination location; is that
11:55:42 14 generally fair?

11:55:43 15 MR. COSTAKOS: Objection. Form.

11:56:01 16 THE WITNESS: I think in general that's
11:56:02 17 fair. I'm trying to think if that's -- that I can
11:56:05 18 agree with that under all circumstances, so I think
11:56:09 19 I can only agree to that as a general statement
11:56:14 20 within the context of what I think you are talking
11:56:17 21 about.

11:56:18 22 BY MR. SIKORSKI:

11:56:18 23 Q Okay. Be that as it may, on page 3 in the middle
11:56:22 24 of the slug flow supplement, there's a sentence,
11:56:30 25 quote, "Just as with slug flow, the slug flow

11:56:33 1 inhibit board will prevent a portion of the liquid
11:56:36 2 flow from being counted during loading/unloading,"
11:56:40 3 end quote. Do you see that?

11:56:41 4 A I do.

11:56:42 5 Q So you would agree that regardless whether used in
11:56:45 6 its slug flow -- slug flow capacity or its
11:56:49 7 loading/unloading capacity, this slug flow inhibit
11:56:52 8 board, quote, "prevents," end quote, a portion of
11:56:58 9 the liquid from being counted, right?

11:57:00 10 MR. COSTAKOS: Objection. Form.

11:57:05 11 THE WITNESS: It could prevent that from
11:57:07 12 happening --

11:57:10 13 BY MR. SIKORSKI:

11:57:10 14 Q Well, it --

11:57:11 15 A -- depending on the situation.

11:57:12 16 Q The sentence I just read actually says, quote,
11:57:16 17 "will prevent," end quote, in no uncertain terms.
11:57:21 18 So should I see elsewhere for some reference that
11:57:25 19 says that this sentence is incorrect?

11:57:27 20 MR. COSTAKOS: Objection. Form.

11:57:29 21 THE WITNESS: It will prevent it in the
11:57:31 22 context of this start-up procedure under some
11:57:41 23 circumstances of -- of -- Just leave it there.

11:57:46 24 BY MR. SIKORSKI:

11:57:46 25 Q And in fact, in any circumstance where the specific

11:57:50 1 gravity of the flowtube's content is below 0.5,
11:57:53 2 right?

11:57:54 3 MR. COSTAKOS: Objection. Form.

11:57:55 4 THE WITNESS: It will -- Under those
11:57:57 5 circumstances, it will inhibit reporting. And so
11:58:01 6 the accurate -- accuracy of the totalized result
11:58:09 7 might not be accurate because fluid flow may not be
11:58:16 8 counted but under some circumstances, not in every
11:58:23 9 possible situation.

11:58:31 10 BY MR. SIKORSKI:

11:58:31 11 Q Is there a situation where the specific gravity is
11:58:36 12 below 0.5 and whatever fluid is flowing through
11:58:40 13 that conduit or flowtube is being -- the flow rate
11:58:47 14 of that slug is being measured?

11:58:55 15 MR. COSTAKOS: Objection. Form.

11:58:56 16 THE WITNESS: Okay. Let me just step
11:58:58 17 back and say the Coriolis flowmeter is measuring
11:59:02 18 all the time. It doesn't matter if it's being
11:59:07 19 loaded or unloaded, whether or not there -- whether
11:59:14 20 there's two-phase conditions or single-phase
11:59:17 21 conditions, whether it's all liquid or all gas or
11:59:20 22 some mixture, whether there's a slug there or not.
11:59:26 23 It's making the determination all the time. The
11:59:29 24 slug flow board simply recognizes that under some
11:59:38 25 conditions of specific gravity of whatever at the

11:59:45 1 time is in the conduit of the flowmeter may not
11:59:50 2 result in an accurate determination, and so it
11:59:56 3 inhibits the reporting of that to the customer.

12:00:18 4 BY MR. SIKORSKI:

12:00:18 5 Q I'm going to move to a different topic but still
12:00:24 6 with regard to the slug flow. There's a sentence,
12:00:27 7 No. 4 on page 3. And, again, this description
12:00:37 8 deals with getting air out of the conduit.

12:00:42 9 A Just a second. Which --

12:00:45 10 Q Sure.

12:00:45 11 A Just a second. The pages -- I'm not sure if when
12:00:49 12 you're saying "page" --

12:00:50 13 Q Ahhh.

12:00:51 14 A -- if you're talking about --

12:00:52 15 Q I understand.

12:00:53 16 A -- the number of the page in the document or --

12:00:56 17 Q Sure. So Section 3.2 --

12:01:00 18 A Okay.

12:01:00 19 Q -- very middle of the page, No. 4, are you there?

12:01:10 20 A "Slowly open the upstream valve --"

12:01:13 21 Q Right.

12:01:14 22 A "-- to force the air out and slowly fill the
12:01:17 23 flowmeter. The slow opening minimizes the shock to
12:01:21 24 the meter and reduces the recovery time," is what
12:01:23 25 it says.

12:01:24 1 Q Right. What are you -- what are you -- The term
12:01:27 2 "shock" in that second sentence, that talks
12:01:30 3 about -- that refers to, I should say, the
12:01:34 4 transition from a zero specific gravity gas such as
12:01:38 5 air to the presumably heavier, more massive fluid
12:01:45 6 that's going to flow through the flow meter's
12:01:48 7 conduit, right?

12:01:49 8 MR. COSTAKOS: Objection. Form.

12:01:57 9 THE WITNESS: I would say in general,
12:01:58 10 true. I mean, it's really analogous to what you
12:02:02 11 would call in your household hammer, water hammer,
12:02:05 12 where you rapidly open and close a valve, you might
12:02:08 13 hear knocking in the pipes from another room.
12:02:11 14 That's the type of shock that I think they're
12:02:14 15 referring to.

12:02:14 16 BY MR. SIKORSKI:

12:02:14 17 Q Right. Then you and I are on the same page. But
12:02:18 18 my question is, when this kind of shock is
12:02:30 19 expected, the resonant frequency of the pipe
12:02:34 20 likewise goes through a sudden transition from its
12:02:39 21 empty resonant frequency, which you indicated
12:02:42 22 earlier today is of a higher frequency, to a second
12:02:49 23 lower resonant frequency when the conduit is full
12:02:53 24 of whatever its contents are, right?

12:02:56 25 A I think in general that's true. However, I'd like

12:03:03 1 to indicate that these conduits or flowtubes and
12:03:15 2 Coriolis flowmeters are generally lightly damped
12:03:19 3 structures. So the resonant frequency or the
12:03:29 4 oscillatory vibration of the tube doesn't
12:03:34 5 instantaneously change. The tube keeps ringing.
12:03:41 6 Q It has some momentum to it you're saying?
12:03:43 7 A It has momentum. It's a spring mass system. The
12:03:48 8 resonant frequency will eventually change if the
12:03:55 9 density of the fluid within it changes.
12:04:20 10 Q Does the peak-to-peak travel or displacement of the
12:04:25 11 tube change when it transitions from full of air to
12:04:30 12 full of liquid?
12:04:32 13 MR. COSTAKOS: Objection. Form.
12:06:06 14 THE WITNESS: Could I hear that question
12:06:07 15 one more time, please?
12:06:08 16 (Last question read.)
12:06:35 17 THE WITNESS: The peak-to-peak
12:06:38 18 displacement of the tube, as I think you refer to,
12:06:49 19 in proximity, which I assume you refer to in
12:06:55 20 proximity to the actuator, will change over time
12:07:03 21 when that happens.
12:07:09 22 BY MR. SIKORSKI:
12:07:09 23 Q The peak-to-peak displacement is greater when --
12:07:13 24 A In general. It may not, but it's -- in general it
12:07:18 25 would.

12:07:18 1 Q In general, the peak-to-peak displacement would be
12:07:22 2 greater when the tube is empty, right --
12:07:23 3 MR. COSTAKOS: Objection form.
12:07:24 4 BY MR. SIKORSKI:
12:07:24 5 Q -- as opposed to when it's full?
12:07:28 6 MR. COSTAKOS: Objection. Form.
12:07:59 7 THE WITNESS: Okay. Assuming the signal
12:08:01 8 drive and amplitude remains the same, in general,
12:08:12 9 the peak-to-peak displacement of the tube might
12:08:18 10 very well change when there is a change in density
12:08:25 11 of whatever is flowing through the tube. However,
12:08:28 12 the flowmeter attempts to control the peak-to-peak
12:08:40 13 motion of the flowtube. It may not be
12:08:42 14 displacement. It may be velocity, for example, but
12:08:46 15 there is some regulation that the flowmeter
12:08:50 16 attempts to perform.
12:08:57 17 MR. SIKORSKI: It's now a good time to
12:08:58 18 transition to lunch.
12:08:59 19 MR. COSTAKOS: Sure, whatever you want.
12:09:01 20 THE VIDEOGRAPHER: We are off the record
12:09:02 21 at 12:08 p.m.
12:09:04 22 (Lunch recess taken.)
01:15:11 23 THE VIDEOGRAPHER: We are back on the
01:15:14 24 record at 1:15 p.m.
01:15:16 25 MR. SIKORSKI:

01:15:17 1 Q Good afternoon, Dr. Sidman.

01:15:19 2 A Good afternoon.

01:15:20 3 Q When we left off, we had in front of us the slug
01:15:26 4 flow supplement, if you can grab that, please.

01:15:45 5 On -- Under Section 3.2, loading/unloading, we were
01:15:53 6 looking at the numbered sentences one through five.
01:15:58 7 Can you find your way to that, please.

01:15:59 8 A I'm there.

01:16:02 9 Q In Section 4, I guess we'll call it, there's that
01:16:09 10 sentence that talks about shock to the meter and
01:16:12 11 recovery time. Do you recall the conversation we
01:16:15 12 had before lunch about shock?

01:16:17 13 A Yes.

01:16:17 14 Q I believe you said something to the effect of the
01:16:20 15 water hammer in a house is akin to that?

01:16:24 16 MR. COSTAKOS: Objection to form.

01:16:28 17 THE WITNESS: I said what I said. I'm
01:16:30 18 not -- I won't disagree with you.

01:16:34 19 MR. SIKORSKI:

01:16:34 20 Q The sentence also refers to recovery time. I'll
01:16:36 21 read that sentence into the record. Quote, "The
01:16:38 22 slow opening minimizes the shock to the meter and
01:16:41 23 reduces the recovery time," end quote. What's your
01:16:44 24 understanding of "recovery time"?

01:16:53 25 A In this context, I presume it means a period of

01:16:58 1 time while the meter is still making measurements
01:17:04 2 and perhaps, perhaps, it may not be making the most
01:17:11 3 accurate measurement or determination of, for
01:17:16 4 example, mass flow rate.

01:17:17 5 Q When you say it's not making the most accurate, are
01:17:21 6 you trying to mince words in admitting that it
01:17:23 7 makes inaccurate measurements of flow rate during
01:17:26 8 that time?

01:17:26 9 MR. COSTAKOS: Objection to form.

01:17:36 10 THE WITNESS: I don't know what the
01:17:37 11 author of this particular article meant or had in
01:17:39 12 mind specifically by "recovery time," but I would
01:17:44 13 presume it relates to a period of time when the
01:17:49 14 flowmeter is continuing to make measurements but
01:17:57 15 perhaps not the most accurate measurements.

01:17:59 16 BY MR. SIKORSKI:

01:17:59 17 Q So, in other words, it's a transition from
01:18:02 18 inaccurate measurements to more accurate
01:18:04 19 measurements; is that fair?

01:18:06 20 MR. COSTAKOS: Objection. Form.

01:18:08 21 THE WITNESS: I can only surmise and
01:18:10 22 speculate what the author had in mind --

01:18:14 23 BY MR. SIKORSKI:

01:18:15 24 Q Well, you --

01:18:17 25 A -- for that -- with that term.

01:18:18 1 Q You --

01:18:18 2 A But I wouldn't disagree with you necessarily.

01:18:21 3 Q You understand that you're rendering opinions based

01:18:24 4 on this document. So if there's any interpretation

01:18:27 5 that you've given after reading these things, I'm

01:18:29 6 entitled to know them. If you have no opinion,

01:18:32 7 then just -- just say you don't, okay?

01:18:35 8 A Okay.

01:18:36 9 Q The next one is No. 5, also under Section 3.2 of

01:18:42 10 the slug flow supplement. Are you there?

01:18:45 11 A Um-hum. Yes, I am.

01:18:46 12 Q That paragraph begins, quote, "Once the flowmeter

01:18:49 13 begins counting in a normal manner," end quote.

01:18:53 14 The sentence continues. What's your understanding

01:18:56 15 of "counting in a normal manner" in the context of

01:19:00 16 this Model D slug flow supplement?

01:19:05 17 A I presume that the author of this article meant

01:19:10 18 that it was producing -- that the flowmeter was

01:19:15 19 producing accurate measurements when he uses the

01:19:22 20 term "normal."

01:19:23 21 Q That sentence implies that before the normal

01:19:26 22 manner, there was an abnormal manner, right?

01:19:29 23 MR. COSTAKOS: Objection. Form.

01:19:44 24 THE WITNESS: If there was -- If there

01:19:52 25 was a time at which the meter was not operating in

01:19:58 1 a normal manner, I presume that he meant during
01:20:04 2 this recovery time that he mentions in the previous
01:20:09 3 sentence.

01:20:11 4 BY MR. SIKORSKI:

01:20:11 5 Q So let's walk through that sentence. It begins,
01:20:14 6 once the flowmeter begins counting in a normal
01:20:18 7 manner, and it continues after that, that is in no
01:20:22 8 uncertain terms a statement that you were to wait
01:20:25 9 for the abnormal manner of counting to end, right?

01:20:29 10 MR. COSTAKOS: Objection. Form.

01:20:43 11 THE WITNESS: That potentially could be
01:20:45 12 the case but not necessarily. For example, that
01:20:49 13 previous sentence says, "This slow opening
01:20:54 14 minimizes the shock to the meter and reduces the
01:20:58 15 recovery time." The shock may not be substantial,
01:21:03 16 and the recovery time and the meter may be
01:21:10 17 producing accurate measurements throughout.
01:21:14 18 Perhaps it is. Perhaps it isn't.

01:21:16 19 BY MR. SIKORSKI:

01:21:16 20 Q Well, now it sounds like you're speculating because
01:21:19 21 paragraph four says it minimizes the shock. It
01:21:23 22 doesn't say it eliminates the shock. And likewise,
01:21:26 23 it says it reduces recovery time. It doesn't say
01:21:29 24 eliminate recovery time, correct?

01:21:31 25 MR. COSTAKOS: Objection. Form.

01:21:34 1 THE WITNESS: My understanding of
01:21:37 2 "minimizes the shock" is that it minimizes the
01:21:41 3 potential shock.
01:21:42 4 BY MR. SIKORSKI:
01:21:42 5 Q So you're inserting a word into the sentence that
01:21:46 6 doesn't exist?
01:21:46 7 A Well, you're asking for my interpretation.
01:21:48 8 Q Okay.
01:21:49 9 A I don't see why shock necessarily would occur. I
01:21:58 10 think it may or may not under those circumstances.
01:22:01 11 Q What about recovery time? It says it reduces
01:22:04 12 recovery time. It does not say it eliminates
01:22:08 13 recovery time. What's your interpretation of the
01:22:10 14 sentence in Section 4 of the page we're looking at?
01:22:19 15 A Okay. Again, the meter or a given meter may
01:22:22 16 potentially be operating in an accurate manner
01:22:26 17 throughout this operation of loading or unloading.
01:22:35 18 There may be a recovery time during or -- following
01:22:45 19 transition of the flow.
01:22:46 20 Q Are you reading from the document?
01:22:47 21 A No.
01:22:47 22 Q Or are you reading into the document?
01:22:50 23 MR. COSTAKOS: Objection to form.
01:22:51 24 THE WITNESS: Well, if you'd like, I can
01:22:52 25 look at you while I'm answering. I'm just looking

01:22:54 1 at the document while I'm reading it.

01:22:58 2 BY MR. SIKORSKI:

01:22:58 3 Q You --

01:22:59 4 A I'm just trying to present my interpretation of it

01:23:02 5 as I'm reading it off the cuff.

01:23:03 6 Q Okay.

01:23:05 7 A I honestly haven't considered the --

01:23:33 8 Q The what?

01:23:40 9 A The inevitability of shock during this procedure or

01:23:48 10 that there -- that there is a recovery time

01:23:53 11 necessarily.

01:23:55 12 Q Have you considered the abnormal counting operation

01:24:00 13 that's explicitly referred to in part five?

01:24:04 14 MR. COSTAKOS: Objection. Form.

01:24:06 15 Objection. Mischaracterizes.

01:24:08 16 THE WITNESS: Okay. Again, that's

01:24:16 17 premised on what may or may not have happened

01:24:18 18 before. It's possible that the meter was not

01:24:26 19 counting in a normal or -- manner in which case the

01:24:51 20 slug flow board would not allow false or inaccurate

01:25:04 21 measurements that the meter was continuing to make

01:25:07 22 from being presented to the customer or

01:25:13 23 accumulating a total net flow. Leave it there.

01:25:32 24 BY MR. SIKORSKI:

01:25:32 25 Q The paragraph under No. 5 continues, quote, "The

01:25:35 1 amount of time required before the downstream valve
01:25:38 2 can be fully opened is typically less than two
01:25:41 3 minutes," and it continues. That's referring to
01:25:45 4 two minutes of flow that's not counted, right?

01:25:50 5 MR. COSTAKOS: Objection. Form.

01:25:59 6 THE WITNESS: You are reading it --
01:26:01 7 You're reading something into it that I don't by
01:26:04 8 making that statement.

01:26:05 9 BY MR. SIKORSKI:

01:26:05 10 Q Okay. Well, let me -- let me express to you where
01:26:07 11 I'm -- how I'm interpreting it, and you tell me
01:26:10 12 where you end up differing. Paragraph size --
01:26:13 13 Paragraph five begins, "Once the flowmeter begins
01:26:15 14 counting in a normal manner, slowly open the
01:26:19 15 downstream valve until it is fully open." You see
01:26:21 16 that?

01:26:22 17 A Yes.

01:26:22 18 Q That implies that before opening the downstream
01:26:26 19 valve, the flowmeter is counting in an abnormal
01:26:28 20 manner, right?

01:26:30 21 MR. COSTAKOS: Objection. Form.

01:26:35 22 THE WITNESS: I don't agree with that.

01:26:36 23 Let me just make a statement.

01:26:37 24 BY MR. SIKORSKI:

01:26:38 25 Q I'd rather you answer my question, but if you want

01:26:40 1 to make a statement.

01:26:41 2 A I'm trying -- I'm not quite sure how to answer your

01:26:43 3 question, but let me make a statement that

01:26:45 4 hopefully will -- will answer the question in

01:26:50 5 essence. Opening the valve slowly is a -- can be,

01:27:02 6 depending on the situation, a prudent thing to do

01:27:06 7 to minimize noise or shock that may affect the

01:27:15 8 inaccuracy -- that may affect the accuracy of the

01:27:18 9 flowmeter. So open the valve slowly, and then

01:27:26 10 you're likely to have a better result. Shock can

01:27:32 11 damage components in the system, and that's --

01:27:39 12 don't want to see that. That's a problem that's

01:27:43 13 unrelated to or to accurate measurement of mass

01:27:54 14 flow rate.

01:27:55 15 Q Paragraph five is telling us that under this

01:27:59 16 recommended set-up for the start-up technique, the

01:28:05 17 person can expect to have two minutes of flow not

01:28:09 18 counted by the flowmeter?

01:28:12 19 MR. COSTAKOS: Objection. Form.

01:28:14 20 Mischaracterizes.

01:28:15 21 BY MR. SIKORSKI:

01:28:15 22 Q And with that in mind, I wondered how you come to

01:28:18 23 the conclusion that the slug flow supplement

01:28:20 24 satisfies the final limitation of Claim 1 in the

01:28:23 25 '646 patent which we saw toward the end of your

01:28:27 1 Declaration?

01:28:28 2 MR. COSTAKOS: Objection. Form.

01:28:31 3 THE WITNESS: Okay. Well, I don't agree
01:28:32 4 with the premise of your question that the
01:28:36 5 flowmeter is producing inaccurate measurements for
01:28:45 6 a full two minutes. I think it's just depending on
01:28:50 7 the particular situation would be a prudent thing
01:28:54 8 to slowly open that valve for reasons unrelated to
01:29:03 9 measurement accuracy perhaps.

01:29:05 10 BY MR. SIKORSKI:

01:29:05 11 Q You would agree, of course, based on testimony that
01:29:07 12 you presented before lunch, that the slug flow
01:29:11 13 supplement -- Strike that. You would agree with
01:29:19 14 me, of course, based on testimony you gave before
01:29:21 15 lunch, that inaccurate flow measurements are being
01:29:26 16 made until the point where the contents of the
01:29:29 17 flowtube are greater than 0.5 specific gravity,
01:29:35 18 right?

01:29:35 19 MR. COSTAKOS: Objection. Form.

01:29:37 20 THE WITNESS: Okay. There is a potential
01:29:42 21 for that, not a necessity, that inaccurate
01:29:46 22 measurements may be made during two flow --
01:29:50 23 two-phase flow.

01:29:55 24 BY MR. SIKORSKI:

01:29:55 25 Q Do you know the method by which the slug flow board

01:29:59 1 prevents the or -- inhibits is the right verb the
01:30:08 2 output of flow pulses?
01:30:14 3 A Could I hear that question again, please?
4 (Last question read.)
01:31:45 5 THE WITNESS: While this document,
01:31:47 6 Exhibit 2020, describes the threshold by which
01:31:52 7 those pulses may be inhibited, it does not provide
01:31:56 8 an electronic schematic that would allow me to tell
01:32:00 9 you specifically what circuitry was used to make
01:32:04 10 that happen.
01:32:09 11 BY MR. SIKORSKI:
01:32:09 12 Q If you flip a little bit deeper into the slug flow
01:32:13 13 supplement document at Appendix B -- excuse me,
01:32:17 14 appendix -- Strike that. If you flip a little
01:32:21 15 deeper into the slug flow supplement document to
01:32:26 16 the description under Table 2, slug flow inhibit
01:32:31 17 standard switch settings --
01:32:34 18 MR. COSTAKOS: What page? Page 5?
01:32:36 19 MR. SIKORSKI: Page 5 of the exhibit,
01:32:38 20 yes.
01:32:42 21 BY MR. SIKORSKI:
01:32:42 22 Q Are you there?
01:32:43 23 A Just a second.
01:32:44 24 Q Sure.
01:32:45 25 A I'm there. Let me -- I haven't reviewed this

01:32:49 1 recently, so --

01:32:51 2 Q How about if you read the text below Table 2
01:32:54 3 through the bottom of the page, and let me know
01:32:56 4 when you're done.

01:33:55 5 A Okay.

01:33:57 6 Q This references here to an indicator light on the
01:34:02 7 slug flow inhibit board. Yes?

01:34:05 8 A It does mention that, yes.

01:34:08 9 Q And in the third, I guess the largest paragraph, it
01:34:14 10 says, "The indicator light should be on when the
01:34:18 11 sensor is full of fluid." Do you see that?

01:34:21 12 A Yeah. I do.

01:34:22 13 Q It also says, "When the sensor is empty or
01:34:25 14 partially empty, flow pulses should be inhibited,
01:34:28 15 and the indicator light should be off." Do you see
01:34:31 16 that?

01:34:31 17 A I do.

01:34:31 18 Q Is it fair to say that the mode of operation
01:34:35 19 described here inhibits flow pulses in the
01:34:40 20 measurement of flow rate when the flowtube is
01:34:45 21 anything but full?

01:34:46 22 MR. COSTAKOS: Objection. Form.

01:34:55 23 THE WITNESS: My understanding of the way
01:34:56 24 this thing works is that there is a threshold point
01:35:02 25 between those points determined by a switch setting

01:35:08 1 that specifies that threshold in units of specific
01:35:15 2 gravity, so inhibition occurs somewhere between
01:35:28 3 full and empty. Where it occurs, it depends on the
01:35:32 4 switch setting.

01:35:36 5 BY MR. SIKORSKI:

01:35:41 6 Q And of course, here it says explicitly that the
01:35:44 7 flow pulses should be inhibited not only when the
01:35:46 8 sensor's empty but when it's also partially empty,
01:35:49 9 right?

01:35:50 10 MR. COSTAKOS: Objection. Form.

01:36:04 11 THE WITNESS: That's what it says, so
01:36:13 12 when the -- when the flowmeter is partially empty,
01:36:29 13 the specific gravity as measured by the flowmeter
01:36:34 14 will be below the threshold where inhibition of
01:36:38 15 pulses occurs. That's how I interpret that
01:36:50 16 paragraph.

01:37:21 17 BY MR. SIKORSKI:

01:37:21 18 Q If flow pulses are inhibited, how is a flow rate
01:37:26 19 even determined?

01:37:29 20 MR. COSTAKOS: Objection. Form.

01:37:31 21 THE WITNESS: It's determined in the same
01:37:34 22 manner the Model D transmitter would determine it
01:37:39 23 without the inhibit board present.

01:37:47 24 BY MR. SIKORSKI:

01:37:47 25 Q Although you just admitted you don't know the

01:37:49 1 circuitry the slug board uses to inhibit the Model
01:37:52 2 D flow pulses, right?

01:37:53 3 MR. COSTAKOS: Objection. I'm sorry.
01:37:55 4 Objection. Form.

01:38:15 5 THE WITNESS: Well, I don't know the
01:38:17 6 specific embodiment that's used in this instance.
01:38:23 7 In general, a logic designer might use a simple AND
01:38:27 8 gate to accomplish that. It's a very simple
01:38:33 9 concept of inhibiting pulses. It's common,
01:38:38 10 well-known to logic design engineers.

01:38:40 11 BY MR. SIKORSKI:

01:38:40 12 Q Right. You didn't see that AND gate in any of the
01:38:46 13 documents that you looked at, right? You're just
01:38:48 14 making that up right now?

01:38:50 15 A I'm not --

01:38:50 16 MR. COSTAKOS: Objection to form.

01:38:51 17 THE WITNESS: I'm not making it up. That
01:38:53 18 would be how I would design it if I were designing
01:39:00 19 this thing at the time. There's nothing unusual
01:39:08 20 about that approach, and there are other approaches
01:39:13 21 that use other types of logic gates to accomplish
01:39:15 22 the same.

01:39:57 23 (Exhibit No. 2021 was marked.)

01:40:09 24 BY MR. SIKORSKI:

01:40:09 25 Q Dr. Sidman, we handed you Exhibit 2021 which is a

01:40:17 1 U.S. Patent to Lindenbaum, U.S. 5,224,387. I

01:40:26 2 assume you've seen that before today?

01:40:28 3 A I have.

01:40:38 4 MR. COSTAKOS: I'm sorry. What was the

01:40:39 5 exhibit number you used on this? 2021. Okay.

01:40:45 6 BY MR. SIKORSKI:

01:40:47 7 Q Wait one second. I'll get my copy. It was your

01:41:42 8 opinion, was it not, that Lindenbaum anticipates

01:41:49 9 several claims of the '646 patent, right -- excuse

01:42:01 10 me '761 patent?

01:42:11 11 A That's correct. And also, in combination with

01:42:18 12 Romano, it's my opinion that the '761 is obvious in

01:42:28 13 addition to that anticipation ground.

01:42:35 14 Q Right.

01:43:24 15 MR. SIKORSKI: Let's go off the record

01:43:25 16 one second. I think --

01:43:27 17 THE VIDEOGRAPHER: We are off the record

01:43:28 18 at 1:43 p.m.

01:44:04 19 (Discussion off the record.)

01:45:11 20 THE VIDEOGRAPHER: We are back on the

01:45:13 21 record at 1:45 p.m.

01:45:18 22 BY MR. SIKORSKI:

01:45:18 23 Q Dr. Sidman, you've had a chance to flip through the

01:45:21 24 Lindenbaum patent while we were taking a

01:45:24 25 couple-minute break there? Yes?

01:45:25 1 A Just very briefly, yes.

01:45:28 2 Q When is the last time you looked at the Lindenbaum

01:45:30 3 patent before today?

01:45:34 4 A Yesterday.

01:45:35 5 Q Great. So you're all dialed in, I assume?

01:45:39 6 A Well, of course, I would prefer to have my

01:45:42 7 marked-up version, but I'm sure we can navigate

01:45:48 8 through this.

01:45:49 9 Q Lindenbaum is cited by you for the proposition of

01:45:56 10 operating certain aspects of its operation during

01:46:00 11 two-phase flow, right? If you want to refer to one

01:46:19 12 of your Declarations, you should probably bring the

01:46:21 13 one in front of you for the '761 patent, and I

01:46:26 14 think you're looking at the right one. Great.

01:46:28 15 A I think I was looking at the '761. Looking at

01:46:42 16 ground 6 beginning on page 88. Okay. So one place

01:48:31 17 I could refer you to is the claim chart beginning

01:48:34 18 on page 89 relating to Claim 5 of the '761 patent

01:48:41 19 and more specifically to the -- the clause,

01:48:59 20 "Maintaining oscillation of the flowtube during an

01:49:02 21 onset of liquid flow through the substantially

01:49:06 22 empty flowtube." And I have some description of

01:49:17 23 what Lindenbaum discloses related to that in the

01:49:22 24 right hand -- corresponding right-hand column.

01:49:29 25 Q Right. That's in your Declaration. Thank you.

01:49:31 1 A That's correct.

01:49:33 2 Q So let's talk about Lindenbaum. Lindenbaum uses
01:49:45 3 pulses to measure mass flow rate, right?

01:50:09 4 A Okay. So he describes -- I'm looking in column
01:50:14 5 two, the paragraph beginning at line 32. He
01:50:18 6 describes a measuring instrument which he
01:50:25 7 designates MG which produces pulses corresponding
01:50:41 8 to mass flow measurement.

01:50:46 9 Q What produces those pulses?

01:50:50 10 A Measurement instrument MG. By the way, I think
01:50:56 11 that the G is missing from this figure here.

01:51:03 12 Q You're pointing to Figure 4?

01:51:05 13 A Yeah, Figure 4. I think that M should be MG, if I
01:51:08 14 recall correctly.

01:51:16 15 Q Thank you for that.

01:51:17 16 A I think that clarifies that paragraph in the
01:51:19 17 context of Figure 4.

01:51:20 18 Q Other than being a box with the letters N and
01:51:26 19 potentially MG in it, what is it that's producing
01:51:30 20 these pulses that Lindenbaum is using for flow rate
01:51:36 21 measurement?

01:51:37 22 A As he describes in his abstract, for example, he
01:51:44 23 talks about a measuring device in accordance with
01:51:47 24 the Coriolis principle.

01:51:52 25 Q What's your understanding of the sensor that's

01:51:54 1 producing these pulses or whatever it might be if
01:51:57 2 not a sensor?

01:51:59 3 MR. COSTAKOS: Objection. Form.

01:52:03 4 THE WITNESS: A Coriolis flow, mass
01:52:07 5 flowmeter having a flexible conduit, oscillating
01:52:21 6 conduit.

01:52:22 7 BY MR. SIKORSKI:

01:52:22 8 Q Every single Coriolis flowmeter has a flexible and
01:52:26 9 oscillating conduit, right? So my question for you
01:52:36 10 is what is Lindenbaum using in his flowmeter to
01:52:42 11 generate these pulses used to evaluate flow rate?

01:52:50 12 A Lindenbaum is talking or disclosing an arrangement
01:52:55 13 for flow measurement that is used in combination
01:53:08 14 with a Coriolis mass flowmeter. That instrument,
01:53:22 15 measuring instrument, is designated as MG, and he
01:53:26 16 proposes circuitry that follows the output
01:53:36 17 measurement of that existing Coriolis flowmeter.

01:53:41 18 Q I'm going to go back to my previous question. What
01:53:44 19 is it in Lindenbaum that's producing these pulses?
01:53:48 20 If you like, I'm not hearing an answer.

01:53:50 21 MR. COSTAKOS: Objection. Form. Move to
01:53:53 22 strike.

01:54:12 23 THE WITNESS: He discloses measurement
01:54:14 24 instrument MG that performs that operation.

01:54:17 25 BY MR. SIKORSKI:

01:54:17 1 Q What do you understand the letters "MG" to refer to
01:54:22 2 in terms of sensors, devices, circuitry? What?
01:54:26 3 What's inside MG?

01:54:28 4 MR. COSTAKOS: Objection. Form.

01:54:58 5 THE WITNESS: A Coriolis flowmeter
01:55:01 6 measurement instrument.

01:55:02 7 BY MR. SIKORSKI:

01:55:03 8 Q Such as what?

01:55:04 9 A Such as what's described in many of the patents at
01:55:10 10 issue and in the prior art as well.

01:55:14 11 Q What do these pulses correspond to? Does
01:55:20 12 placement, position, velocity, acceleration? And
01:55:23 13 in answering that, please point me where in
01:55:26 14 Lindenbaum you find that answer.

01:55:28 15 A Okay.

01:55:29 16 MR. COSTAKOS: Objection. Form.

01:55:29 17 THE WITNESS: So let me begin by just
01:55:35 18 pointing out column 2, line -- the sentence
01:55:39 19 beginning at line 33 which reads, in this figure,
01:55:43 20 MG designates the measuring instrument within the
01:55:46 21 arrangement for mass flow measurement, dot, dot,
01:55:53 22 dot. So that instrument MG is making a mass flow
01:55:58 23 measurement.

01:56:00 24 BY MR. SIKORSKI:

01:56:00 25 Q And it's producing pulses, right?

01:56:04 1 A He goes on to say, the measurement signal -- since
01:56:11 2 this measurement signal, dot, dot, dot, consists of
01:56:15 3 pulses, dot, dot, dot, so yes.

01:56:19 4 Q What does each pulse represent in Lindenbaum?

01:56:45 5 A The passage of mass through the Coriolis flowmeter
01:56:50 6 measurement instrument.

01:56:51 7 Q Is it -- Is it coming from a displacement sensor,
01:56:56 8 location sensor, velocity sensor or acceleration
01:57:00 9 sensor? What?

01:57:22 10 A It could be any of those. He doesn't restrict the
01:57:26 11 scope of his disclosure to any -- any one of those
01:57:35 12 particular methods of measuring mass flow.

01:57:39 13 Q You say he doesn't restrict, but does he identify
01:57:43 14 what he's using to generate these pulses?

01:57:46 15 A I would just answer the question the same way I did
01:57:51 16 earlier which is a mass flow measuring instrument
01:57:57 17 which he designates MG.

01:58:00 18 Q Why is it that the frequency of Lindenbaum's
01:58:09 19 pulses -- What physically causes the frequency of
01:58:13 20 his pulses to be unacceptably high?

01:58:38 21 A I'd refer you to the claim chart on page 91 of my
01:58:45 22 Declaration in Exhibit 2019. I'll just read a
01:58:55 23 portion of it, "Lindenbaum further discloses
01:58:58 24 measurement during the time when fluid begins to
01:59:01 25 flow as the tube fills with raw material." For

01:59:06 1 example, Lindenbaum discloses, quote, "Minimizing
01:59:09 2 the measurement and accuracies during the time in
01:59:13 3 which a heterogenous two-phase mixture flows
01:59:17 4 through the metering tube," unquote. There's more
01:59:23 5 in there, but I think that may answer your
01:59:26 6 question.

01:59:26 7 MR. SIKORSKI: Why don't we read back my
01:59:27 8 question, and let's find out.

01:59:29 9 (Following question read.)

10 Q Why is it that the frequency of
11 Lindenbaum's pulses -- What
12 physically causes the frequency of
01:59:44 13 his pulses to be unacceptably high?

01:59:44 14 BY MR. SIKORSKI:

01:59:46 15 Q I'm going to ask that question again, please.

01:59:48 16 MR. COSTAKOS: Objection to form.

01:59:51 17 THE WITNESS: The inaccuracies occur
01:59:54 18 during a time in which a heterogenous two-phase
01:59:58 19 mixture flows.

01:59:58 20 BY MR. SIKORSKI:

01:59:59 21 Q What's causing the inaccuracies during the time in
02:00:01 22 which the heterogenous two-phase mixture flows?

02:00:32 23 A Because Lindenbaum's methodology is independent,
02:00:42 24 how -- how those measuring inaccuracies may occur,
02:00:49 25 he doesn't disclose them.

02:00:50 1 Q Right. He doesn't disclose it, does he?

02:00:53 2 A He recognizes that they do exist during these
02:00:58 3 conditions.

02:00:58 4 Q Isn't it true that the frequency of pulses in
02:01:03 5 Lindenbaum corresponds to the frequency of
02:01:07 6 vibration of his flowtube?

02:01:12 7 MR. COSTAKOS: Objection. Form.

02:01:27 8 THE WITNESS: I -- I don't know where you
02:01:28 9 get that from. I -- I disagree with it. If you
02:01:32 10 want to direct me to something that indicates that,
02:01:35 11 I can discuss that.

02:01:36 12 BY MR. SIKORSKI:

02:01:36 13 Q I'll ask you a different question. Is there a
02:01:38 14 correlation between the vibrating frequency of his
02:01:41 15 flowtube and the frequency of the -- what he calls
02:01:46 16 pulses used to measure mass flow rate?

02:01:51 17 MR. COSTAKOS: Objection. Form.

02:01:56 18 THE WITNESS: Could I have the question
02:01:57 19 again?

02:02:10 20 (Last question read.)

02:02:42 21 THE WITNESS: I don't know why there
02:02:43 22 should be any correlation, and Lindenbaum doesn't
02:02:46 23 state that there is any.

02:03:09 24 BY MR. SIKORSKI:

02:03:09 25 Q If you flip to column 3 in Lindenbaum at line 34,

02:03:22 1 there's a paragraph. Can you read that to
02:03:24 2 yourself? I'll read it into the record.
02:03:26 3 "Accordingly, there is no flow measurement for the
02:03:29 4 time in which a heterogenous two-phase mixture
02:03:34 5 flows through the metering tube within the
02:03:37 6 arrangement for mass flow measurement M since this
02:03:41 7 measurement is too inaccurate. Instead, a
02:03:45 8 synthesized signal is fed to the counter for
02:03:48 9 analysis," end quote. You see that, right?
02:03:52 10 A I do, yes.
02:03:52 11 Q And you would agree, of course, that during
02:03:55 12 two-phase flow, Lindenbaum isn't capable of
02:03:57 13 accurately measuring flow --
02:04:01 14 MR. COSTAKOS: Objection to form.
02:04:03 15 BY MR. SIKORSKI:
02:04:03 16 Q -- right?
02:04:03 17 A Okay. I can't agree with that question as you've
02:04:14 18 asked it, but let me make a statement that
02:04:18 19 hopefully will clarify the matter. There is a
02:04:28 20 possibility, and this -- that no flow measurement
02:04:35 21 may occur during a time in which a heterogenous
02:04:40 22 two-phase mixture flows through the metering tube
02:04:43 23 of the Coriolis flow metering device. And that
02:04:53 24 is -- that possibility is -- is what Lindenbaum's
02:04:58 25 disclosure deals with. He's not stating that it

02:05:07 1 has to happen. It may happen.

02:05:15 2 Q So you -- You read the unequivocal sentence that
02:05:19 3 appears in the Lindenbaum reference that, quote,
02:05:21 4 "There is no flow measurement for the time in which
02:05:23 5 a heterogenous two-phase mixture flows to the
02:05:27 6 metering tube," end quote, as being simply a
02:05:31 7 possibility and not what the sentence actually
02:05:35 8 says?

02:05:36 9 MR. COSTAKOS: Objection. Form.

02:05:37 10 THE WITNESS: Okay. The context in which
02:05:40 11 this statement is made is assuming that that
02:05:51 12 flowmeter produces no flow measurement during this
02:05:56 13 period in which a heterogenous two-phase mixture
02:06:00 14 flows. He's not making a statement about
02:06:08 15 flowmeters in general under all operating
02:06:12 16 conditions. He's just talking about the conditions
02:06:22 17 under which this might happen.

02:06:25 18 BY MR. SIKORSKI:

02:06:25 19 Q Those conditions are, without question,
02:06:29 20 heterogenous two-phase flow, right?

02:06:31 21 MR. COSTAKOS: Objection to form.

02:06:33 22 BY MR. SIKORSKI:

02:06:34 23 Q Seems pretty unequivocal to me.

02:06:36 24 MR. COSTAKOS: Objection to form.

02:06:51 25 THE WITNESS: I'm not sure I'm -- I'm

02:06:52 1 disagreeing with you, but Lindenbaum discloses the
02:07:01 2 possibility that no flow measurement may occur
02:07:04 3 during this particular condition. Potentially may
02:07:10 4 happen. Not necessarily happens. I think to read
02:07:13 5 that in would be inappropriate, and I don't.

02:07:19 6 BY MR. SIKORSKI:

02:07:20 7 Q Wow. Okay.

02:07:22 8 MR. COSTAKOS: Move to strike.

02:07:29 9 BY MR. SIKORSKI:

02:07:29 10 Q When Lindenbaum is not making any flow measurement,
02:07:33 11 whether it be because there's two-phase flow or for
02:07:35 12 other reasons -- Let me rephrase that. Without
02:08:11 13 measuring -- Hmm. How do I put that question?
02:08:58 14 What property of the flowing liquid is Lindenbaum
02:09:02 15 capable of determining during the time when, for
02:09:08 16 whatever reason, be it two-phase flow or something
02:09:11 17 else, Lindenbaum is making no flow measurement?

02:09:15 18 MR. COSTAKOS: Objection. Form.

02:09:23 19 THE WITNESS: Okay. So to begin with,
02:09:25 20 Lindenbaum is an inventor. He's not a measurement
02:09:30 21 device. He's disclosing a mass flow measurement
02:09:39 22 instrument and how it may respond to a heterogenous
02:09:53 23 two-phase mixture.

02:10:05 24 BY MR. SIKORSKI:

02:10:05 25 Q In your claim chart in your Declaration, page 91,

02:10:15 1 at the bottom there's a box. On the left, it says,
02:10:19 2 "Determining based on sensor signals from a
02:10:20 3 sensor -- sensor connected to the flowtube, a
02:10:23 4 property of the flow, fluid flow." See that?
02:10:25 5 A I do.
02:10:32 6 Q And you refer to Lindenbaum's ability to measure
02:10:38 7 fluid flow. I'm paraphrasing, obviously.
02:10:39 8 A Right. I say he discloses an apparatus for
02:10:42 9 measuring fluid flow --
02:10:43 10 Q Right.
02:10:44 11 A -- dot, dot, dot.
02:10:47 12 Q If as stated in column 3, line 34 of Lindenbaum he
02:10:54 13 is not making -- During the time at which he is not
02:10:57 14 making a fluid flow measurement, is it possible for
02:11:02 15 Lindenbaum to be determining a property of the
02:11:05 16 fluid flow?
02:11:10 17 MR. COSTAKOS: Objection. Form.
02:11:11 18 MR. SIKORSKI: Let's read that one back.
02:11:28 19 (Last question read.)
02:11:32 20 THE WITNESS: I can't answer the question
02:11:34 21 as you've asked it, but the Coriolis mass flowmeter
02:11:46 22 instrument is making a measurement. It doesn't
02:11:54 23 stop making a measurement. If you look, for
02:12:04 24 example at Figures 2 and 3, the instrument is
02:12:12 25 active in producing pulses at the -- at the

02:12:18 1 beginning of the time of metering and in Figure 3
02:12:24 2 at the time or the end of metering. It never stops
02:12:31 3 operating in making a determination.

02:12:35 4 BY MR. SIKORSKI:

02:12:35 5 Q Okay.

02:12:35 6 A Whether those determinations are accurate or not,
02:12:38 7 that's what Lindenbaum tries to address with his
02:12:42 8 art.

02:12:43 9 Q For the time period when Lindenbaum's flow
02:12:47 10 measurements are inaccurate, what property of the
02:12:51 11 fluid is being determined?

02:12:59 12 A He discusses a flow -- mass flow measurement
02:13:05 13 instrument so that the property would be mass flow.

02:13:10 14 Q Even though it's an inaccurate measurement?

02:13:16 15 A It may be inaccurate. It may not be inaccurate.

02:13:19 16 Q My question, sir -- Sorry. Go ahead.

02:13:25 17 A He tries to deal with his art with making the best
02:13:35 18 of a situation when it's apparent that the
02:13:40 19 measurement instrument is producing an inaccurate
02:13:45 20 mass flow measurement.

02:13:46 21 Q My question was, during the time when the mass flow
02:13:50 22 measurement is indeed inaccurate, what property is
02:13:55 23 being determined of the fluid flow, if any?

02:14:00 24 A Its mass flow, the rate at which mass is passing
02:14:09 25 through the Coriolis mass fluid measurement device,

02:14:15 1 conduit or conduits.

02:14:17 2 Q So you're saying inaccurate measurements of mass
02:14:20 3 flow -- inaccurate measurements of mass flow tell
02:14:23 4 you mass flow of the actual fluid?

02:14:27 5 MR. COSTAKOS: Objection to form.

02:16:44 6 BY MR. SIKORSKI:

02:16:44 7 Q You seem to be reading a lot of out of your
02:16:46 8 Declaration. A couple minutes have gone by after a
9 relatively simple question, so let's read it back
02:16:49 10 so we're not --

02:16:49 11 A I was about to answer your question.

02:16:51 12 Q Great.

02:17:05 13 A I direct you to page 91 of my -- of Exhibit 2019,
02:17:14 14 my Declaration, where it discusses a property of
02:17:21 15 the fluid flow, property of the fluid flow
02:17:30 16 identified in Lindenbaum as the movement of flow
02:17:44 17 through the conduit indicative of the flow rate of
02:17:50 18 the fluid through the conduit. It's making a
02:17:54 19 determination of a property of the fluid flow as
02:17:59 20 opposed to a property of the fluid. That's mass
02:18:08 21 flow rate.

02:18:09 22 Q But if the -- If the mass flow rate is acknowledged
02:18:13 23 to be inaccurate, how is it that you're determining
02:18:17 24 the fluid flow rate?

02:18:22 25 A The measure -- Coriolis mass flow measurement

02:18:29 1 instrument continues to make estimates of the mass
02:18:36 2 flow rate at all times. They may be inaccurate at
02:18:46 3 times due to the conditions which, for example,
02:18:52 4 Lindenbaum illustrates. But measurement
02:19:03 5 instrument -- the Coriolis flow -- mass flow --
02:19:06 6 The Coriolis mass flow instrument never stops
02:19:10 7 making measurements or estimates of the mass flow
02:19:14 8 rate.

02:19:15 9 Q Now, the claim that you were just referring to on
02:19:18 10 page 91 of your Declaration, that's Claim 5, I
02:19:24 11 believe, out of the '761 patent. You'll see, of
02:19:28 12 course, that it says, "Determining based on sensor
02:19:31 13 signals from a sensor connected to the flowtube,
02:19:35 14 comma, a property of the fluid flow," end quote, do
02:19:40 15 you see that?

02:19:40 16 A What page are you on?

02:19:41 17 Q Sure. Your Declaration, page 91, bottom where your
02:19:53 18 left hand is on the left-hand side.

02:19:56 19 A Okay. Yep. I see it.

02:19:57 20 Q All right. So this determining clause is from
02:19:59 21 Claim 5 of the '761, right, and it doesn't talk
02:20:07 22 about estimating anything. It says, "Determining
02:20:09 23 based on sensor signals from a sensor connected to
02:20:13 24 the flowtube, a property of the flowtube." And my
02:20:17 25 question again is, what property of a flowtube

02:20:22 1 comes from, admittedly, inaccurate flow

02:20:25 2 measurements in the Lindenbaum reference?

02:20:28 3 MR. COSTAKOS: Objection. Form.

02:20:33 4 THE WITNESS: Okay. I don't know how to
02:20:35 5 answer that question as you've asked it, so I'll
02:20:37 6 just make a statement that I think is relevant and
02:20:42 7 may answer your question, whatever that exactly may
02:20:46 8 be. So Lindenbaum discusses a measuring device
02:21:00 9 operating in accordance with the Coriolis
02:21:04 10 principle, and then that's in his abstract, then
02:21:07 11 later in column 2, about line 35, discusses it in
02:21:16 12 the context of making a mass flow measurement.
02:21:19 13 That technology is well-known and referenced by
02:21:27 14 Lindenbaum.

02:21:28 15 BY MR. SIKORSKI:

02:21:28 16 Q I'm going to ask you a quick question. We've got
02:21:31 17 two minutes before a disk change.

02:21:33 18 A Okay.

02:21:33 19 Q For the time period during which Lindenbaum knows
02:21:40 20 its flow measures to be wrong and inaccurate, what
02:21:43 21 property, if any, do you believe comes out of those
02:21:47 22 measurements, property of the fluid flow?

02:21:51 23 MR. COSTAKOS: Objection. Form.

02:21:55 24 THE WITNESS: The instrument that he
02:21:57 25 discloses is attempting to continuously make

02:22:03 1 determinations as to mass flow.

02:22:12 2 MR. SIKORSKI: Take a break to switch
02:22:13 3 disks.

02:22:14 4 THE VIDEOGRAPHER: We are off the record
02:22:15 5 at 2:22 p.m. This is the end of Disk No. 2 in the
02:22:19 6 deposition of Michael Sidman.

02:22:22 7 (Recess taken.)

02:35:59 8 THE VIDEOGRAPHER: We are back on the
02:36:02 9 record at 2:35 p.m. This is the beginning of Disk
02:36:07 10 No. 3 in the deposition of Michael Sidman.

02:36:11 11 BY MR. SIKORSKI:

02:36:11 12 Q Dr. Sidman, you have the Lindenbaum, excuse me,
02:36:19 13 reference in front of you?

02:36:19 14 A Yes, I do.

02:36:21 15 Q If you turn to Figure 6, you can -- feel free to
02:36:33 16 refer to the specification if you want. Figure 6
02:36:37 17 shows a situation that Lindenbaum calls "purging"
02:36:43 18 when you've got fluid in the pipes and you're
02:36:49 19 slowly emptying it as opposed to start-up which is
02:36:53 20 shown in Figure 5 and what we've been talking for
02:36:56 21 the most part today of going from empty to full?

02:36:59 22 A Okay. I need to re-read that paragraph --

02:37:01 23 Q Sure, sure.

02:37:02 24 A -- there.

02:41:58 25 Q Dr. Sidman, the description of Figure 6 is all of

02:42:01 1 three lines long.

02:42:02 2 A Oh, I was reading the paragraph beginning at the
02:42:07 3 end of column 3 and onto 4 that relates to Figure 6
02:42:19 4 and trying to make sense of that.

02:42:22 5 Q All right. Well, let me know when you do.

02:42:30 6 A Is there -- Is there some question you'd like me to
02:42:34 7 address? Maybe I can go to the heart of it.

02:42:36 8 Q I have nothing but questions. I'm just waiting for
02:42:38 9 you to sort of acknowledge and understand for your
02:42:40 10 sake.

02:42:43 11 A Right.

02:42:43 12 Q There are a couple of questions waiting in the
02:42:46 13 wings.

02:42:46 14 A Right. I wish I had my marked-up copy that would
02:42:49 15 aid me, so --

02:42:50 16 Q You could have brought it.

02:42:51 17 A I could have.

02:43:07 18 Q So how about if I ask my questions and if you need
02:43:10 19 to refer to this text to move things along, fair?

02:43:12 20 A Good idea.

02:43:13 21 Q Okay. Great. So in Figure 6, we have essentially
02:43:19 22 the reverse of start-up. Instead of going from
02:43:21 23 empty to full, the conduit is going from full to
02:43:25 24 empty, right?

02:43:28 25 A Yes.

02:43:28 1 Q Pretty simple. Great. So on the left side of
02:43:37 2 Figure 6, we have what I'll call normal operation
02:43:43 3 where the Coriolis flowmeter is oscillating the
02:43:49 4 conduit and some sort of measurement pulses are
02:43:53 5 being produced, and a mass flow rate from those
02:43:56 6 pulses is being determined, right?

02:43:58 7 A That's correct.

02:44:00 8 Q Great. And to the right in Figure 6, we have a
02:44:07 9 situation where some of those measurement pulses
02:44:10 10 become untrustworthy, right?

02:44:14 11 MR. COSTAKOS: Objection. Form. Go
02:44:18 12 ahead.

02:44:18 13 THE WITNESS: Their frequency increases
02:44:21 14 beyond what would physically be possible --

02:44:30 15 BY MR. SIKORSKI:

02:44:30 16 Q Right.

02:44:31 17 A -- for that particular pump.

02:44:35 18 Q So taking into account for the time being the left
02:44:39 19 side of Figure 6, there's presumably a drive
02:44:44 20 mechanism that is oscillating the flowtube, right?

02:44:50 21 A There is. Not presumably. There is.

02:44:53 22 Q Great. And that flowtube is being driven at or
02:45:00 23 about its resonant frequency, right?

02:45:04 24 A Ideally, it would be. I would not have any basis
02:45:10 25 to believe that Lindenbaum is discussing at that

02:45:13 1 point where it would not, at least on the left-hand
02:45:17 2 side of that Figure 6.

02:45:19 3 Q So we can accept that ideally to the left side of
02:45:24 4 Figure 6, the flowtube is being driven at its
02:45:29 5 resonant frequency, right?

02:45:31 6 A We can make that assumption.

02:45:33 7 Q Great. To the right in Figure 6 is when the fluid
02:45:38 8 begins to empty out of that conduit, right?

02:45:41 9 A Yes.

02:45:41 10 Q If the drive system were able to keep oscillating
02:45:52 11 the flowtube at its resonant frequency,
02:45:57 12 understanding that the resonant frequency is
02:46:00 13 probably changing as the flowtube empties of fluid,
02:46:05 14 if Lindenbaum's drive system were able to keep
02:46:10 15 oscillating the flowtube at the then resonant
02:46:15 16 frequency, are you with me so far?

02:46:20 17 A Okay. Let me listen to what you have to say,
02:46:27 18 but --

02:46:27 19 Q Let me ask a question.

02:46:28 20 A I'm not -- I'm not totally agreeing where I think
02:46:35 21 you're going with the premise. Why don't you
02:46:38 22 finish the question.

02:46:38 23 Q Right. I'll ask it in full. If the drive system
02:46:44 24 for Lindenbaum's flowtube were capable of driving
02:46:49 25 that tube at its then resonant frequency as that

02:46:54 1 flowtube is emptying of liquid, wouldn't the flow
02:47:01 2 pulses be entirely accurate? In other words, put
02:47:07 3 another way, isn't the source of inaccuracy in his
02:47:12 4 pulse -- pulse frequency the fact that he's
02:47:15 5 incapable of oscillating the flowtube at its
02:47:19 6 resonant frequency?

02:47:21 7 MR. COSTAKOS: Objection. Form.

02:47:40 8 THE WITNESS: It doesn't state the basis
02:47:42 9 for inaccurate measurement in Figure 6 other than
02:47:53 10 he -- other than Lindenbaum discloses a
02:47:56 11 heterogenous two-phase mixture. It doesn't
02:48:05 12 describe that oscillation is occurring, not
02:48:17 13 occurring, whether it's tracking the resonant
02:48:20 14 frequency, whatever that may be as -- as conditions
02:48:23 15 change within the flowtube.

02:48:27 16 BY MR. SIKORSKI:

02:48:27 17 Q Wouldn't your expectation be that if the flowtube
02:48:33 18 were kept oscillating at its resonant frequency
02:48:39 19 that the flow pulses would be output at an accurate
02:48:43 20 frequency?

02:48:44 21 MR. COSTAKOS: Objection. Form.

02:48:58 22 THE WITNESS: It would certainly increase
02:48:59 23 the likelihood of that, not necessarily but
02:49:06 24 increase the likelihood, certainly.

02:49:07 25 BY MR. SIKORSKI:

02:49:08 1 Q And likewise, for start-up, if the flowtube were
02:49:13 2 driven at its -- Let me backtrack. Figure 5 is the
02:49:19 3 start-up sequence that sort of mirrors Figure 6.
02:49:27 4 With reference to Figure 5 if that helps, if the
02:49:30 5 flowtube were oscillated at its then-appropriate
02:49:37 6 resonant frequency as the flowtube fills with
02:49:40 7 liquid, wouldn't your expectation be that
02:49:46 8 Lindenbaum's flow pulses would be accurate?

02:49:52 9 MR. COSTAKOS: Objection to form.

02:49:57 10 THE WITNESS: I think -- Let me hear that
02:50:08 11 question again.

02:50:35 12 (Last question read.)

02:51:03 13 THE WITNESS: My response to that would
02:51:04 14 be similar to what I had to say about Figure 6.

02:51:09 15 BY MR. SIKORSKI:

02:51:09 16 Q And what is that?

02:51:11 17 MR. COSTAKOS: Objection. Form.

02:51:15 18 THE WITNESS: First of all, the resonant
02:51:19 19 frequency changes as the flowtube is filling. It's
02:51:30 20 not an instantaneous change. Having -- if -- If
02:51:35 21 there was at any one instant in time a resonant
02:51:43 22 frequency related to the density of material in --
02:51:53 23 in the flowtube, certainly, having the tube
02:52:02 24 oscillate at that hypothetical natural frequency
02:52:10 25 would greatly increase the chances of the flowmeter

02:52:16 1 instrument producing accurate measurements.

02:53:33 2 MR. SIKORSKI: One second.

02:53:57 3 (Exhibit No. 2022 was marked.)

02:54:08 4 BY MR. SIKORSKI:

02:54:08 5 Q Dr. Sidman, we've handed you Exhibit 2022 to your

02:54:13 6 deposition which corresponds to Micro Motion 1006.

02:54:18 7 It's the U.S. Patent to Romano 4,934,196. You

02:54:37 8 recognize this patent? Yes?

02:54:39 9 A I do. I haven't verified it's complete, but I

02:54:42 10 would presume that it is.

02:54:42 11 Q It's intended to be. But if you spot anything

02:54:45 12 missing, let me know.

02:54:46 13 A Sure.

02:54:56 14 Q If you could flip in the Romano reference to page

02:55:05 15 49 of the exhibit which is columns 25 and 26,

02:55:08 16 please.

02:55:21 17 MR. COSTAKOS: Which ones?

02:55:22 18 THE WITNESS: 25 and 26.

02:55:23 19 MR. COSTAKOS: 25 and 26.

02:55:25 20 THE WITNESS: I'm there. I haven't read

02:55:26 21 it, but I'm on that page.

02:55:30 22 BY MR. SIKORSKI:

02:55:30 23 Q You're familiar with this reference, right?

02:55:31 24 A Yes, I am.

02:55:33 25 Q It's set in your Declarations?

02:55:36 1 A What I mean is I haven't refreshed myself just now.

02:55:41 2 Q Okay. Well, I'm sure you recall that beginning at

02:55:45 3 column 26, line 17 is where you cite in Romano for

02:55:52 4 the proposition of initial vibration of -- of the

02:56:03 5 tubes, right? And feel free to reference either of

02:56:06 6 your Declarations.

02:56:08 7 A Which Declaration are you referring to, the '761 or

02:56:11 8 the '646 right now?

02:56:13 9 Q It's going to be the '646 right now. You've got a

02:57:15 10 claim chart at page 60 and some text that is before

02:57:18 11 and after that.

02:57:25 12 A Just a moment. Okay. You're directing me to the

02:57:54 13 claim chart on page 60 of the '646 Declaration.

02:57:57 14 Q Yeah. I mean, you're free to look at whatever you

02:58:00 15 want in your Declaration. I'm just pointing out

02:58:02 16 that page 60 is where you have a claim chart.

02:58:04 17 Perhaps that's helpful. Perhaps that's not.

02:58:06 18 A Okay. So what was your original question?

02:58:12 19 Q At column 26, line 17 is where Romano talks about

02:58:35 20 placing his flow tubes into laboratory motion. You

02:58:39 21 see that?

03:00:37 22 A Okay. I don't see where I've cited to that section

03:00:39 23 in this particular claim chart.

03:00:41 24 Q Okay. Perhaps I jumped a little bit ahead.

03:00:44 25 A Okay.

03:00:44 1 Q So your claim chart begins at about page 60 of your
03:00:49 2 Declaration, right?

03:00:50 3 A Claim 1, yes.

03:00:53 4 Q Yes. And on page 61 is a part of Claim 1 in the
03:00:57 5 '646 that talks about determining flow rate during
03:01:01 6 the transition from empty to full, right?

03:01:04 7 A It does.

03:01:08 8 Q And in the right column, you have one, two, three,
03:01:12 9 four, five, maybe six paragraphs that, if I
03:01:19 10 understand your claim chart correctly, purport to
03:01:22 11 meet this claim limitation, right?

03:01:29 12 A They do. Let me just re-read them briefly.

03:01:32 13 Q Sure.

03:02:07 14 A Okay.

03:02:07 15 Q Which of the paragraphs in the right side of your
03:02:10 16 claim chart do you rely on for the proposition of
03:02:17 17 determining flow rate during that transition from
03:02:20 18 empty to full?

03:02:26 19 A All of them.

03:02:27 20 Q All of them?

03:02:27 21 A All of the ones listed, yes.

03:02:29 22 Q I mean, the portions that you quote, none of them
03:02:33 23 talk about the transition from empty to full. They
03:02:34 24 just talk about determining flow rate?

03:02:39 25 MR. COSTAKOS: Objection. Form.

03:02:49 1 THE WITNESS: Okay. I don't -- I don't
03:02:50 2 follow your question.

03:02:51 3 BY MR. SIKORSKI:

03:02:51 4 Q Sure. The claim requires determining a flow rate
03:02:55 5 as the flowtube transitions from substantially
03:02:59 6 empty to substantially full, correct?

03:03:02 7 A Yes.

03:03:02 8 Q Right. And none of the passages on the right side
03:03:05 9 of your claim chart discuss the situation where the
03:03:09 10 flowtube transitions from empty to full?

03:03:17 11 MR. COSTAKOS: Objection. Form.

03:04:15 12 THE WITNESS: Implicitly some of them do.

03:04:19 13 BY MR. SIKORSKI:

03:04:19 14 Q How so?

03:04:22 15 A Okay. So I'm looking at the third element or
03:04:29 16 statement, quote, "A specific object is to provide
03:04:33 17 such a meter which is substantially immune to noise
03:04:41 18 regardless of whether that noise originates from
03:04:44 19 harmonies, turbulent flow conditions, modal
03:04:46 20 excitation or other noise sources such as," end
03:04:50 21 quote, such as might occur during that transition
03:04:56 22 from substantially empty to substantially full. So
03:05:01 23 he's discussing noise there.

03:05:07 24 Then he talks -- Excuse me. The fifth
03:05:20 25 statement in my claim chart states, "Varying the

03:05:27 1 sampling frequency in response to the ascertained
03:05:29 2 face value in order to compensate for a change in
03:05:31 3 the fundamental frequency caused by a substantially
03:05:35 4 simultaneously-occurring variation in density of
03:05:41 5 the fluid flowing through the meter such as would
03:05:45 6 occur during a" -- end of quote, such as would
03:05:50 7 occur in the transition from a condition where the
03:05:55 8 flowtube is substantially empty to where it's
03:06:01 9 substantially full.

03:06:05 10 And then lastly, the sixth quotation on
03:06:11 11 the page -- top of page 62, quote, "In the event
03:06:15 12 that the combined signals produced by both velocity
03:06:19 13 sensors are too low, indicating that the flowtube
03:06:22 14 are not vibrating over a sufficiently-large
03:06:24 15 distance, then the power amplifier will increase
03:06:27 16 its peak output to correspondingly increase the
03:06:31 17 peak vibratory amplitude of the flow tubes,"
03:06:35 18 unquote, such -- such as may occur in the
03:06:42 19 transition from when the flowtube is substantially
03:06:46 20 empty to when it is substantially full.

03:07:06 21 Q So any discussion of a variation in density to you
03:07:09 22 refers to the situation when the flow is starting
03:07:14 23 from empty to full?

03:07:22 24 A I didn't say that, and I didn't mean to imply that.

03:07:26 25 Q Well, at the bottom of page 61, you just quoted a

03:07:29 1 sentence that talks about a variation in density,
03:07:32 2 and you said you read that as referring to
03:07:34 3 start-up.

03:07:35 4 MR. COSTAKOS: Objection. Form.

03:07:44 5 THE WITNESS: That would be a condition
03:07:45 6 that would occur during that transition. I'm not
03:07:50 7 saying that's the only way a variation in density
03:07:55 8 of the fluid flowing through the meter may occur.
03:08:01 9 This claim -- This claim clause relates to that
03:08:06 10 specific condition. That's -- And these references
03:08:14 11 are all pertinent to that.

03:08:26 12 BY MR. SIKORSKI:

03:08:27 13 Q If you look at column 26, line 17 --

03:08:39 14 A Okay.

03:08:40 15 Q -- read that paragraph beginning, "Whenever the
03:08:45 16 flow tubes are to be initially placed into
03:08:48 17 vibratory motion."

03:09:57 18 A Okay.

03:10:03 19 Q So here we have a description of initial vibration,
03:10:09 20 right?

03:10:12 21 A The flow tubes are to be initially placed into
03:10:17 22 vibratory motion --

03:10:18 23 Q Right.

03:10:18 24 A -- from a stationary position is what it says.

03:10:20 25 Q And having read this paragraph, I assume you read

03:10:24 1 from column -- column 26, line 17, to line 42?

03:10:29 2 A I did.

03:10:30 3 Q There's no description of two-phase flow here,
03:10:32 4 right?

03:10:42 5 A I agree.

03:10:58 6 MR. SIKORSKI: All right. Why don't we
03:10:59 7 take a break.

03:11:03 8 THE VIDEOGRAPHER: We are off the record
03:11:05 9 at 3:11 p.m.

03:11:07 10 (Recess taken.)

03:25:36 11 (Exhibit No. 2023 was marked.)

03:26:14 12 THE VIDEOGRAPHER: We are back on the
03:26:15 13 record at 3:26 p.m.

03:26:18 14 EXAMINATION

03:26:22 15 BY MR. HEINTZ:

03:26:22 16 Q Good afternoon, Doctor.

03:26:23 17 A Good afternoon.

03:26:24 18 Q Sir, I'm going to switch over now, and we're going
03:26:26 19 to talk about the '854 patent, okay. Placed before
03:26:29 20 you marked as Exhibit 2023 is a copy of what I
03:26:32 21 believe is your expert report concerning the '854
03:26:36 22 patent in the 167 IPR; is that correct?

03:26:45 23 A That's my Declaration.

03:26:49 24 Q Okay. I'm sorry. Declaration.

03:26:50 25 A That's fine.

03:26:51 1 Q Sir, I'd like for you to turn your attention to
03:26:57 2 paragraph 109.

03:27:09 3 MR. COSTAKOS: What'd you say, paragraph
03:27:10 4 109?

03:27:11 5 MR. HEINTZ: I did, paragraph 109.

03:27:18 6 BY MR. HEINTZ:

03:27:18 7 Q All right. This paragraph states that you
03:27:20 8 understand that claims in an Inter Partes Review
03:27:24 9 proceeding are given their broadest, reasonable
03:27:26 10 construction that is consistent with the patent
03:27:28 11 specification. Do you see that?

03:27:30 12 A I do.

03:27:30 13 Q Okay. Did your Declaration, what's been marked as
03:27:33 14 Exhibit 2023, specifically construe any claims of
03:27:38 15 the '854 patent?

03:27:42 16 MR. COSTAKOS: Objection. Form.

03:28:09 17 THE WITNESS: I think in general I
03:28:10 18 accepted how the Patent Office ended up construing
03:28:18 19 the patents and claim terms after looking at my
03:28:25 20 report. Does that answer your question?

03:28:31 21 BY MR. HEINTZ:

03:28:32 22 Q Do you mean your Declaration?

03:28:34 23 A My Declaration. Thank you.

03:28:36 24 Q I led you astray.

25 MR. COSTAKOS: Yes, you did.

1 BY MR. HEINTZ:

2 Q Well, Dr. Sidman, you filed your Declaration before
03:28:39 3 the Patent Office construed any claim terms,
03:28:40 4 correct?

03:28:40 5 A That's correct.

03:28:41 6 Q Okay. And so my question is, in Exhibit 2023
03:28:46 7 itself, and I think the answer's no, I'm just
03:28:49 8 asking you to confirm, you didn't specifically set
03:28:53 9 forth any constructions in the way you construed
03:28:55 10 any of the claims of the '854 patent; is that
03:29:21 11 correct?

03:29:21 12 MR. COSTAKOS: Objection. Form.

03:29:26 13 THE WITNESS: I'm not an attorney, but I
03:29:28 14 don't think I did explicitly.

03:29:36 15 BY MR. HEINTZ:

03:29:37 16 Q Okay. Did you assist the petitioner in developing
03:29:41 17 the petitioner's claim constructions?

03:29:46 18 A For the action in District Court, yes.

03:29:53 19 Q Do you remember which -- which terms of the '854
03:29:57 20 patent you helped petitioner construe? And if you
03:30:05 21 need the patent, I can give it to you.

03:30:07 22 A There were -- There's a lot of material there. I
03:30:13 23 don't recall which I may have helped them construe
03:30:19 24 it specifically, but I did spend a lot of time
03:30:27 25 helping them construe or helping them formulate

03:30:31 1 that document.

03:30:36 2 Q And have you reviewed the Board's construction in
03:30:39 3 its institution decision, again, with respect to
03:30:42 4 the '854 patent?

03:30:44 5 A I have.

03:30:44 6 Q Okay. Did you agree with the Board's constructions
03:30:48 7 in that decision?

03:31:02 8 MR. COSTAKOS: Objection. Form.

03:31:08 9 MR. HEINTZ: What's the basis for the
03:31:10 10 objection, counselor?

03:31:10 11 MR. COSTAKOS: I wouldn't -- I wouldn't
03:31:11 12 say it was a construction. I would say it was a
03:31:14 13 preliminary construction.

03:31:15 14 BY MR. HEINTZ:

03:31:16 15 Q Thank you. With that caveat, sir, did you agree
03:31:19 16 with the Board's preliminary construction in its
03:31:25 17 institution of this decision?

03:31:33 18 A For the most part, yes, but not completely.

03:31:35 19 Q Okay. What parts didn't you agree with?

03:31:42 20 A What I can think of off the cuff is how they
03:31:48 21 construed the term "positive feedback mode" as,
03:31:54 22 quote, "Drive signals generated on the basis of
03:31:56 23 sensor signal analysis," unquote, wherein the drive
03:32:00 24 signal, quote, "includes components of a sensor
03:32:03 25 signal detected by the sensor and fed back to the

03:32:05 1 driver," unquote.

03:32:07 2 Q All right. Why don't we mark as Exhibit 2024 the
03:32:11 3 Institution Decision, Paper No. 10 in
03:32:16 4 IPR-2014-00167.

03:32:29 5 (Exhibit No. 2024 was marked.)

03:32:47 6 BY MR. HEINTZ:

03:32:47 7 Q Okay. Dr. Sidman, I'll ask you when you're ready,
03:32:51 8 when you've reviewed this, to turn to page 9. Take
03:32:55 9 your time, sir.

03:33:16 10 A Okay. I'm on page 9.

03:33:19 11 Q There on the top of page 9 under No. 4 is the term
03:33:23 12 "positive feedback mode." Is that the construction
03:33:28 13 with which you disagree as you indicated earlier?

03:33:33 14 A I disagree in part with that, yes.

03:33:37 15 Q Okay.

03:33:38 16 A That's -- That's what we're talking about here, so
03:33:41 17 fine.

03:33:42 18 Q With which part of that construction do you
03:33:44 19 disagree?

03:33:47 20 A The word "analysis."

03:34:16 21 Q That's the word "analysis" that appears at the end
03:34:20 22 of petitioner's proposed construction; is that
03:34:22 23 right?

03:34:22 24 MR. COSTAKOS: Objection. Form.

03:34:29 25 THE WITNESS: Which document are you

03:34:31 1 referring to?

03:34:31 2 BY MR. HEINTZ:

03:34:31 3 Q Yeah. We're referring to what's been marked as

03:34:34 4 Exhibit 2024.

03:34:36 5 A Right.

03:34:36 6 Q This is the Board's institution decision.

03:34:38 7 A Right.

03:34:38 8 Q We're on page 9.

03:34:40 9 A Right.

03:34:40 10 Q And the second line reads, "Petitioner's proposed

03:34:44 11 construction for this term is."

03:34:48 12 A Oh, okay. I understand that.

03:34:49 13 Q Okay. And I think you said you disagreed with the

03:34:52 14 term "analysis."

03:34:54 15 A Right.

03:34:54 16 Q Okay. And that's petitioner's proposed

03:34:57 17 construction?

03:34:59 18 MR. COSTAKOS: Objection. Form.

03:35:02 19 BY MR. HEINTZ:

03:35:02 20 Q Correct?

03:35:04 21 A All I said is it's petitioner's proposed

03:35:07 22 construction. I'm not sure I'm differing with you

03:35:10 23 at all.

03:35:10 24 Q Okay.

03:35:11 25 A I'm just trying to be careful.

03:35:12 1 Q All right. So what about the word "analysis" is --
03:35:18 2 do you disagree with?
03:35:29 3 A It adds an unnecessary restriction.
03:35:35 4 Q And what is the unnecessary restriction that it
03:35:38 5 adds?
03:35:42 6 A That the drive signals generated for positive
03:35:48 7 feedback mode need to be, quote-unquote,
03:35:55 8 "analyzed."
03:36:00 9 Q Well, the construction doesn't say that the drive
03:36:02 10 signals need to be analyzed. It says that the
03:36:04 11 sensor signal needs to be analyzed, correct?
03:36:06 12 A You're correct.
03:36:07 13 Q Okay.
03:36:08 14 A That the sensor signal needs to be analyzed.
03:36:10 15 Q And you disagree with that?
03:36:14 16 A I think that's an unnecessary -- that analyzing the
03:36:19 17 sensor signal is an unnecessary restriction.
03:36:26 18 Q What's your understanding of the meaning of the
03:36:28 19 word "analysis" in this context?
03:36:33 20 A Okay. So that question, I think, goes to the heart
03:36:38 21 of the problem. And that is what is analysis and
03:36:43 22 how -- and what it means to different people. So
03:36:53 23 if "analysis," for example, means or implies that
03:37:03 24 the sensor signal needs to be analyzed to the
03:37:08 25 extent that, for example, a parameter of it is

03:37:12 1 estimated, I disagree with that. If "analysis"
03:37:20 2 means the signal is merely filtered, gain adjusted,
03:37:32 3 offsetted, I don't have a problem with it. But I
03:37:42 4 think that in its -- outside of the context of this
03:37:52 5 litigation, "analysis" implies something more than
03:38:00 6 just gain adjustment or filtering or the like. So
03:38:05 7 I don't like that word "analysis." I think it
03:38:09 8 presents an unnecessary restriction on positive
03:38:18 9 feedback mode, and I don't think Henry's actually
03:38:24 10 doing analysis anyways in the positive feedback
03:38:31 11 mode.

03:38:31 12 Q Okay. Is that your answer? I don't want to cut
03:38:33 13 you off.

03:38:34 14 A Yeah. That's it.

03:38:35 15 Q Okay. So I want to go back and cover a couple of
03:38:38 16 points, so you said you -- At the end of your
03:38:40 17 answer, you said you don't think Henry is doing
03:38:43 18 analysis in the positive feedback mode. When you
03:38:48 19 used the word "analysis" in that part of your
03:38:51 20 answer, were you referring to analysis in the first
03:38:54 21 sense in the example you gave me or the second
03:38:58 22 sense?

03:38:58 23 A In the sense that, for example, a parameter may be
03:39:02 24 estimated versus the signal, the sensor signal just
03:39:05 25 filtered or gain adjusted.

03:39:08 1 Q And so you would say in the Henry patent it's not
03:39:11 2 talking about the former. It's really talking
03:39:15 3 about the latter. In other words, what Henry is
03:39:17 4 talking about is, according to you, gain adjustment
03:39:21 5 and filtering and offsetting any other kinds of
03:39:25 6 things you -- you gave in your answer as to the
03:39:28 7 second mode of analysis?

03:39:30 8 MR. COSTAKOS: Objection. Form.

03:39:43 9 THE WITNESS: That's correct.

03:39:44 10 BY MR. HEINTZ:

03:39:44 11 Q Okay. Now, in your answer, you also mentioned the
03:39:52 12 term "filtered." What did you mean by "filtered"?

03:39:57 13 A Taking a signal and filtering it through analog
03:40:05 14 signal filtering or digital signal filtering. An
03:40:16 15 example would be low pass filtering, gain
03:40:19 16 adjustment, integration as in a PI controller.

03:40:28 17 Q If he simply shifted the phase of a signal, would
03:40:32 18 you consider that to be filtering?

03:40:34 19 MR. COSTAKOS: Objection to form.

03:40:50 20 THE WITNESS: As opposed to analysis?

03:40:54 21 BY MR. HEINTZ:

03:40:54 22 Q No. I'm just asking, you know, would a phase shift
03:40:59 23 in your opinion be considered filtering?

03:41:02 24 MR. COSTAKOS: Objection. Form.

03:42:43 25 THE WITNESS: Can I have the question one

03:42:44 1 more time, please?

03:42:54 2 (Following question read.)

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

03:43:11 7 THE WITNESS: A filter could create a
03:43:18 8 phase shift in a signal.

03:43:35 9 BY MR. HEINTZ:

03:43:35 10 Q Is that your answer?

03:43:36 11 A Yes. I'm not sure I answered your question.

03:43:38 12 Q It didn't, so --

03:43:40 13 A Okay. Ask it -- Ask it a different way perhaps.

03:43:42 14 Q I'll try. So if you had a circuit element that
03:43:46 15 shifted the phase of a signal but did not affect
03:43:49 16 the signal's amplitude and did not affect the
03:43:52 17 signal's frequency, would you consider that element
03:43:55 18 to have performed filtering on such a signal?

03:43:59 19 MR. COSTAKOS: Objection. Form.

03:44:12 20 THE WITNESS: Could I have the question
03:44:12 21 one more time?

03:44:27 22 (Last question read.)

03:44:27 23 THE WITNESS: Are you talking about a
03:44:28 24 digital filter or a continuous filter?

03:44:32 25 BY MR. HEINTZ:

03:44:33 1 Q Either one.

03:44:58 2 A It's possible to create a phase shift through a
03:45:07 3 filter.

03:45:15 4 Q Well, I'm sorry. Again, that doesn't answer the
03:45:17 5 question. So I've described for you a circuit
03:45:20 6 element that does nothing but shift the phase, has
03:45:24 7 no other effect on the signal but a phase shift.
03:45:28 8 So my question to you is, is that filtering the
03:45:31 9 signal?

03:45:31 10 MR. COSTAKOS: Objection. Form.

03:45:38 11 THE WITNESS: It could be performed by
03:45:39 12 filtering the signal in general.

03:45:53 13 BY MR. HEINTZ:

03:45:54 14 Q Is performing a phase shift on a signal without
03:45:58 15 affecting any other property of the signal
03:46:00 16 necessarily filtering the signal?

03:46:03 17 MR. COSTAKOS: Objection. Form.

03:46:29 18 THE WITNESS: I'd have to think about it.
03:46:31 19 I haven't thought about that hypothetical question.

03:46:37 20 BY MR. HEINTZ:

03:46:37 21 Q Okay. As of right now, you don't have an opinion
03:46:39 22 on that; is that correct?

03:46:59 23 A I haven't considered the possibilities that might
03:47:03 24 be encompassed by -- all of the possibilities that
03:47:05 25 might be encompassed by your general hypothetical

03:47:09 1 condition, so I'm reluctant to offer an opinion on
03:47:14 2 that until I've had time to consider that in a way
03:47:28 3 other than I've already expressed.

03:48:11 4 Q I'd like to have marked as Exhibit 2025 what's been
03:48:16 5 previously marked as Micro Motion Exhibit 1008
03:48:21 6 which is U.S. Patent No. 5,009,109 to Kalotay.
03:48:37 7 (Exhibit No. 2025 was marked.)

03:48:40 8 BY MR. HEINTZ:

03:48:47 9 Q Dr. Sidman, I'll ask you if you're familiar with
03:48:54 10 the Kalotay patent, what's been marked as Exhibit
03:48:57 11 2025.

03:49:29 12 A Yes. I refer to it with reference to the -- in my
03:49:36 13 '136 IPR Declaration.

03:49:40 14 Q You do, sir. That's correct. I'd ask you to turn
03:49:43 15 to Figure 3 of the Kalotay patent, and I'll ask you
03:49:53 16 in particular to direct your attention to what's
03:49:55 17 marked with reference numeral 431 which reads,
03:49:58 18 "Inside the box 90-degree phase shift." Do you see
03:50:01 19 that circuit element?

03:50:03 20 A I do.

03:50:04 21 Q Is that circuit element performing filtering of the
03:50:07 22 left velocity sensor signal?

03:50:18 23 A Designated at .41, yes. It's also designated as VL
03:50:27 24 in that figure.

03:50:29 25 Q I'm sorry. So does that mean that the circuit

03:50:32 1 element 431 in Figure 3 of the Kalotay patent is
03:50:36 2 filtering the signal designated as VL at -- I don't
03:50:42 3 know if the node is marked as 41, but --
03:50:45 4 A Well --
03:50:45 5 Q -- the signal marked as VL in any event, is the --
03:50:49 6 Let me restate this. Does the circuit element 431
03:50:54 7 filter the signal designated as VL in Figure 3 of
03:50:58 8 the Kalotay patent?
03:50:59 9 A Okay. Yes, as described in column 9 in the
03:52:06 10 paragraph beginning at line 29, it states:
03:52:11 11 "Specifically, the left -- the sinusoidal left
03:52:15 12 velocity signal, VL, produced by coil 160L, is
03:52:20 13 applied, via lead 41, as input to the 90 degrees
03:52:23 14 phase shifter 431. The sinusoidal output of the
03:52:29 15 phase shifter is applied through amplifier 438,"
03:52:34 16 dot, dot, dot. So it's performing a filtering
03:52:41 17 operation on the left velocity signal.
03:52:44 18 Q Sorry. Did you finish?
03:52:46 19 A Yep.
03:52:47 20 Q Thank you. Okay. And, again, with reference to
03:52:51 21 Kalotay, this will help get to another question,
03:52:56 22 there is a -- an amp 438 that accepts the output of
03:53:01 23 the 90-degree phase shift circuit element 431. Do
03:53:05 24 you see that?
03:53:07 25 A That's correct.

1 (Attorney Johnson leaves the room.)

03:53:08 2 BY MR. HEINTZ:

03:53:08 3 Q Okay. What does the amp 438 do to the -- I guess
03:53:17 4 we've established it's a filtered left velocity
03:53:25 5 sensor signal?

03:53:46 6 A Well, obviously, it -- it amplifies the output of
03:53:50 7 that 90-degree phase shifter in some way.

03:53:55 8 Q And what does "amplify" mean?

03:53:59 9 A In this case, it might just mean presenting --
03:54:27 10 presenting a low impedance drive signal to linear
03:54:32 11 inverter 439. It doesn't state explicitly how it's
03:54:43 12 performing the amplification.

03:54:48 13 Q Is it correct to say that "amplification" means
03:54:51 14 applying a gain to a signal?

03:54:53 15 MR. COSTAKOS: Objection. Form.

03:55:20 16 THE WITNESS: They're not necessarily
03:55:22 17 synonymous, though introducing a gain higher than
03:55:42 18 unity is often accomplished through the use of an
03:55:45 19 amplifier.

03:55:52 20 BY MR. HEINTZ:

03:55:53 21 Q And let me just lay a little bit of groundwork here
03:55:55 22 since we jumped into this figure. Figure 3 in
03:55:58 23 Kalotay is a circuit that uses a positive feedback
03:56:04 24 mode to generate a drive signal; is that correct?
03:56:14 25 And again, I'm using positive feedback mode as

03:56:18 1 construed by the Board.

03:56:19 2 A Okay. Could I take a look at the decision of the

03:56:55 3 Board with respect to the '136?

03:57:02 4 Q Sure. I think we're up to Exhibit 2026, so I'll

03:57:26 5 have the Board's decision with respect to U.S.

03:57:30 6 Patent No. 6,311,136 in IPR2014-00170 marked as

03:57:40 7 2026.

03:57:41 8 (Exhibit No. 2026 was marked.)

04:00:02 9 MR. COSTAKOS: Did you give him the '136

04:00:05 10 Declaration or not?

04:00:06 11 MR. HEINTZ: I did not.

04:00:06 12 MR. COSTAKOS: Oh, okay.

04:00:11 13 THE WITNESS: Oh.

04:00:12 14 BY MR. HEINTZ:

04:00:12 15 Q Just so we're clear, I'm asking you about the '854

04:00:16 16 patent.

04:00:16 17 A Oh.

04:00:16 18 Q And I asked -- Sorry. And earlier, I told you I'm

04:00:20 19 using positive feedback mode in that question as

04:00:24 20 construed by the Board in connection with the '854

04:00:28 21 patent, so Exhibit 2024 is the Board's decision.

04:00:32 22 A Okay.

04:00:33 23 MR. COSTAKOS: Well, then my objection is

04:00:34 24 scope. It's beyond the scope.

04:00:38 25 MR. HEINTZ: Beyond the scope of what?

04:00:40 1 MR. COSTAKOS: I don't think Kalotay is
04:00:42 2 involved with the '854 patent. No, so it's beyond
04:00:49 3 the scope. That's my objection.

04:00:52 4 MR. HEINTZ: Okay.

04:00:53 5 BY MR. HEINTZ:

04:00:53 6 Q You can still answer the question if you're able
04:00:55 7 to, sir.

04:00:56 8 A I haven't considered Kalotay with respect to that
04:01:00 9 IPR.

04:01:01 10 Q You are familiar with the way in which the Kalotay
04:01:04 11 patent works, correct?

04:01:06 12 A Yes.

04:01:07 13 Q And you're familiar with the way that the drive
04:01:09 14 circuit in Figure 3 works, correct?

04:01:16 15 A Yes, of the Kalotay '109 patent, right.

04:01:21 16 Q Right. And you're familiar with the Board's
04:01:23 17 construction of positive feedback mode, correct, in
04:01:29 18 IPR2014-167?

04:01:34 19 MR. COSTAKOS: The '136 -- No, the '854?

04:01:37 20 MR. HEINTZ: For the '854 patent, yes.

04:01:40 21 MR. COSTAKOS: Okay.

04:02:14 22 THE WITNESS: Yes.

04:02:15 23 BY MR. HEINTZ:

04:02:15 24 Q Okay. So my question is, does the circuit shown in
04:02:21 25 Figure 3 of the Kalotay patent implement positive

04:02:25 1 feedback mode as that term was construed by the
04:02:28 2 Board in connection with IPR2014-00167?

04:02:36 3 MR. COSTAKOS: Objection. Form and
04:02:37 4 scope. And just so I don't have to say "scope"
04:02:39 5 every time, I'm going to kind of just be continuing
04:02:41 6 on scope as it relates to this issue.

04:02:43 7 MR. HEINTZ: I don't -- I don't mind the
04:02:44 8 continuing objection. I disagree with you that
04:02:47 9 there's anything improper about the scope, but we
04:02:49 10 disagree.

04:02:49 11 MR. COSTAKOS: Obviously, you disagree.
04:02:51 12 I'm not asking for your agreement.

04:02:52 13 MR. HEINTZ: I understand, but I don't
04:02:54 14 have a problem with you objecting -- a continuing
04:02:57 15 objection on scope if that's what you want to do.

04:02:59 16 MR. COSTAKOS: Fair enough.

04:04:42 17 THE WITNESS: I haven't considered that
04:04:43 18 possibility, and I'm reluctant to answer your
04:04:45 19 question in a way that might be speculative. I'd
04:04:54 20 need time to consider that.

04:04:58 21 BY MR. HEINTZ:

04:04:58 22 Q Okay. Well, I'm just trying to get some vocabulary
04:05:03 23 down. And, you know, you remember earlier when I
04:05:07 24 asked you about the Board's construction of
04:05:09 25 positive feedback mode in connection with the '854

04:05:14 1 patent, you told me that you disagreed with the
04:05:16 2 word "analysis" in the Board's construction which
04:05:19 3 is the same as petitioner's construction, correct?

04:05:22 4 MR. COSTAKOS: Objection. Form.

04:05:24 5 THE WITNESS: I think it's an unnecessary
04:05:25 6 restriction and opens up the possibility of
04:05:30 7 misinterpretation.

04:05:31 8 (Attorney Johnson enters the room.)

04:05:34 9 BY MR. HEINTZ:

04:05:34 10 Q By the way, is the reason you didn't put any claim
04:05:37 11 constructions in your Declaration in connection
04:05:39 12 with the '854 patent because you disagreed with the
04:05:43 13 petitioner over this construction of positive
04:05:45 14 feedback mode?

04:05:48 15 MR. COSTAKOS: Objection. Form.

04:06:31 16 THE WITNESS: No. I didn't start
04:06:33 17 worrying about the possible implications of the
04:06:35 18 word "analysis" in that claim construction until
04:06:38 19 recently.

04:06:38 20 BY MR. HEINTZ:

04:06:38 21 Q What caused you to start worrying about the
04:06:40 22 implications recently?

04:06:42 23 A Just preparing for this deposition.

04:06:46 24 Q What implications are you concerned about?

04:06:49 25 A The ones that I described to you earlier.

04:06:54 1 Q Why -- Why is it then that you chose not to include
04:06:59 2 any constructions in your Declaration for the '854
04:07:02 3 patent?

04:07:04 4 MR. COSTAKOS: Objection. Form.

04:07:07 5 BY MR. HEINTZ:

04:07:07 6 Q Actually, let me lay a foundation. Did you decide
04:07:10 7 whether or not to include constructions in your
04:07:12 8 Declaration for the '854 patent?

04:07:23 9 A Having already helped Foley Lardner draft their
04:07:32 10 invalidity contentions, I didn't see any need for
04:07:35 11 that.

04:07:37 12 Q Did you understand that those invalidity
04:07:40 13 contentions that you helped Foley Lardner draft
04:07:42 14 were not -- Well, let me rephrase that. Which
04:07:46 15 invalidity contentions are you referring to in your
04:07:48 16 answer?

04:07:51 17 A Their claim charts.

04:07:54 18 Q Those in the petition for --

04:07:55 19 A The petition.

04:07:56 20 Q Okay. All right. You did include constructions in
04:08:03 21 some of your other Declarations, though, did you
04:08:06 22 not?

04:08:07 23 A I'm not sure which -- what you're referring to. If
04:08:10 24 you want to direct me to something, I can comment
04:08:13 25 on it.

04:08:14 1 Q That's all right. All right.

04:08:16 2 MR. COSTAKOS: And for the record, I

04:08:17 3 don't think he did, but --

04:08:18 4 MR. HEINTZ: Okay.

04:08:19 5 MR. COSTAKOS: -- the record is whatever

04:08:19 6 it is.

04:08:20 7 MR. HEINTZ: Fair enough.

04:08:20 8 MR. COSTAKOS: I mean, they say what they

04:08:22 9 say.

04:08:22 10 MR. HEINTZ: All right.

04:08:27 11 BY MR. HEINTZ:

04:08:27 12 Q When you gave me your answer earlier and you used

04:08:29 13 the word -- Sorry. You told me you disagreed with

04:08:33 14 the word "analysis" in the construction of positive

04:08:37 15 feedback mode, you mentioned the term "gain

04:08:42 16 adjusted." Do you recall that?

04:08:45 17 A I believe that's one of the phrases I used.

04:08:48 18 Q What does "gain adjusted" mean?

04:08:52 19 A Changing the gain of a signal.

04:08:54 20 Q What is the gain of a signal?

04:09:03 21 A Well, signal in and of itself doesn't have a gain.

04:09:08 22 Gain is an operation applied to a signal, applying

04:09:12 23 a gain, multiplying it by five, for example.

04:09:18 24 Q Okay. How do you determine what the gain of a

04:09:21 25 signal -- I'm sorry, what the gain that's applied

04:09:24 1 to a signal is?

04:09:57 2 A It could mean different things based on the
04:10:00 3 context. For example, if we're talking about a
04:10:07 4 voltage gain on an analog signal through an
04:10:10 5 operational amplifier circuit, it would have
04:10:12 6 generally what's understood as a fixed gain using
04:10:16 7 fixed resistors as feedback.

04:10:21 8 Q All right.

04:10:21 9 A If the --

04:10:22 10 Q Sorry.

04:10:25 11 A In digital signal processing, the gain may be
04:10:31 12 multiplication, arithmetic, within the
04:10:37 13 microprocessor or digital signal processor or the
04:10:43 14 like.

04:10:44 15 Q I'm actually -- Thank you, but I'm actually asking
04:10:47 16 you a much simpler question than that. So let me
04:10:49 17 redirect your attention to Figure 3 of the Kalotay
04:10:52 18 patent, if you would. I'm going to again direct
04:10:57 19 your attention to the amp -- the amp which I
04:10:59 20 believe is an amplifier circuit element 438. Do
04:11:04 21 you see that?

04:11:04 22 A I do.

04:11:04 23 Q Would it be correct to say that that amplifier
04:11:06 24 applies a gain to the output of circuit element
04:11:10 25 431?

04:11:11 1 MR. COSTAKOS: Objection. Scope.

04:11:49 2 THE WITNESS: Kalotay does not disclose

04:11:50 3 in his '109 patent that amplifier 438 produces, for

04:11:57 4 example, a voltage gain on the signal coming out of

04:12:01 5 phase shifter 431.

04:12:05 6 BY MR. HEINTZ:

04:12:09 7 Q Do you have an understanding as to whether the

04:12:12 8 amplifier 438 produces a voltage gain on the signal

04:12:16 9 coming out of 431?

04:12:18 10 A No.

04:12:21 11 Q All right.

04:12:22 12 A It may be just as I mentioned, a way to drive the

04:12:31 13 following block which is linear inverter 439 from a

04:12:39 14 layman's point of view.

04:12:40 15 Q Okay. The signal that comes out of circuit element

04:12:43 16 431 is an analog signal, correct?

04:12:47 17 MR. COSTAKOS: Objection. Scope.

04:13:07 18 THE WITNESS: I understand Kalotay's

04:13:08 19 implementation of that block in Figure 3, i.e., is

04:13:19 20 preferred embodiment to be analog.

04:13:23 21 BY MR. HEINTZ:

04:13:23 22 Q Okay. Would it be correct to say that it is a

04:13:29 23 sinusoidal analog signal?

04:13:34 24 MR. COSTAKOS: Objection. Scope.

04:13:37 25 THE WITNESS: Which signal are you

04:13:44 1 talking about, VL?

04:13:47 2 BY MR. HEINTZ:

04:13:47 3 Q I am talking about the output of circuit element
04:13:52 4 431.

04:14:06 5 A Well, as I mentioned earlier, the motion of the
04:14:11 6 conduit, i.e., as reflected by sensor signals in
04:14:16 7 this case, left velocity sensor 160L, there's not
04:14:29 8 necessarily purely sinusoidal, so that's one of the
04:14:35 9 problems I have in answering your question in the
04:14:38 10 affirmative.

04:14:38 11 Q Okay. Let me ask you to assume for a second that
04:14:44 12 VL is a pure sinusoidal signal, okay. And I'll
04:14:51 13 ask, wouldn't that mean that the output of circuit
04:14:54 14 element 431 would also be a pure sinusoidal signal,
04:15:03 15 assuming there is no -- neglecting the effects of
04:15:07 16 any noise that might get implemented or impressed
04:15:07 17 on the signal by circuit element 431?

04:15:11 18 MR. COSTAKOS: Objection. Form.

04:15:16 19 MR. HEINTZ: You know, I'll withdraw the
04:15:18 20 question.

04:15:18 21 BY MR. HEINTZ:

04:15:18 22 Q I'll ask you to assume that the output of the
04:15:21 23 circuit element 431 is a pure sinusoid, okay?

04:15:25 24 A That the output --

04:15:26 25 Q The output is a pure sinusoid of 431.

04:15:31 1 A Okay.

04:15:31 2 Q All right. Now, I'll further ask you to assume

04:15:33 3 that the amplifier 438 is a -- going to apply a

04:15:39 4 voltage gain to that signal, to the output of

04:15:43 5 circuit element 431, okay?

04:15:46 6 A Of something other than unity?

04:15:51 7 Q Something other than unity, yes.

04:15:54 8 A All right.

04:15:54 9 Q Okay. Now, how would I go about determining what

04:15:56 10 the gain was that was applied to the output of the

04:16:05 11 circuit element 431?

04:16:08 12 MR. COSTAKOS: Objection. Scope.

04:16:15 13 THE WITNESS: Are you asking me what kind

04:16:16 14 of instruments I would use --

04:16:18 15 BY MR. HEINTZ:

04:16:19 16 Q No.

04:16:19 17 A -- to determine that, or are you asking me how, for

04:16:21 18 example, I would determine it from a schematic? I

04:16:24 19 mean, I don't -- There's a whole range of possible

04:16:27 20 ways to answer your question.

04:16:30 21 Q I understand.

04:16:31 22 A Depending on the context, I would answer that

04:16:36 23 question in a variety of different ways.

04:16:38 24 Q All right. If the amplitude of the pure sinusoid

04:16:42 25 that was input to the amplifier 438 were one volt

04:16:46 1 and the amplitude of the sinusoid that was output
04:16:52 2 by the amp 438 were two volts, what would be the
04:16:54 3 gain, the voltage gain?

04:17:01 4 MR. COSTAKOS: Objection. Form.

04:17:03 5 THE WITNESS: Assuming you're measuring
04:17:05 6 both signals in the same way, i.e., zero to peak?

04:17:09 7 BY MR. HEINTZ:

04:17:10 8 Q Yes.

04:17:10 9 A Then I think it would be reasonable to say that
04:17:13 10 that amplifier had a gain of two.

04:17:17 11 Q That would be the rate --

04:17:20 12 A That's what you asked me to assume. I'm not saying
04:17:23 13 that that's what Kalotay says, nor is Kalotay
04:17:26 14 indicating that it has any particular voltage gain.

04:17:31 15 Q I understand. I'm just trying to get vocabulary
04:17:34 16 down. There's been some confusion because you
04:17:37 17 talked about gain adjustment for a signal. Then we
04:17:39 18 found out that signals don't have gain, so I'm just
04:17:42 19 trying to figure out if it's correct to say that --
04:17:44 20 that gain means the ratio of the output signal to
04:17:49 21 the input signal for whatever quantity you're
04:17:52 22 defining gain?

04:17:55 23 MR. COSTAKOS: Objection. Form. Scope.

04:18:03 24 THE WITNESS: Okay. Depending on the
04:18:04 25 context of your question, and there's a lot of

04:18:10 1 possibilities there, it's possible to understand
04:18:14 2 that the ratio of those voltages are amplitudes as
04:18:19 3 related to the voltage gain.

04:18:21 4 BY MR. HEINTZ:

04:18:21 5 Q Okay.

04:18:22 6 A But there are all kinds of caveats there.

04:18:26 7 Q Well, what are --

04:18:27 8 A So I'm -- I'm reluctant to make a blanket statement
04:18:33 9 that general -- that generalizes an acceptance of
04:18:39 10 the premise of your question.

04:18:41 11 Q Okay. What are those caveats?

04:18:45 12 MR. COSTAKOS: Same objections.

04:18:51 13 THE WITNESS: Could be a whole range of
04:18:53 14 possibilities. For example, suppose the amplifier
04:19:01 15 438 has a nonlinearity --

04:19:13 16 BY MR. HEINTZ:

04:19:13 17 Q Okay.

04:19:13 18 A -- or it limits. There's a whole range of
04:19:19 19 possibilities. I'd rather not speculate on all of
04:19:24 20 the possibilities because I haven't really
04:19:26 21 considered that in preparation of this IPR
04:19:31 22 Declaration.

04:19:41 23 Q The fact that a -- an amplifier might have a
04:19:45 24 nonlinear gain doesn't mean that there's a
04:19:49 25 different definition to the word "gain," does it?

04:19:52 1 MR. COSTAKOS: Objection. Form. Scope.

04:19:56 2 Relevance.

04:20:07 3 THE WITNESS: Could I hear that question
04:20:08 4 one more time, please?

04:20:18 5 (Following question read.)

6 Q The fact that a -- an amplifier
7 might have a nonlinear gain doesn't
8 mean that there's a different
9 definition to the word "gain," does
04:20:25 10 it?

04:20:25 11 THE WITNESS: I don't know what you mean
04:20:26 12 by "nonlinear gain."

04:20:29 13 BY MR. HEINTZ:

04:20:30 14 Q Well, what did you mean when you told me that the
04:20:32 15 nonlinearity in an amplifier was one of the
04:20:36 16 caveats?

04:20:44 17 A Well, inherently, a nonlinearity implies a
04:20:57 18 nonlinear relationship between the input and output
04:20:59 19 of the amplifier as we're discussing here.

04:21:02 20 Q And regardless of -- I'm sorry.

04:21:04 21 A Okay. Continue.

04:21:04 22 Q No. I didn't want to cut you off. I didn't
04:21:06 23 realize you weren't done, so please finish your
04:21:09 24 answer.

04:21:09 25 A Now I've forgotten my response, so why don't you

04:21:12 1 ask your next question.

04:21:13 2 Q Okay. I'll try to wait a little longer. So you

04:21:15 3 talked about a nonlinear gain.

04:21:18 4 A No, I didn't.

04:21:20 5 Q I'm sorry?

04:21:21 6 A I didn't say that.

04:21:21 7 Q What did you say, sir?

04:21:23 8 A I said I don't know what you mean by "a nonlinear

04:21:28 9 gain."

04:21:28 10 Q I'm sorry. A nonlinear amplifier.

04:21:31 11 A Okay. What's your question?

04:21:50 12 Q Okay. Let me go back a little bit here. Okay.

04:21:51 13 You told me that nonlinearity meant a nonlinear

04:21:54 14 relationship between the input and the output?

04:21:57 15 A Right. That's what it could mean in the context of

04:22:01 16 this amplifier, for example.

04:22:03 17 Q Okay. The fact that there's a nonlinear

04:22:06 18 relationship between the input and the output

04:22:09 19 doesn't mean that the definition of "gain" is

04:22:12 20 somehow different, does it?

04:22:15 21 A It means that the term "gain" cannot be applied in

04:22:20 22 a blanket manner.

04:22:21 23 Q In each instance, for each value of the input

04:22:30 24 signal and the output signal, I can calculate a

04:22:33 25 gain, and that gain would be the ratio of the

04:22:36 1 output signal to the input signal, would it not?

04:22:40 2 A Okay.

04:22:41 3 MR. COSTAKOS: Objection. Form. Scope.

04:22:49 4 THE WITNESS: I don't want to simplify it

04:22:51 5 like that, and I'll just give you an example or two

04:22:58 6 as to why I don't want to do that.

04:23:03 7 BY MR. HEINTZ:

04:23:03 8 Q Okay.

04:23:04 9 A So an electronic circuit, for example, could have a

04:23:18 10 small signal gain or a large signal gain -- large

04:23:22 11 signal gain which are different, in part, due to a

04:23:30 12 nonlinearity within the device. So I don't want to

04:23:36 13 oversimplify something that is commonly understood

04:23:46 14 is a real issue, for example, in amplifiers.

04:23:53 15 Q Okay. Is that your answer?

04:23:55 16 A Yep.

04:23:56 17 Q All right.

04:23:56 18 A It is.

04:23:57 19 Q So you gave an example of a small signal gain and a

04:24:01 20 large signal gain for a single amplifier, correct?

04:24:07 21 MR. COSTAKOS: Objection. Form. Scope.

04:24:09 22 Relevance.

04:24:38 23 BY MR. HEINTZ:

04:24:39 24 Q Would you like to hear your answer read back?

04:24:43 25 A No.

04:24:43 1 Q Okay.

04:25:01 2 A There are different ways of measuring gain
04:25:07 3 depending on, for example, the magnitude of an --
04:25:20 4 of an input signal, its offset into a system that
04:25:24 5 has a -- that has nonlinear behavior, so that's a
04:25:32 6 caveat. I don't see how any of that is relevant to
04:25:39 7 the issues of invalidity in this case. So any
04:25:47 8 answer that I give you like that to a hypothetical
04:25:54 9 situation like what you proposed would be
04:26:00 10 incomplete because I haven't considered all of the
04:26:03 11 nuances of responding to that question.

04:26:09 12 Q Okay. You said that there would be different ways
04:26:12 13 to determine the gain depending on the magnitude of
04:26:18 14 the input signal, correct?

04:26:21 15 A Um-hum.

04:26:21 16 Q So what are the different ways of determining a
04:26:23 17 gain based on the magnitude of the input signal?

04:26:27 18 MR. COSTAKOS: Same objections.

04:26:31 19 THE WITNESS: Could be lots of different
04:26:32 20 ways, just, for example, the small signal gain of
04:26:52 21 the amplifier about an operating point, a reference
04:26:57 22 level, the magnitude of the signal, and I think
04:27:07 23 you're talking about sinusoidal signals here,
04:27:11 24 correct?

04:27:16 25 BY MR. HEINTZ:

04:27:16 1 Q I am, yes.

04:27:17 2 A And that in combination with its offset, those are
04:27:19 3 just a few examples that I can think of off the
04:27:21 4 cuff.

04:27:23 5 Q Okay. I was asking you for different ways to
04:27:34 6 determine the gain or measure the gain, and you
04:27:39 7 told me one of the ways is a small signal gain
04:27:41 8 about an operating point, correct?

04:27:45 9 A Right.

04:27:47 10 Q Does that mean you would -- I'm sorry. By "small,"
04:27:50 11 what do you mean?

04:27:51 12 MR. COSTAKOS: Same objections.

04:28:26 13 THE WITNESS: That would have different
04:28:27 14 meanings depending on the type of nonlinearity, for
04:28:34 15 example.

04:28:34 16 BY MR. HEINTZ:

04:28:34 17 Q Are we talking about the amplitude?

04:28:36 18 MR. COSTAKOS: Objection. Form.

04:28:38 19 THE WITNESS: I don't know what you're
04:28:40 20 talking about at this point. You have to be more
04:28:44 21 specific in your question. Then I could help you.

04:28:47 22 BY MR. HEINTZ:

04:28:47 23 Q Well, you told me you could measure the small
04:28:50 24 signal gain of an amplifier -- Sorry. You can
04:28:53 25 measure the gain of an amplifier using a small

04:28:55 1 signal gain about an operating point I think is
04:29:00 2 what I wrote down that you said. Okay. "Small
04:29:03 3 signal" means something, I presume, and I'm just
04:29:07 4 asking you what it means.

04:29:08 5 A Oh.

04:29:09 6 MR. COSTAKOS: Objection. Form. Scope.
04:29:10 7 Relevance.

04:29:18 8 BY MR. HEINTZ:

04:29:18 9 Q Let me give you an answer that I think what you're
04:29:20 10 getting at. You tell me if I'm just off base,
04:29:23 11 okay. When you say "small signal" and "large
04:29:25 12 signal," I think what you might mean is if we're
04:29:27 13 talking about a gain for the amplitude, by "small
04:29:34 14 signal" you mean signals with small amplitudes as
04:29:38 15 compared to large signals which are signals with
04:29:41 16 larger amplitudes, and it's just some relative
04:29:44 17 measure; is that correct?

04:29:45 18 MR. COSTAKOS: Objection. Form.

04:29:49 19 THE WITNESS: Okay. So I think this
04:29:55 20 discussion is going down the rat hole, but there's
04:29:59 21 a whole area of engineering theory relating to gain
04:30:13 22 of systems in the presence of nonlinearities. And
04:30:20 23 those -- And that area is generally described as
04:30:24 24 "describing functions," quote-unquote. So I don't
04:30:27 25 see the need to go down that path, and I certainly

04:30:31 1 haven't been considering describing functions,
04:30:37 2 nonlinear behavior of amplifier 438, in formulating
04:30:42 3 my Declaration or Declarations for these IPRs.

04:30:51 4 BY MR. HEINTZ:

04:30:51 5 Q Okay. Well, you understand I get to ask the
04:30:53 6 questions. So even if you don't understand why I'm
04:30:55 7 asking, you have to answer if you're able. You get
04:30:57 8 that, right?

04:30:58 9 A Well, I'm trying to be -- I'm trying to -- I'm
04:31:02 10 trying to illustrate that the subject as you've
04:31:10 11 asked in a hypothetical way, in a very general way,
04:31:15 12 could be subject to a whole range of issues or
04:31:22 13 complications that are really beyond the scope of
04:31:29 14 the patents at issue.

04:31:31 15 Q Okay. Let's see if we can get to a simpler answer
04:31:34 16 then. If we have a linear amplifier, right, and I
04:31:37 17 take the gain at one value of an input signal and I
04:31:43 18 look at the gain of another value of the input
04:31:46 19 signal, I can draw a line between those two points,
04:31:49 20 correct?

04:31:51 21 MR. COSTAKOS: Can you read that back
04:31:52 22 again?

04:32:08 23 (Last question read.)

04:32:16 24 THE WITNESS: I don't know how to answer
04:32:18 25 your question as asked, but let me just make a

04:32:20 1 statement.

04:32:20 2 BY MR. HEINTZ:

04:32:21 3 Q Go right ahead, sir.

04:32:23 4 A If the amplifier is truly linear, then it should
04:32:30 5 have the same gain independent of the amplitude or
04:32:34 6 operating point. That's a theoretical, ideal,
04:32:41 7 linear amplifier.

04:32:43 8 Q Okay. So if I had an input signal, we talked
04:32:48 9 earlier about a sinusoid with a one-volt,
04:32:52 10 peak-to-peak amplitude and the gain were two, the
04:32:57 11 output signal would be two volts peak to peak,
04:33:00 12 correct?

04:33:00 13 A I think that would be fair, yes.

04:33:02 14 Q And when it's linear, that means that ratio,
04:33:05 15 two-to-one, is going to hold regardless of what the
04:33:08 16 input signal is. So if I go to a four-volt input
04:33:12 17 signal, I'm going to get an eight-volt output
04:33:14 18 signal, again, in both instances peak to peak for a
04:33:17 19 linear amplifier, correct?

04:33:18 20 MR. COSTAKOS: Objection. Form. Scope.

04:33:20 21 THE WITNESS: Again, you're asking me to
04:33:23 22 make assumptions in answering that question. For
04:33:32 23 example, the dynamic behavior of the amplifier, if
04:33:37 24 it has a voltage gain, let's say, of 4 at DC, what
04:33:42 25 is the voltage gain at a hundred hertz or 10

04:33:46 1 kilohertz, 10 gigahertz? It's likely to be
04:33:50 2 different.
04:33:52 3 BY MR. HEINTZ:
04:33:52 4 Q Okay. But if this were an ideal linear
04:33:56 5 amplifier --
04:33:56 6 A Right.
04:33:56 7 Q -- would my question be correct? Would the answer
04:33:59 8 to my question be "yes"?
04:34:04 9 MR. COSTAKOS: Same objections.
04:34:06 10 THE WITNESS: Could I hear the --
04:34:08 11 BY MR. HEINTZ:
04:34:09 12 Q I'll just ask it again.
04:34:11 13 A Thank you.
04:34:11 14 Q If the gain were two and I had an ideal linear
04:34:16 15 amplifier --
04:34:17 16 A Yes.
04:34:17 17 Q -- if I put in a signal with a peak-to-peak value
04:34:20 18 or peak-to-peak amplitude of four, I'm going to get
04:34:23 19 out a signal with a peak-to-peak amplitude of
04:34:26 20 eight?
04:34:27 21 A That would be --
04:34:27 22 MR. COSTAKOS: Objection. Scope.
04:34:30 23 THE WITNESS: Within what I -- I think
04:34:34 24 your assumptions might be, I would say, "Yes."
04:34:43 25 BY MR. HEINTZ:

04:34:44 1 Q Okay. And if I had a nonlinear amplifier, right, I
04:34:50 2 could put in an input signal of one volt peak to
04:34:53 3 peak, get an output signal of two volts peak to
04:34:57 4 peak. But then when I put in the input signal of
04:35:00 5 four volts peak to peak, I wouldn't get eight volts
04:35:03 6 peak to peak because the linear -- sorry, because
04:35:05 7 the amplifier is nonlinear, correct?

04:35:07 8 MR. COSTAKOS: Objection. Form. Scope.

04:35:09 9 THE WITNESS: So I can't answer that in
04:35:16 10 the affirmative, and let me just give you an
04:35:19 11 example as to why.

04:35:20 12 BY MR. HEINTZ:

04:35:20 13 Q Okay.

04:35:20 14 A Okay. Just one that comes to mind off the cuff,
04:35:23 15 and this is the problem in trying to respond to
04:35:25 16 your line of questions which are hypothetical and
04:35:29 17 general, suppose the amplifier can't provide an
04:35:37 18 output greater than plus or minus X volts.

04:35:40 19 Q Um-hum.

04:35:42 20 A Okay. So you put in a sine wave, but the output is
04:35:49 21 a clipped sine wave because the output can't exceed
04:35:54 22 the amplitude of the voltage limits of the
04:35:57 23 amplifier, so then what's the amplitude?

04:36:01 24 Q Okay.

04:36:02 25 A Okay. That's where the problems begin to arise.

04:36:07 1 Q So why is it you can't determine what the gain
04:36:14 2 is -- I'm sorry. Are you able to determine what
04:36:16 3 the gain is if the output signal is clipped?
04:36:19 4 MR. COSTAKOS: Objection. Form. Scope.
04:36:21 5 Relevance.
04:36:23 6 THE WITNESS: Okay. This discussion, I
04:36:27 7 think, is in the context of something other than
04:36:32 8 these patents. So we're talking about some
04:36:39 9 hypothetical, theoretical ideal situation in which
04:36:43 10 different measures could apply. So, for example,
04:36:49 11 the gain of this nonlinear clipped sine wave could
04:36:59 12 be expressed through a set of describing functions.
04:37:07 13 Some people might say that in that context that's a
04:37:12 14 gain, but that's not what the small signal gain
04:37:17 15 might be at some operating point. Might be zero.
04:37:21 16 Might be, what did you say, four. So it gets
04:37:25 17 complicated to answer your question in a general
04:37:27 18 way like that. If you want to ask me about
04:37:30 19 something specific in Kalotay, for example, I can
04:37:37 20 help you with that.
04:37:39 21 MR. HEINTZ: All right.
04:37:40 22 MR. COSTAKOS: We've been going about an
04:37:42 23 hour and ten or so, so let's take a break.
04:37:45 24 MR. HEINTZ: We need to change the tape.
04:37:46 25 THE VIDEOGRAPHER: We are off the record

04:37:47 1 at 4:37 p.m. This is the end of Disk 3 in the
04:37:55 2 deposition of Michael Sidman.

04:37:58 3 (Recess taken.)

04:45:40 4 (Attorney Sikorski now present.)

04:45:40 5 THE VIDEOGRAPHER: We are back on the
04:45:42 6 record at 4:45 p.m. This is the beginning of Disk
04:45:46 7 No. 4 in the deposition of Michael Sidman.

04:45:49 8 BY MR. HEINTZ:

04:45:49 9 Q Okay, Dr. Sigmund -- sorry, Dr. Sidman, before the
04:45:53 10 break, we were talking about gains, and you were
04:45:56 11 explaining to me that gains can be linear. They
04:45:59 12 can be nonlinear. They can be characterized, I
04:46:06 13 think, by something you called a describing
04:46:11 14 function; is that correct?

15 MR. COSTAKOS: Objection to form.

04:46:12 16 THE WITNESS: That's not exactly what I
04:46:13 17 said, the first two parts of your question.

04:46:19 18 BY MR. HEINTZ:

04:46:19 19 Q Okay. I see my mistake. An amplifier can have a
04:46:25 20 linear gain, correct?

04:46:28 21 A It could have a linear gain.

04:46:30 22 Q It could have a nonlinear gain, correct?

04:46:37 23 A Theoretically, "gain" means a proportionate
04:46:42 24 relationship -- proportional relationship between
04:46:45 25 input and output, for example, in an amplifier.

04:46:48 1 Q Okay.

04:46:50 2 A So --

04:46:55 3 Q I understand that as a practical matter the
04:47:01 4 relationship between the input signal and the
04:47:07 5 output signal of a practical device is going to be
04:47:12 6 somewhat complex. But when you talk about the gain
04:47:15 7 of that device, isn't it correct to say that
04:47:18 8 regardless of how you characterize the gain you are
04:47:22 9 talking about some relationship between the output
04:47:24 10 signal and the input signal?

04:47:26 11 MR. COSTAKOS: Objection. Form.

04:47:28 12 Foundation. Scope. Relevance.

04:47:32 13 THE WITNESS: You used the word "device."

04:47:35 14 BY MR. HEINTZ:

04:47:35 15 Q I did.

04:47:36 16 A I'm not sure what you mean by "device."

04:47:41 17 Q Let's just say --

04:47:42 18 A That changes, potentially, the scope, for example.

04:47:44 19 Q Let's just say "amplifier."

04:47:47 20 MR. COSTAKOS: Same objections.

04:47:48 21 THE WITNESS: Okay. So could I have the
04:47:49 22 question one more time with that instruction?

04:47:54 23 BY MR. HEINTZ:

04:47:54 24 Q I'll give it a try.

04:47:55 25 A Sure.

04:47:55 1 Q When we talk about the gain of an amplifier,
04:47:58 2 regardless of whether the gain is linear or
04:48:00 3 nonlinear -- No. Okay. I'm sorry. You're right.
04:48:04 4 A I'm shaking my head.
04:48:06 5 Q Yes. I understand. When we talk about the gain of
04:48:10 6 an amplifier, we are talking about some
04:48:18 7 relationship between the output signal of the
04:48:21 8 amplifier and the input signal of the amplifier; is
04:48:28 9 that correct?

04:48:28 10 MR. COSTAKOS: Same objections.

04:48:42 11 (Attorney Johnson leaves the room.)

04:48:42 12 THE WITNESS: I think if we were having a
04:48:44 13 conversation in the classroom about that outside of
04:48:50 14 the scope of this -- these patents at issue, I'd
04:48:56 15 say, "Sure."

04:48:59 16 BY MR. HEINTZ:

04:48:59 17 Q How is it different inside the scope of the patents
04:49:01 18 that are at issue here?

04:49:02 19 A I'd have to -- I'd have to consider how you're
04:49:05 20 going to apply the term "gain" to -- I don't know
04:49:09 21 what questions you're going to ask, so I'm
04:49:12 22 reluctant to make general statements outside of an
04:49:18 23 ideal theoretical basis based on some set of
04:49:23 24 assumptions that haven't been stated that may not
04:49:33 25 apply to something, for example, in the Kalotay

04:49:37 1 patent. So I think -- honestly, I think it would
04:49:42 2 be more helpful to the Board to ask --
04:49:49 3 Q Dr. Sidman, I'm going to -- I'm going to cut you
04:49:50 4 off here. I really don't care what you think is
04:49:52 5 helpful for the Board. You have to understand,
04:49:55 6 this is my deposition. I get to answer (sic) the
04:49:58 7 questions. You have to answer them if you're able
04:50:00 8 to. We don't need your opinion on what you think
04:50:03 9 is going to be helpful, okay?

04:50:05 10 MR. COSTAKOS: Well, I mean, you asked
04:50:06 11 him why he couldn't answer the question, and he
04:50:08 12 gave you -- he answered that, so I think his answer
04:50:11 13 was entirely appropriate. And so -- And with all
04:50:16 14 due respect, I don't think you get to ask him
04:50:18 15 whatever you want to ask him. There are rules that
04:50:21 16 govern this deposition just like any other. And
04:50:24 17 you're obliged to follow them, too.

04:50:26 18 MR. HEINTZ: And one of those rules is
04:50:28 19 against speaking objections, is it not, sir?

04:50:30 20 MR. COSTAKOS: I don't think I made a
04:50:32 21 speaking objection. After his answer was given, I
04:50:34 22 said to you why your attempt to cut him off -- not
04:50:37 23 your attempt, your successful attempt to cut him
04:50:40 24 off was improper. That's not a speaking objection.
04:50:42 25 That's a criticism of you, and that I think I'm

04:50:44 1 entitled to make.

04:50:45 2 MR. HEINTZ: We disagree.

04:50:47 3 BY MR. HEINTZ:

04:50:47 4 Q All right. Dr. Sidman, can you give me any
04:50:54 5 instance in which it would not be correct to say
04:51:04 6 that a gain is some relationship between an input
04:51:09 7 signal and an output signal in the context of any
04:51:12 8 of the patents that we've discussed today?

04:51:15 9 MR. COSTAKOS: Objection. Form.

04:51:46 10 THE WITNESS: Gain is an aspect of a
04:52:12 11 multitude of parameters that can be used to
04:52:27 12 characterize the input/output relationship of an
04:52:31 13 amplifier.

04:52:34 14 BY MR. HEINTZ:

04:52:34 15 Q And I think you told me earlier today that a signal
04:52:37 16 does not have a gain, correct?

04:52:39 17 MR. COSTAKOS: Objection. Form.

04:52:48 18 THE WITNESS: Generally, no.

04:52:54 19 BY MR. HEINTZ:

04:52:54 20 Q Is there any time a signal has a gain?

04:52:57 21 MR. COSTAKOS: Objection. Form.

04:53:55 22 THE WITNESS: I'm hesitant to answer that
04:53:56 23 question in a general way considering that there
04:54:15 24 are multitude -- multiple -- a multitude of ways to
04:54:20 25 measure signals, for example, in radio frequencies

04:54:32 1 which aren't related to these -- these patents at
04:54:40 2 all. So I don't want to make a general statement
04:54:44 3 that encompasses the whole range of, for example,
04:54:48 4 electrical engineering. If you put it in a more
04:54:52 5 narrow context, perhaps I can help you.

04:54:56 6 BY MR. HEINTZ:

04:54:56 7 Q In the context of Coriolis flowmeters.

04:54:59 8 A Okay. So let me hear your question again.

04:55:03 9 MR. HEINTZ: Madam reporter, if you
04:55:04 10 would.

04:55:17 11 (Following question read.)

12 Q Is there any time a signal has a
04:55:20 13 gain?

04:55:20 14 MR. COSTAKOS: Objection. Form.

04:55:26 15 THE WITNESS: That's not generally a way
04:55:27 16 to describe a signal in the context of the
04:55:31 17 technology we're talking about here.

04:55:34 18 BY MR. HEINTZ:

04:55:35 19 Q Thank you. Sir, let me ask you to direct your
04:55:37 20 attention back to Exhibit 2024, and that's the
04:55:40 21 decision of the Board in the 167 IPR, and that's
04:55:47 22 for the '854 patent. Should be a thin one, sir.

04:55:56 23 A Okay. What page?

04:55:59 24 Q 2024. We're looking for the IPR decision. You've
04:56:04 25 got it, Dr. Sidman?

04:56:05 1 A Yes. What page are you referring to?

04:56:08 2 Q Well, we were on page 9.

04:56:09 3 A Right.

04:56:09 4 Q But the question is, you told me you disagreed with

04:56:12 5 the Board's construction of positive feedback mode

04:56:14 6 in some respects. Is there any other construction

04:56:18 7 in this decision, Exhibit 2024, with which you

04:56:21 8 disagree, in whole or in part?

04:56:27 9 A No, there is not. Let me just add, I think the

04:56:50 10 word "analysis" is reading something into the claim

04:56:57 11 construction that's unnecessary and ambiguous and

04:57:21 12 confusing depending on the context.

04:57:25 13 Q Did you voice any of those concerns to petitioner

04:57:28 14 prior to the institution decision?

04:57:37 15 A I didn't start worrying about it until recently, so

04:57:40 16 no.

04:57:40 17 Q I'm sorry. You did tell me that. I forgot. Okay.

04:57:43 18 Let me ask you to turn your attention to page 7 of

04:57:46 19 Exhibit 2024. That's the institution decision.

04:57:54 20 A Did you say page 7 or paragraph 7?

04:57:56 21 Q I said "page."

04:57:58 22 A Okay.

04:58:03 23 MR. COSTAKOS: Are we -- I'm sorry. What

04:58:05 24 page are we on?

04:58:06 25 MR. HEINTZ: Page 7.

04:58:07 1 BY MR. HEINTZ:

04:58:07 2 Q All right. I'll direct your attention to the drive
04:58:09 3 signal generating mode construction. You see that,
04:58:12 4 sir?

04:58:14 5 A Yes. Let me review that briefly.

04:58:18 6 Q Sure. And I'll just tell what you my question is.
04:58:23 7 Maybe that'll help you. I just want to know,
04:58:25 8 confirm, if you agree with the Board's construction
04:58:32 9 which actually appears later on in this document of
04:58:41 10 a way of generating a drive signal. And that
04:58:49 11 construction actually appears on page 9.

04:58:51 12 A Right. In the first full paragraph there, the
04:58:56 13 Board ruled, "In summary, for" -- excuse me, "for
04:59:00 14 purposes of this decision, we construe, quote,
04:59:04 15 'drive signal generating mode,' end quote, as a way
04:59:08 16 of generating a drive signal." And I don't
04:59:11 17 disagree with that.

04:59:11 18 Q And is that the construction you used in preparing
04:59:14 19 your Declaration in IPR2014-00167?

05:01:04 20 A My opinions are consistent with the Board's
05:01:13 21 interpretation of drive signal generating mode.

05:01:17 22 Q So you would agree then that merely changing the
05:01:20 23 parameters in a method for generating a drive
05:01:24 24 signal is not changing the mode of generating the
05:01:26 25 drive signal?

05:01:29 1 MR. COSTAKOS: Objection. Form.

05:01:56 2 THE WITNESS: I believe their

05:01:57 3 construction is reasonable and appropriate.

05:02:01 4 BY MR. HEINTZ:

05:02:01 5 Q So is the answer to my question "yes" or "no"?

05:02:04 6 MR. COSTAKOS: Objection. Form.

05:02:10 7 THE WITNESS: I'm not disagreeing with

05:02:13 8 them in the context of their construction for this,

05:02:18 9 for the purposes of interpreting these claims.

05:02:24 10 BY MR. HEINTZ:

05:02:24 11 Q So does that mean that merely changing the

05:02:28 12 parameters and a method for generating a drive

05:02:32 13 signal is the same as drive -- I'm sorry, is the

05:02:35 14 same as changing the drive signal generating mode?

05:02:39 15 MR. COSTAKOS: Objection. Form.

05:02:43 16 THE WITNESS: Okay. I'm getting

05:02:45 17 confused, and I think part of it is because I'm not

05:02:47 18 an attorney. And I think you're asking me to parse

05:02:50 19 something that might have legal implications, so --

05:03:01 20 BY MR. HEINTZ:

05:03:01 21 Q Let's -- sorry.

05:03:02 22 A I'm just speaking as an engineer in the context of

05:03:08 23 these claims and what the Patent Office ruled.

05:03:11 24 Q All right. Let's go to page 8 of Exhibit 2024.

05:03:18 25 I'll direct your attention to the second full

05:03:21 1 paragraph. It begins, "Patent owner argues." Do
05:03:25 2 you see that?

05:03:25 3 A I do.

05:03:26 4 Q Okay. My question to you is, do you agree that
05:03:30 5 merely changing the parameters in a method for
05:03:34 6 generating a drive signal is not changing the mode
05:03:37 7 of generating the drive signal?

05:03:42 8 MR. COSTAKOS: Objection. Form.

05:04:07 9 THE WITNESS: I agree --

05:04:09 10 BY MR. HEINTZ:

05:04:09 11 Q Thank you.

05:04:17 12 A -- that that's a reasonable interpretation.

05:04:20 13 Q I'll have the reporter mark the next Exhibit 2026,
05:04:27 14 U.S. Patent No. 7,505,854.

05:04:38 15 MS. REPORTER: 2027.

05:04:39 16 MR. HEINTZ: I'm sorry, 2027.

05:05:15 17 (Exhibit No. 2027 was marked.)

05:05:15 18 BY MR. HEINTZ:

05:05:15 19 Q All right. Sir, when you're ready, I'll ask you to
05:05:18 20 direct your attention to Claim 7 which appears in
05:05:20 21 column 34.

05:05:23 22 A Just hold on a second.

05:05:26 23 Q Okay.

05:05:27 24 A Thank you. Okay.

05:06:02 25 Q You're familiar with this patent, are you not, sir?

05:06:06 1 A I am.

05:06:06 2 Q Okay. I'll ask you to turn your attention to Claim
05:06:12 3 7 which appears at column 34, line 22.

05:06:47 4 A Okay.

05:06:49 5 Q All right. Do you see the words "digital synthesis
05:06:53 6 mode" in Claim 7?

05:07:02 7 A Yes.

05:07:06 8 Q What's your understanding of that term?

05:07:35 9 A That Board ruled, "Digital synthesis mode,"
05:07:39 10 quote-unquote, is, quote, "drive signals generated
05:07:42 11 on the basis of sensor signal analysis," end quote,
05:07:45 12 wherein the drive signal is, quote, "synthesized by
05:07:48 13 control and measurement system based on an analysis
05:07:52 14 of the sensor signal."

05:07:55 15 Q Now --

05:07:57 16 A And I agree.

05:07:58 17 Q Okay. Now, earlier today, you told me that there
05:08:03 18 were two different senses that could be used in
05:08:06 19 connection with the word "analysis." Do you
05:08:09 20 remember that, in connection with the positive
05:08:11 21 feedback mode? Is there any qualification to your
05:08:15 22 agreement with the Board's construction in this
05:08:17 23 case for "digital synthesis mode"?

05:08:27 24 A I -- I think the word "analysis" is appropriate in
05:08:31 25 the -- in their interpretation and ruling of the

05:08:35 1 phrase "digital synthesis mode."

05:08:39 2 Q Okay. And what is your understanding of what the
05:09:06 3 word "synthesized" here means? I'm sorry. Let me
05:09:12 4 make this clear. In Claim 7 on the third line, we
05:09:19 5 have the words "signal is digitally synthesized."
05:09:23 6 Do you see that?

05:09:23 7 A I do.

05:09:24 8 Q What is is your understanding of the meaning of
05:09:26 9 "synthesized" --

05:09:28 10 MR. COSTAKOS: Objection. Form.

05:09:29 11

05:09:30 12 BY MR. HEINTZ:

05:09:30 13 Q -- in the context of Claim 7?

05:09:32 14 MR. COSTAKOS: Sorry. Objection to form.

05:09:50 15 THE WITNESS: Like it says, that the
05:09:52 16 drive signal is digitally synthesized, i.e., in a
05:09:59 17 microprocessor or computer or signal processor of
05:10:02 18 the like based on an analysis of the sensor signal.
05:10:12 19 Examples of that might be determining a parameter
05:10:18 20 of the sensor signal like as accomplished by a DFT
05:10:36 21 analysis of a time-based sensor signal.

05:10:43 22 BY MR. HEINTZ:

05:10:43 23 Q You think determining a parameter of a sensor
05:10:47 24 signal is what's meant by "digitally synthesizing a
05:10:52 25 drive signal"?

05:10:53 1 MR. COSTAKOS: Objection to form.

05:10:54 2 THE WITNESS: I don't think I said that.

05:10:56 3 BY MR. HEINTZ:

05:10:56 4 Q Okay. Well, my question was, when we're talking

05:11:00 5 about digitally synthesizing a signal, in the words

05:11:06 6 of the claim, "a drive signal is digitally

05:11:08 7 synthesized," what does "synthesized" mean in that

05:11:13 8 context?

05:11:14 9 MR. COSTAKOS: Objection to form.

05:13:29 10 THE WITNESS: In the context of the '854

05:13:32 11 patent, synthesis of a sine wave occurs based on

05:13:46 12 calculated parameters. Digitally is an ideal sine

05:14:31 13 or cosine wave.

05:14:48 14 BY MR. HEINTZ:

05:14:49 15 Q Sorry. Does that complete your answer, or are you

05:14:51 16 still thinking?

05:14:52 17 A I'm still thinking, but let that suffice for now.

05:14:55 18 Q Okay. Is that something like digitally creating

05:14:59 19 the signal?

05:15:04 20 MR. COSTAKOS: Objection. Form.

05:15:28 21 (Attorney Johnson enters the room.)

05:15:40 22 THE WITNESS: I think that's fair, as

05:15:49 23 opposed to developing the signal or generating it

05:15:55 24 based on some filtering operation of the sensor

05:16:00 25 signal.

05:16:05 1 BY MR. HEINTZ:

05:16:05 2 Q All right. Is that your answer?

05:16:06 3 A That's fine.

05:16:07 4 Q Okay. Sir, let me ask you to direct your attention

05:16:09 5 now back to Exhibit 2023, and that's your expert

05:16:14 6 report for the '854 patent -- I'm sorry, your

05:16:17 7 expert Declaration of the '854 patent. All right.

05:16:27 8 And I'll ask you to turn your attention to

05:16:29 9 paragraph 114. Okay. The second sentence reads,

05:16:50 10 "As noted in above," and then proceeds. What does

05:16:54 11 "as noted in above" refer to? And I'll suggest it

05:17:05 12 might refer to paragraph 104. I'm just trying to

05:17:08 13 get confirmation.

05:17:54 14 A I don't think that's the most -- that's a good

05:17:57 15 reference for that comment, "as noted in above."

05:18:06 16 Q I'm sure you can anticipate my next question, so

05:18:09 17 what does "above" refer to?

05:18:31 18 A I take it back. I misread that. "As noted above"

05:18:36 19 which relates to '104 which states, "U.S. Patent

05:18:48 20 7,505,854 is directed to a Coriolis-type

05:18:52 21 flowmeter," dot, dot, dot, which may be a mass flow

05:18:58 22 rate meter or a densitometer.

05:19:09 23 Q I'm sorry. I'm having trouble figuring out when

05:19:12 24 you're stopping.

05:19:13 25 A Okay. So in 114, "As noted above," that sentence

05:19:19 1 reads, "As noted in above, a densitometer is one
05:19:22 2 type of flowmeter that uses vibration of a
05:19:28 3 flowtube." In 104, the '854 is -- I state, "The
05:19:38 4 '854 is directed to a Coriolis-type flowmeter which
05:19:41 5 may be a mass flow -- flow rate meter or a
05:19:45 6 densitometer," dot, dot, dot.

05:19:56 7 Q Anything further?

05:19:58 8 A That's --

05:20:00 9 Q Okay.

05:20:00 10 A That's my initial response. I don't know what else
05:20:02 11 you'd like me to comment on.

05:20:04 12 Q I'm just -- just trying to figure out when you're
05:20:06 13 done, so maybe if you would look up when you --
05:20:08 14 when you -- to give me a signal that it's time to
05:20:11 15 ask the next question.

05:20:12 16 A Okay.

05:20:12 17 Q Okay. And I'm not trying to rush you. Just for
05:20:15 18 the mechanics of this, I'd like to not waste time
05:20:17 19 if we can avoid it. All right. Is the only thing
05:20:29 20 you're citing to for your conclusion that Miller's
05:20:33 21 densitometer is a flowmeter the '854 patent?

05:20:37 22 MR. COSTAKOS: Objection. Form.

05:24:55 23 THE WITNESS: I'm looking for a copy of
05:24:57 24 Miller. I don't think I have that in front of me
05:25:00 25 yet.

05:25:00 1 BY MR. HEINTZ:

05:25:00 2 Q Well, you don't, but I just want to make sure we're
05:25:03 3 clear. My question to you is, in your expert
05:25:06 4 report, is the only thing that you cite to for your
05:25:11 5 conclusion that Miller discloses a flowmeter the
05:25:16 6 '854 patent?

05:25:20 7 A I think Miller itself aids me in that respect.

05:25:29 8 Q All right.

05:25:29 9 A And I don't -- I thought I had a copy of it in
05:25:33 10 front of me. I don't, so that would be helpful.

05:25:35 11 Q Okay. I'll have you -- I'll hand you Miller in
05:25:38 12 just a moment. But in your expert report, do you
05:25:40 13 have any analysis of Miller that shows that Miller
05:25:42 14 is a flowmeter?

05:25:45 15 MR. COSTAKOS: Objection. Form.

05:25:47 16 BY MR. HEINTZ:

05:25:47 17 Q I'm just asking you to identify it if it's in your
05:25:49 18 expert report -- I'm sorry, your expert
05:25:52 19 Declaration.

05:25:55 20 MR. COSTAKOS: Objection to form.

05:26:13 21 THE WITNESS: There is one thing I can
05:26:14 22 see off the cuff. It's paragraph 114 on page 52 of
05:26:20 23 Exhibit 2023 which makes reference to Miller's
05:26:26 24 abstract. I'll read the last sentence in paragraph
05:26:33 25 114. Miller discloses a, quote, "flow-through

05:26:36 1 densitometer," end quote, that includes, quote, "a
05:26:41 2 vibrator for causing the tubes to vibrate,"
05:26:44 3 unquote.

05:26:47 4 BY MR. HEINTZ:

05:26:48 5 Q Is there anything else, sir?

05:26:50 6 MR. COSTAKOS: Objection. Form.

05:26:57 7 BY MR. HEINTZ:

05:26:57 8 Q Sorry. Anything else in your expert report?

05:27:00 9 A That relates to?

05:27:02 10 Q Whether or not you did an analysis of Miller to
05:27:05 11 determine whether or not Miller discloses a
05:27:08 12 flowmeter?

05:27:09 13 MR. COSTAKOS: Objection to form.

05:28:05 14 THE WITNESS: I think it's restricted to
05:28:07 15 Miller's abstract.

05:28:09 16 BY MR. HEINTZ:

05:28:09 17 Q Okay. Let's mark as Exhibit 2028 U.S. Patent
05:28:18 18 No. 4,679,947.

05:28:40 19 (Exhibit No. 2028 was marked.)

05:28:41 20 MR. COSTAKOS: Is this 2028? I've
05:28:42 21 forgotten.

05:28:44 22 MS. REPORTER: Yes.

05:28:49 23 THE WITNESS: I'd like to append my last
05:28:51 24 answer.

05:28:54 25 BY MR. HEINTZ:

05:28:55 1 Q Okay.

05:28:55 2 A Now that I have Miller in front of me --

05:28:58 3 Q All right.

05:29:01 4 A -- I'd direct you to Figure 3 of Miller -- the
05:29:05 5 469 -- 4,697,947 patent.

05:29:12 6 MR. COSTAKOS: 679.

05:29:15 7 THE WITNESS: Okay. Excuse me,

05:29:19 8 4,679,947. Thank you. So this Figure 3

05:29:32 9 illustrates that Miller's densitometer measures the

05:29:45 10 density of the fluid flowing through it as denoted

05:29:50 11 by these arrows. Let's see here. There's an

05:30:02 12 upward arrow -- two upward arrows, a downward arrow

05:30:07 13 and a -- an arrow to the left which capture the

05:30:11 14 flow through the main conduit to which the

05:30:22 15 densitometer is attached.

05:30:26 16 BY MR. HEINTZ:

05:30:26 17 Q And when you say --

05:30:27 18 A It's not just capturing -- It's not just measuring

05:30:30 19 the density of an isolated sample. It's measuring

05:30:42 20 the density of the fluid or gas or steam that's

05:30:49 21 flowing through the densitometer as a result of

05:30:53 22 being attached to the main conduit.

05:30:58 23 Q Does Miller measure any flow rate?

05:31:12 24 MR. COSTAKOS: Object to the form.

05:31:38 25 THE WITNESS: Even though Miller's

05:31:40 1 abstract discloses a, quote, "flow-through
05:31:44 2 densitometer," end quote, it doesn't describe
05:31:56 3 measuring flow rate.

05:31:58 4 BY MR. HEINTZ:

05:31:58 5 Q Is Miller's circuit capable of measuring flow rate?

05:32:03 6 MR. COSTAKOS: Objection. Form.

05:32:08 7 THE WITNESS: Which circuit are you
05:32:09 8 referring to?

05:32:10 9 BY MR. HEINTZ:

05:32:10 10 Q Let's start with the one in Figure 3.

05:32:17 11 A I don't see a circuit in Figure 3.

05:32:19 12 Q Fair enough. Is Miller's device capable of
05:32:22 13 measuring a mass flow rate?

05:35:50 14 A Although Miller's descriptions of his system
05:36:08 15 include many of the components that would be found
05:36:13 16 in a mass flow rate measuring device, it doesn't
05:36:19 17 describe measurement of mass flow rate. It's
05:36:25 18 concerned with density measurement.

05:36:39 19 Q Let me refer you to Figure 3 of Miller. Can you
05:36:48 20 identify for me where the sensors are in Figure 3?
05:37:02 21 And again, just to help, I'm not trying to make
05:37:05 22 this into a test. 90 and 92, I believe, are the
05:37:08 23 sensors, but please confirm that for yourself. And
05:37:36 24 if you want to take a look at column 11 and around
05:37:40 25 line 40.

05:38:23 1 A So at line 40, Miller states, quote, "The magnitude
05:38:26 2 and frequency of the vibration of tube 62 is
05:38:28 3 detected by the strain gauges 90 and 92." He also
05:38:36 4 describes further down another sensor, temperature
05:38:41 5 probe 94. That's lines 43 or 4.

6 THE REPORTER: Lines what?

7 THE WITNESS: Lines 43 to 44.

05:38:56 8 BY MR. HEINTZ:

05:38:56 9 Q Okay. With the strain gauges 90 and 92 positioned
05:39:01 10 as they are shown in Figure 3, is it possible for
05:39:04 11 Miller's devices depicted in Figure 3 to calculate
05:39:08 12 the mass flow rate or to measure the mass flow
05:39:11 13 rate?

05:39:13 14 MR. COSTAKOS: Objection. Form.

05:41:11 15 THE WITNESS: I don't believe strain
05:41:14 16 gauges 90 and 92 depicted in Miller's Figure 3 are
05:41:23 17 situated in the densitometer assembly ideally to
05:41:41 18 measure flow rate, nor do I think he situated them
05:41:48 19 in a way to measure mass flow rate. That's it.

05:42:05 20 BY MR. HEINTZ:

05:42:05 21 Q Okay. Thank you for looking up. I noticed you
05:42:09 22 qualified your answer with the word "ideally." I
05:42:12 23 want to find out if there's any way you can think
05:42:14 24 of that the device depicted in Miller Figure 3 or
05:42:19 25 any other figure in Miller would be capable of

05:42:22 1 measuring mass flow rate.

05:42:25 2 MR. COSTAKOS: Objection. Form. Scope.

05:42:28 3 BY MR. HEINTZ:

05:42:29 4 Q And if you don't know, that's fine, too. I just
05:42:30 5 want to understand whether you have an opinion with
05:42:32 6 respect to this or not.

05:42:33 7 A Well, I haven't considered that possibility in
05:42:38 8 analyzing Miller's '947 patent. However, Micro
05:42:48 9 Motion, for example, has straight tube flowmeters
05:43:01 10 that might -- whose technology might make use of
05:43:17 11 those signals. I don't think they're -- I don't
05:43:23 12 think they're ideally situated even for that
05:43:25 13 application, but that is a possibility that I don't
05:43:30 14 want to exclude in answering your hypothetical
05:43:35 15 question.

05:43:36 16 Q Are you familiar with the Micro Motion straight
05:43:40 17 tube flowmeters you just mentioned?

05:43:43 18 A The art described in their patents that I've
05:43:48 19 referenced in my Declarations.

05:43:54 20 Q If I use the term "central axis" for the tube in
05:43:59 21 those -- for the flowtube in those meters, does
05:44:05 22 that make sense to you?

05:44:06 23 A Yes. I'm not -- I don't recall if that's a term
05:44:09 24 that they're using in one of those prior art
05:44:13 25 patents.

05:44:14 1 Q I understand.

05:44:15 2 A It just makes sense.

05:44:16 3 Q Okay.

05:44:16 4 A I don't think these sensors are -- in Miller are
05:44:24 5 intended by Miller's disclosure to be used to
05:44:28 6 measure flow rate, only density.

05:44:31 7 Q And that's because if they were intended to do
05:44:32 8 that, they would be displaced with respect to each
05:44:34 9 other along the central axis of the flowtube,
05:44:38 10 right?

05:44:38 11 A Ideally.

05:44:39 12 Q Okay. On the Micro Motion flowmeters, straight
05:44:46 13 tube flowmeters you referred to earlier, are, in
05:44:48 14 fact, the sensors displaced with respect to each
05:44:50 15 other along the central axis?

05:44:56 16 A Did displace longitudinally in the embodiments that
05:45:02 17 they describe.

05:45:04 18 Q And --

05:45:05 19 A But I don't want to exclude the possibility in
05:45:08 20 responding to your hypothetical question, which I
05:45:12 21 haven't really considered a priority to this
05:45:16 22 question, whether or not those sensors might be
05:45:21 23 capable of making some sort of flow rate
05:45:25 24 measurement. Again, I don't think that was the
05:45:27 25 intention, that that was the intention of the '947

05:45:36 1 patent, because it didn't disclose flow rate
05:45:39 2 measurement.

05:45:41 3 Q Other than not wanting to exclude the possibility,
05:45:44 4 you have no opinion then, is it true, as to whether
05:45:47 5 or not Miller's device as depicted in Figure 3
05:45:54 6 could measure mass flow rate?

05:45:56 7 MR. COSTAKOS: Objection. Scope.
05:45:57 8 Foundation.

05:46:01 9 THE WITNESS: I don't have an opinion at
05:46:02 10 this time without considering your proposition.

05:46:10 11 BY MR. HEINTZ:

05:46:10 12 Q And you certainly -- And you certainly didn't do
05:46:14 13 that in your expert Declaration, correct? You
05:46:16 14 expressed no such opinion in your expert
05:46:18 15 Declaration?

05:46:19 16 A That?

05:46:19 17 MR. COSTAKOS: Objection. Form.

05:46:22 18 BY MR. HEINTZ:

05:46:22 19 Q That Miller's device as depicted in Figure 3 could
05:46:25 20 measure mass flow rate.

05:46:26 21 A I did not offer an opinion on that.

05:46:39 22 MR. HEINTZ: All right. Thank you. We
05:46:40 23 can stop for the day if that's all right with you.

05:46:42 24 MR. COSTAKOS: It's okay with me provided
05:46:45 25 that you don't intend to go more than seven hours

05:46:47 1 tomorrow. In other words --

05:46:50 2 MR. HEINTZ: I understand.

05:46:51 3 MR. COSTAKOS: -- we're not going to stop
05:46:52 4 today and then go eight or nine hours tomorrow or
05:46:55 5 however much time is left over.

05:46:56 6 MR. HEINTZ: Okay. My understanding was
05:46:58 7 you wanted to wrap up early today, and so I'm
05:47:00 8 trying to accommodate that. If you want to -- I
05:47:03 9 think that's correct, all right, assuming nothing
05:47:05 10 strange happens with cooperation of the witness.
05:47:07 11 So if that's going to be okay, we can stop now. If
05:47:12 12 we need to keep going, we'll just keep going.

05:47:14 13 MR. COSTAKOS: And I have no need to wrap
05:47:16 14 up early. I just -- I think -- Let's just go off
05:47:19 15 the record, and we'll talk about this.

05:47:22 16 THE VIDEOGRAPHER: We are off the record
05:47:23 17 at 5:47 p.m.

05:47:27 18 (Discussion off the record.)

05:48:44 19 THE VIDEOGRAPHER: We are back on the
05:48:46 20 record at 5:48 p.m.

05:48:47 21 BY MR. HEINTZ:

05:48:48 22 Q Okay. Dr. Sidman, after a discussion with
05:48:51 23 Mr. Costakos, we've agreed to go off the record
05:48:52 24 today. I just want to remind you that this
05:48:55 25 deposition is continuing. And during any breaks,

05:48:57 1 including overnight, prior to our start tomorrow,
05:48:59 2 you should not be discussing any of the subject
05:49:01 3 matter of this -- I'm sorry, this deposition and
05:49:04 4 cross-examination with anybody else. Do you
05:49:07 5 understand that, sir?

05:49:08 6 A I understand, and I agree.

05:49:10 7 MR. HEINTZ: Okay. Thank you. We can go
05:49:11 8 off the record.

05:49:11 9 MR. COSTAKOS: Well, and just to be
05:49:13 10 clear, the discussion off the record was that
05:49:18 11 tomorrow your questioning would be limited to seven
05:49:20 12 hours. Now, you've said that you didn't think that
05:49:22 13 would be a problem, but I just want to make sure
05:49:24 14 that that's clear on the record.

05:49:27 15 MR. JOHNSON: I just want to make one
05:49:28 16 caveat to that. If we go five hours tomorrow and
05:49:30 17 then you take two hours, we're still entitled to
05:49:33 18 our extra one hour.

05:49:33 19 MR. COSTAKOS: Of course. Of course.

05:49:36 20 MR. JOHNSON: That could run into eight
05:49:37 21 hours.

05:49:37 22 MR. COSTAKOS: I understand that. I'm
05:49:38 23 just talking about the cross-examination part. Of
05:49:40 24 course you're right.

05:49:41 25 MR. JOHNSON: I do not believe that we

05:49:42 1 will take the full seven hours tomorrow with the
05:49:44 2 remainder of our cross.

05:49:46 3 MR. COSTAKOS: Okay. Fine. That's
05:49:47 4 perfect.

05:49:48 5 MR. HEINTZ: With that, we can go off the
05:49:50 6 record.

05:49:51 7 THE VIDEOGRAPHER: Then that concludes
05:49:52 8 today's testimony. We're off the record at
05:49:55 9 5:49 p.m. This is the end of Disk No. 4 in the
05:49:57 10 deposition of Dr. Sidman.

05:50:02 11 (Proceedings concluded at 5:49 p.m.)

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

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

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

20

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Notary Public

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In and for the State of Wisconsin

24

25 My Commission Expires: December 28, 2014.

1 STATE OF)
) SS:
 2 COUNTY OF)
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4 I, MICHAEL D. SIDMAN, Ph.D., do hereby
 5 certify that I have read the foregoing transcript of
 6 proceedings, taken on August 6, 2014, at Foley &
 7 Lardner, 777 East Wisconsin Avenue, Milwaukee,
 8 Wisconsin, and the same is true and correct, except for
 9 the list of corrections noted on the annexed page.

10
 11 Dated at _____
 12 this _____ day of _____, 2014.

13
 14
 15 _____
 16 MICHAEL D. SIDMAN, Ph.D.

17
 18
 19 Subscribed and sworn to before me
 this _____ day of _____ 2014.

20
 21
 22 _____
 Notary Public

23
 24 My Commission Expires:
 25

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C O R R E C T I O N S

PAGE NO.	LINE NO.	DESCRIPTION
----------	----------	-------------

A			
\$450 17:19	56:7 109:4	62:16 74:24 108:16	145:16,20,23
a.m. 1:21 4:4 16:2,5	actuated 15:4	114:12 119:24	analogous 80:10
38:24 39:2 60:22	actuator 50:3 81:20	157:3	analysis 21:18 104:9
61:1 75:17,20	add 45:17 48:15	Ahhh 79:13	127:23 128:20,21
ability 107:6	167:9	aid 113:15	129:14 130:1,19,21
able 59:12 115:10,14	addition 96:13	aids 176:7	130:23 131:1,5,7,10
139:6 156:7 160:2	address 108:7 113:7	air 43:11 53:9 71:18	131:18,19,20 132:7
164:7	addresses 18:25	72:24 79:8,22 80:5	132:20 141:2,18
abnormal 85:22 86:9	adds 130:3,5	81:11	143:14 167:10
88:12 89:19	adjusted 131:2,25	akin 83:15	171:11,13,19,24
Absolutely 65:22	143:16,18	alleged 60:4	172:18,21 176:13
abstract 98:22	adjustment 131:6	allegedly 28:18	177:10
111:10 176:24	132:4,16 148:17	allow 20:7 68:5 88:20	analyzed 130:8,10,11
177:15 179:1	admits 68:11	92:8	130:14,24
acceleration 100:12	admitted 70:25 94:25	ambiguous 167:11	analyzing 130:16
101:8	admittedly 111:1	amount 68:7 70:2	181:8
accept 16:21 115:3	admitting 84:6	89:1	Angela 18:3
acceptance 149:9	adopted 32:1	amp 136:22 137:3	animation 21:14
accepted 3:8 7:8	affect 90:7,8 133:15	144:19,19 148:2	annexed 188:9
125:18	133:16	amplification 137:12	answer 6:21 9:1,24
accepts 136:22	affiliated 11:16	137:13	11:13 16:9 19:14,24
accommodate 184:8	affirmative 146:10	amplifier 122:15	20:1,7 21:2 22:21
accomplish 75:9 95:8	159:10	136:15 137:19	35:21 36:13,14
95:21	affirmatively 49:12	144:5,20,23 145:3,8	37:24 38:5 40:2,3,5
accomplished 137:18	affixed 187:18	147:3,25 148:10	40:13 42:3,14 47:12
172:20	afternoon 83:1,2	149:14,23 150:6,15	50:9 56:24 63:12,22
account 114:18	124:16,17	150:19 151:10,16	67:23 70:14 89:25
accumulating 88:23	ago 9:7,8 10:22 11:2	152:20 153:21	90:2,4 99:20 100:14
accuracies 102:2	11:17 12:6,9,21	154:24,25 156:2,16	101:15 102:5
accuracy 37:18 78:6	17:9 21:17,25	157:4,7,19,23 158:5	107:20 109:11
90:8 91:9	agree 34:10 44:13	158:15 159:1,7,17	111:5,7 125:20
accurate 9:1 17:15	45:17 51:20,22 52:3	159:23 161:19,25	131:12,17,20 132:6
36:6 37:9,25 40:4,5	63:14 68:10 69:19	162:19 163:1,6,8,8	132:11 133:10
78:6,7 79:2 84:3,5	69:20 72:24 76:18	165:13	134:4 139:6 140:18
84:15,18 85:19	76:19 77:5 89:22	amplifiers 152:14	142:16 143:12
86:17 87:16 90:13	91:3,11,13 104:11	amplifies 137:6	147:20,22 150:24
108:6 116:2,19	104:17 124:5 127:6	amplify 137:8	152:15,24 153:8
117:8 118:1	127:15,19 168:8,22	amplitude 82:8	155:9 156:7,15,24
accurately 63:23	170:4,9 171:16	122:17 133:16	158:7 159:9 160:17
104:13	185:6	147:24 148:1	164:6,7,11,12,21
acknowledge 113:9	agreed 34:5,7 71:18	154:17 155:13	165:22 169:5
acknowledged	184:23	157:5,10 158:18,19	173:15 174:2
109:22	agreeing 61:21	159:22,23	177:24 180:22
action 126:18 187:16	115:20	amplitudes 149:2	answer's 126:7
active 107:25	agreement 140:12	155:14,16	answered 20:21,23
actual 28:17 31:8	171:22	analog 15:5 63:10	133:11 164:12
	ahead 13:12 17:5	132:13 144:4	answering 16:6 67:16

87:25 100:13 146:9 157:22 181:14 answers 42:5 59:23 anti-node 53:22 55:1 anticipate 174:16 anticipates 96:8 anticipation 96:13 anybody 185:4 Anyway 66:2 anyways 131:10 apologies 21:5 apologize 37:19 apparatus 107:8 apparent 108:18 Appeal 1:2 3:18 4:11 appear 24:2 53:13 appearances 4:19 appeared 2:4,7,10,13 appears 24:1 27:19 54:25 105:3 128:21 168:9,11 170:20 171:3 append 177:23 appendix 92:13,14 applicable 41:9 application 181:13 applications 28:4,19 29:22 30:7,20 31:14 65:4 66:10 applied 136:13,15 143:22,25 147:10 151:21 applies 36:23 144:24 apply 147:3 160:10 163:20,25 applying 137:14 143:22 approach 95:20 approaches 95:20 appropriate 164:13 169:3 171:24 approximately 9:13 area 155:21,23 areas 29:7 argues 170:1 arithmetic 144:12 arrangement 99:12	100:21 104:6 arrive 33:19 arrived 37:21 arrow 54:25 178:12 178:12,13 arrows 178:11,12 art 11:25 29:12,13 31:3,19,24 34:12,17 34:19 35:3,5,6 36:23,25 42:24 46:6 46:18 48:18 54:1 55:9 100:10 108:8 108:17 181:18,24 article 84:11 85:17 articles 27:4 29:2,14 ascertained 122:1 asked 5:23 17:6 20:12,19,21 32:19 33:4,11 34:8 35:18 35:25 37:7,10,21 66:3 104:18 107:21 111:5 138:18 140:24 148:12 156:11,25 164:10 asking 37:20 50:7 52:9 59:21 72:10 87:7 126:8 132:22 133:3 138:15 140:12 144:15 147:13,17 154:5 155:4 156:7 157:21 169:18 176:17 aspect 165:10 aspects 97:10 assembly 180:17 assist 126:16 associated 11:25 12:20 13:25 16:12 assume 6:20 21:9 42:22 64:24 66:20 81:19 96:2 97:5 123:25 146:11,22 147:2 148:12 assuming 45:2,3,21 82:7 105:11 146:15 148:5 184:9 assumption 115:6	assumptions 157:22 158:24 163:24 astray 125:24 attached 178:15,22 attempt 164:22,23,23 attempting 111:25 attempts 82:12,16 attended 12:5 attention 125:1 135:16 144:17,19 166:20 167:18 168:2 169:25 170:20 171:2 174:4 174:8 attorney 60:12 126:13 137:1 141:8 161:4 163:11 169:18 173:21 187:13,14 attorneys 18:7 24:10 August 1:21 4:5 17:10 21:25 187:10 187:19 188:6 author 84:11,22 85:17 Avenue 1:20 2:3 4:16 188:7 avoid 175:19 aware 13:10,20 18:12 18:21 32:7 35:5 46:6,18 55:10 axis 181:20 182:9,15	background 3:10 7:14,16 8:3 35:10 backtrack 117:2 base 155:10 based 11:8 19:7 20:18 29:1 34:11 58:11 73:13 85:3 91:11,14 107:2 110:12,23 144:2 153:17 163:23 171:13 172:18 173:11,24 basic 14:22 73:23 basically 69:3 basis 29:11,16,20 30:3 114:24 116:8 127:9,22 163:23 171:11 batch 66:17 batching 57:19 70:18 bears 24:6 beginning 4:20 61:1 97:16,17 98:5 100:19 108:1 112:9 113:2 119:2 123:15 136:10 161:6 begins 62:12,18 65:3 73:4 85:12,13 86:5 86:6 89:13,13 101:24 115:8 120:1 170:1 behalf 2:4,7,10,13 5:1 5:4,7 behavior 51:23 153:5 156:2 157:23 belief 30:9 believe 7:11 12:5 24:20 32:25 33:8 34:3 36:3,6 39:17 43:7 55:24 58:15 61:8,9 83:14 110:11 111:21 114:25 124:21 143:17 144:20 169:2 179:22 180:15 185:25 best 55:25 108:17
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>better 38:18 63:4 90:10</p> <p>beyond 22:22 114:14 138:24,25 139:2 156:13</p> <p>billed 17:18</p> <p>bit 38:7 52:25 92:12 119:24 137:21 151:12</p> <p>blanket 149:8 151:22</p> <p>block 58:4 74:15,16 145:13,19</p> <p>board 1:2 3:9 4:11 7:9 14:3,4 62:23 67:19,25 69:1 70:13 72:12 73:6,17 74:7 74:9,11,18 77:1,8 78:24 88:20 91:25 93:7 94:23 95:1 138:1,3,20 140:2 164:2,5 166:21 168:13 171:9</p> <p>Board's 3:18 127:2,6 127:16 129:6 138:5 138:21 139:16 140:24 141:2 167:5 168:8,20 171:22</p> <p>book 25:2,25 26:2,5</p> <p>books 26:10,11,14 27:4,13</p> <p>bookshelf 26:5,11,15 26:18,25 27:14</p> <p>bottom 65:10 93:3 107:1 110:17 122:25</p> <p>Boulder 10:23</p> <p>box 58:1 60:2 98:18 107:1 135:18</p> <p>breach 9:22</p> <p>bread 22:19</p> <p>break 9:17 13:11,18 38:22 60:20 61:21 96:25 112:2 124:7 160:23 161:10</p> <p>breaks 184:25</p> <p>briefly 97:1 120:12 168:5</p>	<p>bring 97:12</p> <p>brings 14:6 21:19</p> <p>broad 15:6</p> <p>Broadcast 1:18 187:7</p> <p>broadest 125:9</p> <p>brought 113:16</p> <p>bubbles 76:4</p> <p>bullet 21:13,20</p> <p>bunch 25:13 48:16</p> <p>business 14:20 16:12 22:14</p> <p>butter 22:19</p> <hr/> <p style="text-align: center;">C</p> <hr/> <p>C 2:1 189:1,1</p> <p>C.F.R 1:15</p> <p>calculate 151:24 180:11</p> <p>calculated 173:12</p> <p>calculates 73:24</p> <p>California 2:7</p> <p>call 15:8 41:3,3 56:8 61:9 80:11 83:9 114:2</p> <p>called 5:8 161:13</p> <p>calls 20:13 103:15 112:17</p> <p>Canfield's 25:25</p> <p>capable 104:12 106:15 115:24 179:5,12 180:25 182:23</p> <p>capacity 77:6,7</p> <p>Captioner 1:18 187:7</p> <p>capture 178:13</p> <p>capturing 178:18</p> <p>care 164:4</p> <p>careful 129:25</p> <p>carrying 53:7</p> <p>case 1:6 4:12 10:4,11 10:12 11:6 12:1 18:14 21:1 27:4,6 28:19 29:23 32:23 34:2 40:8 73:2 86:12 88:19 137:9 146:7 153:7 171:23</p> <p>cases 9:15,20,24</p>	<p>catalog 63:12</p> <p>catch 21:5</p> <p>caused 122:3 141:21</p> <p>causes 101:19 102:12</p> <p>causing 102:21 177:2</p> <p>caveat 127:15 153:6 185:16</p> <p>caveats 149:6,11 150:16</p> <p>central 181:20 182:9 182:15</p> <p>certain 34:16 70:12 75:10 97:10</p> <p>certainly 37:17 38:3 49:7 116:22,24 117:23 155:25 183:12,12</p> <p>certainty 63:12</p> <p>Certified 1:17,17 187:6,6</p> <p>certify 187:8,12 188:5</p> <p>cetera 8:21 29:14</p> <p>chance 96:23</p> <p>chances 117:25</p> <p>change 60:19 81:5,8 81:11,20 82:10,10 111:17 116:15 117:20 122:2 160:24</p> <p>changes 81:9 117:19 162:18</p> <p>changing 115:13 143:19 168:22,24 169:11,14 170:5,6</p> <p>characterize 26:23 27:3 39:20,21 40:22 40:24 41:22 42:10 44:17 162:8 165:12</p> <p>characterized 161:12</p> <p>chart 57:9 58:14 60:8 61:16 97:17 101:21 106:25 119:10,13 119:16,23 120:1,10 120:16 121:9,25</p> <p>charts 142:17</p> <p>cheat 32:25 38:15</p>	<p>chose 142:1</p> <p>circuit 133:14 134:5 135:19,21,25 136:6 136:23 137:23 139:14,24 144:5,20 144:24 145:15 146:3,13,17,23 147:5,11 152:9 179:5,7,11</p> <p>circuitry 92:9 95:1 99:16 100:2</p> <p>circumstance 47:22 77:25</p> <p>circumstances 76:18 77:23 78:5,8 87:10</p> <p>citation 25:24</p> <p>citations 26:9,11</p> <p>cite 13:21 41:10 43:24 55:22 56:3,10 57:1 58:19 62:5 119:3 176:4</p> <p>cited 31:18 97:9 119:22</p> <p>cites 25:2,7</p> <p>citing 175:20</p> <p>claim 3:7 6:21 33:19 35:19 36:10 57:9 58:2,5,14,15,17,20 60:8 62:4,5 67:11 68:22 71:11,14,14 72:3 90:24 97:17,18 101:21 106:25 110:9,10,21 119:10 119:13,16,23 120:1 120:3,4,10,11,16 121:4,9,25 123:9,9 125:19 126:3,17 141:10,18 142:17 167:10 170:20 171:2,6 172:4,13 173:6</p> <p>claimed 6:11</p> <p>claims 32:19,22 33:1 33:4,9,12,16,17 34:1,7,17 36:1,8,17 36:24 37:4,20,21,22 38:4,11,14,16,17</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>96:9 125:8,14 126:10 169:9,23 clarifies 98:16 clarify 49:8 72:11 104:19 class 21:17,23,25 classes 14:24 classification 15:7 classroom 163:13 clause 97:19 110:20 123:9 clear 7:19 31:10 70:16 138:15 172:4 176:3 185:10,14 clearly 70:16 clients 12:15 clipped 159:21 160:3 160:11 close 80:12 closed 44:9 clutter 56:18 CLVS 2:16 coil 136:12 coincide 34:14 collaborative 24:14 column 97:24 98:4 100:18 103:25 107:12 111:11 113:3 119:3,19 120:8 123:13 124:1 124:1 136:9 170:21 171:3 179:24 columns 118:15 combination 34:24 44:1 47:19 96:11 99:13 154:2 combine 56:5 combined 122:12 come 39:12 90:22 comes 49:7 111:1,21 145:15 159:14 comfortable 13:12 23:24 coming 101:7 145:4,9 comma 55:18 62:23 110:14 commencing 1:21</p>	<p>comment 142:24 174:15 175:11 commercial 12:19 13:21 29:15 30:6,12 30:17,18 31:8,13,25 32:3,5 46:6,18 Commission 187:25 188:24 common 7:17,23 95:9 commonly 152:13 communication 74:13 companies 10:7 15:9 Company 21:8 compared 54:21 155:15 compensate 122:2 compensation 17:21 complete 8:24 24:2 35:2 38:19 42:13 56:24 118:9 173:15 completely 127:18 complex 162:6 complicated 160:17 complications 156:13 component 51:4 components 51:6 90:11 127:24 179:15 composition 69:22 compromises 15:15 computer 172:17 concept 95:9 concerned 52:17 141:24 179:18 concerning 3:16 124:21 concerns 167:13 concluded 186:11 concludes 186:7 concluding 1:21 conclusion 34:1,11 38:8 90:23 175:20 176:5 condition 73:19 106:3 122:7 123:5 123:10 135:1</p>	<p>conditions 75:10 78:20,21,25 103:3 105:16,16,19 110:3 116:14 121:19 conduit 40:18 41:7 41:17 42:15,21 43:1 44:3,19 45:4,22 46:8 47:17 48:11 50:4 51:15 52:5,6,7 53:1,20 56:12 57:4 58:8 59:13 64:11 68:4 69:4,14 71:5 74:19 78:13 79:1,8 80:7,23 99:5,6,9 109:1,17,18 113:23 114:4 115:8 146:6 178:14,22 conduits 41:4,6,10 81:1 109:1 confirm 33:6,7 36:3 37:15 55:24 126:8 168:8 179:23 confirmation 174:13 confused 169:17 confusing 167:12 confusion 148:16 connected 59:3 107:3 110:13,23 connection 138:20 140:2,25 141:11 171:19,20 consider 132:18 133:17 135:2 140:20 163:19 considered 88:7,12 132:23 133:5 134:23 139:8 140:17 149:21 153:10 181:7 182:21 considering 156:1 165:23 183:10 consistent 125:10 168:20 consists 6:11 7:6 50:22 51:6 101:2 construction 125:10</p>	<p>127:2,12,13,16 128:12,18,22 129:11,17,22 130:9 139:17 140:24 141:2,3,13,18 143:14 167:5,6,11 168:3,8,11,18 169:3 169:8 171:22 constructions 3:7 6:12,22 126:9,17 127:6 141:11 142:2 142:7,20 construe 125:14 126:20,23,25 168:14 construed 126:3,9 127:21 138:1,20 140:1 construing 125:18 consultant 14:19 15:7 consulting 8:12 14:21 16:13 contact 20:22 content 44:11 55:17 72:25 78:1 contentions 19:15,19 142:10,13,15 contents 7:15 74:19 80:24 91:16 context 32:8 43:23 46:23 47:8,25 48:16 48:17 54:13,17 67:15 72:6 75:8 76:20 77:22 83:25 85:15 98:17 105:10 111:12 130:19 131:4 144:3 147:22 148:25 151:15 160:7,13 165:7 166:5,7,16 167:12 169:8,22 172:13 173:8,10 Continue 150:21 continues 66:16 73:10 85:14 86:7 88:25 89:3 110:1 continuing 84:14</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>88:21 140:5,8,14 184:25 continuous 25:21 133:24 continuously 73:12 111:25 contract 9:23 control 15:3,3 22:17 22:25 25:20,21 26:1 27:24 28:1,10,10 30:4,19 31:11 82:12 171:13 controller 132:16 conversation 83:11 163:13 cooperation 184:10 copies 5:19 23:10 copy 6:16 7:11,12 8:5 23:6 96:7 113:14 124:20 175:23 176:9 Coriolis 11:8 12:12 12:20 13:1 21:15,18 22:1,7,19 23:3 28:16 31:8 32:1,7 39:5,8,14,22 40:10 40:13,15,25 41:4,6 41:17,23 42:11 43:23 44:4,18 45:22 46:14,23 47:8,19,25 48:4,5,17 49:10,18 50:2 51:13 52:3 69:24 72:15 73:9 75:2 78:17 81:2 98:24 99:4,8,14,17 100:5 101:5 104:23 107:21 108:25 109:25 110:6 111:9 114:3 166:7 Coriolis-type 174:20 175:4 Coriolois 110:5 correct 7:16,21 12:10 23:12,25 29:3 31:9 31:17 34:9 36:3,5 43:6,9,10 44:5,12 46:9 48:6 53:3,4</p>	<p>56:7 62:2,7 71:21 72:1 73:8,9 75:5 86:24 96:11 98:1 114:7 121:6 124:22 126:4,5,11 129:20 130:11,12 132:9 134:22 135:14 136:25 137:13,24 139:11,14,17 141:3 144:23 145:16,22 148:19 152:20 153:14,24 154:8 155:17 156:20 157:12,19 158:7 159:7 161:14,20,22 162:7 163:9 165:5 165:16 183:13 184:9 188:8 corrections 188:9 correctly 6:1 58:14 98:14 120:10 correlation 103:14,22 correspond 100:11 corresponding 97:24 98:7 correspondingly 122:16 corresponds 23:22 55:15 103:5 118:6 cosine 173:13 Costakos 2:3 4:23,23 5:19,21,25 6:15,23 8:1 10:9,15 11:4,20 14:16 15:23 17:4,13 18:3,18 19:11,24 20:5,12 22:3,11 23:8 24:17,19,22 26:13,20 27:7 28:21 29:4,24 30:8,21 31:15 33:13,21,24 34:20,23 36:12 37:2 37:6,8,12 39:23 42:1,6,12 43:19 44:20 45:7,11,25 46:10,21,24 47:11 48:14 49:15,20 50:1 50:19 53:24 54:11</p>	<p>55:3 56:14 59:1,16 61:14 63:8,17 65:3 65:6,24 66:3,6,24 67:6 68:14 69:17 70:7 71:3,6 74:4 75:6,11,13 76:6,15 77:10,20 78:3,15 80:8 81:13 82:3,6 82:19 83:16 84:9,20 85:23 86:10,25 87:23 88:14 89:5,21 90:19 91:2,19 92:18 93:22 94:10,20 95:3 95:16 96:4 99:3,21 100:4,16 102:16 103:7,17 104:14 105:9,21,24 106:8 106:18 107:17 109:5 111:3,23 114:11 116:7,21 117:9,17 118:17,19 120:25 121:11 123:4 125:3,16,25 126:12 127:8,11 128:24 129:18 132:8,19,24 133:19 134:10,17 137:15 138:9,12,23 139:1 139:19,21 140:3,11 140:16 141:4,15 142:4 143:2,5,8 145:1,17,24 146:18 147:12 148:4,23 149:12 150:1 152:3 152:21 153:18 154:12,18 155:6,18 156:21 157:20 158:9,22 159:8 160:4,22 161:15 162:11,20 163:10 164:10,20 165:9,17 165:21 166:14 167:23 169:1,6,15 170:8 172:10,14 173:1,9,20 175:22 176:15,20 177:6,13 177:20 178:6,24</p>	<p>179:6 180:14 181:2 183:7,17,24 184:3 184:13,23 185:9,19 185:22 186:3 counsel 4:19,21 6:7 6:20 7:5,12 15:18 20:18 66:2 187:13 187:15 counselor 127:10 counted 77:2,9 78:8 89:4 90:18 counter 104:8 counting 85:13,15 86:6,9 88:12,19 89:14,19 COUNTY 187:2 188:2 couple 6:9 12:25 65:15 109:8 113:12 131:15 couple-minute 96:25 course 10:21,23,23 11:7,8,10 12:6,7,9 12:11 14:25 25:20 32:9 35:13 41:18 43:13 91:11,14 94:6 97:6 104:11 110:12 185:19,19,24 courses 12:14 14:21 14:22,23,24 court 4:18 19:5 126:18 cover 131:15 create 133:7 134:2 created 12:11 13:2,3 creating 173:18 criticism 164:25 cross 186:2 cross-examination 185:4,23 crying 37:12 cuff 36:5 39:13 51:7 88:5 127:20 154:4 159:14 176:22 current 10:12 11:12 11:23 17:18 customer 74:10,14</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

75:2 79:3 88:22 customize 12:13 cut 131:12 150:22 164:3,22,23	119:15 120:2 124:23,24 125:13 125:22,23 126:2 135:13 138:10 141:11 142:2,8 149:22 156:3 168:19 174:7 176:19 183:13,15 Declarations 7:20,23 14:11 18:21 19:3,8 23:25 24:3,12,15,21 29:1,11 31:4 34:16 54:8 55:22 56:3 60:1 97:12 118:25 119:6 142:21 156:3 181:19 dedicate 8:15 dedicated 8:11 21:9 deeper 92:12,15 define 42:19 defined 72:4 defining 148:22 definition 51:21 149:25 150:9 151:19 degrees 136:13 demodulators 13:8 demonstrates 13:7 denoted 178:10 densitometer 174:22 175:1,6,21 177:1 178:9,15,21 179:2 180:17 density 25:11 27:12 39:11 70:11 81:9 82:10 117:22 122:4 122:21 123:1,7 178:10,19,20 179:18 182:6 deny 16:21,22 depending 44:23 68:18,18 69:21 77:15 90:6 91:6 147:22 148:24 153:3,13 154:14 167:12 depends 14:17 52:5	94:3 depicted 180:11,16 180:24 183:5,19 deposed 8:25 13:17 deposition 3:6,6 4:6,7 4:14 5:16,17 6:8 8:21 9:4 49:8 60:23 61:2 112:6,10 118:6 141:23 161:2,7 164:6,16 184:25 185:3 186:10 187:9 describe 31:25 41:2 44:21 54:4 55:7 69:3 116:12 166:16 179:2,17 182:17 described 35:9 41:8 43:8 46:5 64:14 93:19 100:9 134:5 136:9 141:25 155:23 181:18 describes 40:7 59:18 67:7 70:10,16,17 92:6 98:4,6,22 180:4 describing 54:13 69:8 155:24 156:1 160:12 161:13 description 21:16 67:3 79:7 92:16 97:22 112:25 123:19 124:3 189:2 descriptions 23:4 179:14 design 10:22,24 14:24 15:12 21:9,21 44:17 95:10,18 designated 54:9,10 99:15 135:23,23 136:2,7 designates 98:7 100:20 101:17 designer 95:7 designing 95:18 destination 76:13 detail 10:2 detected 127:25 180:3	determinating 73:13 determination 60:5 73:18 74:14 78:23 79:2 84:3 108:3 109:19 determinations 75:1 108:6 112:1 determine 94:22 143:24 147:17,18 153:13 154:6 160:1 160:2 177:11 determined 93:25 94:19,21 108:11,23 114:6 determines 66:21 determining 58:7 59:13 61:10,23 64:10 71:15 73:13 106:15 107:2,15 109:23 110:12,20 110:22 120:5,17,24 121:4 147:9 153:16 172:19,23 developed 11:7 21:23 32:8 developing 12:24 15:1 126:16 173:23 device 13:21 30:6 31:23 40:14 45:13 48:21 56:7 63:15 64:3 71:1 73:23,23 74:2 98:23 104:23 106:21 108:25 111:8 152:12 162:5 162:7,13,16 179:12 179:16 180:24 183:5,19 devices 22:7 26:1 28:17 30:12,17,18 31:13 32:5 46:6 100:2 180:11 DFT 172:20 diagram 53:11 diagrams 53:17 dialed 97:5 dictionary 26:3,6 Diego 2:7
--------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

differences 15:10	103:1 145:2 183:1	DLA 2:5,8,11 3:24	139:13 145:12
different 15:11 47:23	disclosed 30:5,19	4:25 5:3,6	168:2,10,15,16,21
52:2,25 53:1 70:22	31:12 60:16	Doctor 124:16	168:23,25 169:12
71:21 72:9 76:11	discloses 57:13,17	document 3:8 7:4,6	169:13,14 170:6,7
79:5 103:13 130:22	61:21 97:23 99:23	13:25 26:19,24 56:6	171:10,12 172:16
133:13 144:2	101:23 102:1 106:1	59:8,11 61:6 65:17	172:25 173:6
147:23 149:25	107:8 111:25	65:21 79:16 85:4	driven 13:2,5 48:5
150:8 151:20	116:10 176:5,25	87:20,22 88:1 92:5	49:12 51:11 114:22
152:11 153:2,12,16	177:11 179:1	92:13,15 127:1	115:4 117:2
153:19 154:5,13	disclosing 99:12	128:25 168:9	driver 49:25 128:1
158:2 160:10	106:21	documented 29:5	drives 49:19 50:3
163:17 171:18	disclosure 59:13 60:4	documents 6:9,10	driving 115:24
differently 45:20	101:11 104:25	14:5 24:9 25:4 59:2	dropped 6:8
differing 89:12	182:5	60:14 95:13	drops 70:12 72:15
129:22	disconnect 70:24	doing 10:16 49:5	73:20
digging 39:25	discuss 17:3 20:19	131:10,17	due 110:3 152:11
digital 14:24 15:3,5	49:12 103:11 121:9	dot 100:21,21,22	164:14
25:21 28:6,9 29:21	discussed 26:15	101:2,2,2,3,3,3	duly 5:9
30:4,18 31:11 63:10	27:10 72:16 165:8	107:11,11,11	dynamic 21:14
132:14 133:24	discusses 41:16 57:16	136:16,16,16	157:23
144:11,13 171:5,9	108:12 109:14	174:21,21,21 175:6	dynamics 13:2,4 15:2
171:23 172:1	111:8,11	175:6,6	15:2,4
digitally 172:5,16,24	discussing 7:18 48:9	doubt 14:12	
173:5,6,12,18	114:25 121:23	downstream 68:5	E
direct 57:8 103:10	150:19 185:2	74:2 89:1,15,18	E 2:1,1,15,15,18 3:2
109:13 135:16	discussion 16:3 75:9	downward 178:12	189:1
142:24 144:18	75:18 96:19 122:21	dozen 9:2	earlier 21:8,16 24:11
166:19 168:2	155:20 160:6	Dr 3:11,12,15 4:6	28:15 30:16 31:7
169:25 170:20	184:18,22 185:10	5:13 6:7 8:9 21:7	43:8,21 80:22
174:4 178:4	discussions 41:8	23:10,15,23 32:16	101:16 128:13
directed 174:20	disk 4:5 60:22 61:1	37:20 38:4 39:4	138:18 140:23
175:4	111:17 112:5,9	41:25 55:14 56:16	141:25 143:12
directing 119:12	161:1,6 186:9	61:2,4 66:8 75:22	146:5 157:9 165:15
direction 57:23	disks 112:3	83:1 95:25 96:23	171:17 182:13
187:11	dispense 6:6	112:12,25 118:5	early 184:7,14
directly 187:15	displace 182:16	126:2 128:7 135:9	East 1:19 2:3 4:15
disagree 34:10 83:18	displaced 182:8,14	161:9,9 164:3 165:4	188:7
85:2 103:9 128:13	displacement 81:10	166:25 184:22	edition 14:4 26:7
128:14,19 130:2,15	81:18,23 82:1,9,14	186:10	Edward 2:6 4:25
131:1 140:8,10,11	101:7	draft 19:15 142:9,13	effect 40:15 74:15
165:2 167:8 168:17	Disposition 3:23	draw 156:19	83:14 134:7
disagreed 129:13	dispute 10:12,13	drawings 53:13 54:7	effects 146:15
141:1,12 143:13	11:12,19,23 14:6	drive 2:12 49:24	effort 24:14
167:4	disputes 9:21,22	51:11,11,15,18 82:8	eight 158:20 159:5
disagreeing 106:1	distance 122:15	114:19 115:10,14	184:4 185:20
169:7	District 126:18	115:23 127:22,23	eight-volt 157:17
disclose 61:23 102:25	disturbances 51:12	130:6,9 137:10,24	either 11:18 17:21

<p>20:25 24:15 35:10 37:23 44:14 46:5 53:13 55:8 119:5 134:1 Electric 10:4,14,17 electrical 15:12 22:16 32:10 166:4 Electromechanical 25:25 electronic 15:2 92:8 152:9 element 121:15 133:14,17 134:6 135:19,21 136:1,6 136:23 144:20,24 145:15 146:3,14,17 146:23 147:5,11 eliminate 86:24 eliminates 86:22 87:12 embodiment 95:6 145:20 embodiments 182:16 Emerson 10:4,14,17 18:8,13,16 19:19 20:22,25 employed 28:2 employee 187:13,14 employees 11:16,22 20:22 empties 115:13 empty 53:2,6 56:12 57:5,15 58:9,24 59:14 60:6 61:12,24 62:1 64:11 66:13 68:24 69:15 70:6 71:2,17 72:23 73:5 80:21 82:2 93:13,14 94:3,8,8,12 97:22 112:21 113:23,24 115:8 120:6,18,23 121:6,10,22 122:8 122:20,23 empty-to-full 66:22 emptying 112:19 116:1 encompassed 134:24</p>	<p>134:25 encompasses 166:3 ended 125:18 ends 54:18 57:9 engagements 14:7,15 16:18 engineer 60:13 169:22 engineering 8:11 14:19 21:7 22:16,16 26:6 32:10 54:4 155:21 166:4 engineers 10:22,24 12:16 15:11,13,13 95:10 entering 6:6 enters 141:8 173:21 entire 33:15 64:24 65:10 entirely 116:2 164:13 entitled 25:10 26:5 40:10 85:6 165:1 185:17 entity 49:18 entry 57:12 especially 16:11 essence 90:5 essentially 113:21 established 137:4 estimated 131:1,24 estimates 110:1,7 estimating 110:22 et 8:21 29:14 evaluate 99:11 event 122:11 136:5 eventually 19:2 81:8 exact 33:7,8,9 exactly 60:10 111:7 161:16 Examination 1:13 2:20 5:11 124:14 examined 5:10 example 13:1,7 19:3 25:14 31:17 32:12 43:16,24 44:9 50:12 50:12,16 52:6,14 54:3,17 57:9,20</p>	<p>61:16 63:11 68:19 82:14 84:4 86:12 98:22 102:1 107:24 110:3 130:23,25 131:21,23 132:15 143:23 144:3 145:4 147:18 149:14 151:16 152:5,9,14 152:19 153:3,20 154:15 157:23 159:11 160:10,19 161:25 162:18 163:25 165:25 166:3 181:9 examples 11:7 12:11 12:23 21:22 154:3 172:19 exceed 159:21 exceeds 62:23 73:8 Excepting 35:13 exceptions 48:25 exchanged 19:5 excitation 121:20 excite 13:6 51:13 excited 51:8 exclude 181:14 182:19 183:3 exclusively 16:15 35:11 49:22 excuse 8:14 62:13 92:13 96:9 112:12 121:24 168:13 178:7 exhibit 3:4 4:2 7:2 8:5,7 23:5,14,17,18 23:21 35:24 40:9 41:5 53:16 55:12,15 55:16 56:20 58:16 58:17 60:4 61:5 92:6,19 95:23,25 96:5 101:22 109:13 118:3,5,15 124:11 124:20 125:14 126:6 128:2,5 129:4 135:4,5,7,10 138:4 138:8,21 166:20 167:7,19 169:24</p>	<p>170:13,17 174:5 176:23 177:17,19 exhibits 3:23 5:16,16 23:10 exist 87:6 103:2 existing 99:17 expect 17:22,23 90:17 expectation 76:4 116:17 117:7 expected 80:19 experience 29:6 expert 3:15 8:15,19 8:20 9:12,14 16:13 124:21 174:5,7 176:3,12,18,18 177:8 183:13,14 experting 14:14 16:17 experts 20:25 Expires 187:25 188:24 explaining 161:11 explicitly 30:23 54:9 88:13 94:6 126:14 137:11 express 28:14,25 89:10 expressed 135:3 160:12 183:14 expressing 30:3 extent 22:20,22 34:13 51:22 59:3,7 60:13 67:12 130:25 external 49:13,18,24 extra 185:18</p> <hr/> <p style="text-align: center;">F</p> <hr/> <p>face 122:2 fact 25:13 29:20 30:16 58:21 69:13 70:1 77:25 116:4 149:23 150:6 151:17 182:14 factors 52:5 fair 8:13 21:24 22:8 22:10,13 24:13 32:6</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>36:21 39:7,17 42:20 45:4,16,22 48:20 53:5 54:24 56:4 59:6 76:1,2,5,10,14 76:17 84:19 93:18 113:19 140:16 143:7 157:13 173:22 179:12 false 88:20 familiar 10:7 13:23 65:16 118:23 135:9 139:10,13,16 170:25 181:16 far 26:14 27:10 115:16 faster 53:6 fed 26:12 104:8 127:25 feedback 127:21 128:12 130:7 131:9 131:10,18 137:23 137:25 138:19 139:17 140:1,25 141:14 143:15 144:7 167:5 171:21 feel 38:5 49:8 70:24 112:15 119:5 fifth 7:13,22 121:24 fighting 15:8 figure 54:17 98:11,12 98:13,17 100:19 108:1 112:15,16,20 112:25 113:3,21 114:2,8,19 115:2,4 115:7 116:9 117:2,3 117:4,14 135:15,24 136:1,7 137:22,22 139:14,25 144:17 145:19 148:19 175:12 178:4,8 179:10,11,19,20 180:10,11,16,24,25 183:5,19 Figures 107:24 figuring 174:23 file 34:12 filed 18:21 19:21 28:5</p>	<p>30:7 31:14 126:2 fill 69:3 79:22 filled 57:14 filling 68:4 117:19 fills 101:25 117:6 filter 133:7,24,24 134:3 136:7 filtered 131:2,25 132:12,12 137:4 filtering 131:6 132:5 132:13,14,14,15,18 132:23 133:6,18 134:8,12,16 135:21 136:2,16 173:24 final 58:2 90:24 financially 187:15 find 26:9 83:7 100:14 102:8 180:23 fine 10:2 13:14 21:6 33:11 55:5 71:19 124:25 128:17 174:3 181:4 186:3 finish 16:6 115:22 136:18 150:23 finished 72:19 fire 15:8 firm 14:8,10 18:1 20:20 27:5,11 34:8 34:22 35:4,25 first 5:9,16 9:4 11:21 17:1 50:14,15 52:9 52:11,12,15,18,20 63:2 65:20,20 117:18 131:20 161:17 168:12 fit 23:3 35:16 five 7:12 9:12 64:15 67:3,10,24 83:6 88:13 89:13 90:15 120:9 143:23 185:16 fixed 54:19 144:6,7 flexible 13:6 50:15 52:9,11,15,18,20 99:5,8 flip 23:23 24:15 25:14 26:8 27:17</p>	<p>55:16 57:22 64:1 92:12,14 96:23 103:25 118:14 Florsheim 18:4 flow 3:13 13:25 14:2 25:11 39:9,10,11 41:17 42:17,19 44:10,17 45:6,23 46:4,15,19,25 47:1 47:7,22 48:1 55:18 56:11,21 57:2,16 58:7,16,22,23 59:5 59:13 60:3,5,16 61:6,9,10,23 62:5 62:24,25 63:1,6,7 63:14,16 64:1,9,10 66:21,21 67:19 68:6 68:11,13,25 69:1,2 69:7 70:4,5,9,12,18 71:1,15 72:2,12,17 73:6,7,14,17,24,25 74:1,3,7,8,11,17,18 75:1,22,24 76:3,24 76:25,25 77:2,6,6,7 78:7,13,24 79:6 80:6,6 83:4 84:4,7 85:10,16 87:19 88:20,23 89:4 90:14 90:17,23 91:12,15 91:22,23,25 92:2,12 92:15,16 93:7,14,19 93:20 94:7,18,18 95:2 97:11,21 98:3 98:8,20 99:4,11,13 100:21,22 101:12 101:16,25 103:16 104:3,6,12,13,20,23 105:4,12,20 106:2 106:10,11,16,17,21 107:4,4,7,9,14,16 108:9,12,12,13,20 108:21,23,24 109:3 109:3,4,15,15,16,17 109:19,21,22,24,25 110:2,5,5,6,7,14 111:1,12,20,22 112:1 114:5 116:1</p>	<p>116:19 117:8 119:20 120:5,17,24 121:4,19 122:17,22 123:16,21 124:3 174:21 175:5,5 178:14,23 179:3,5 179:13,16,17 180:12,12,18,19 181:1 182:6,23 183:1,6,20 flow-through 176:25 179:1 flowing 39:9 40:15 41:12 44:8,12,14,14 44:18 45:2,2,3,4,21 45:24 46:7,15 52:7 53:3 58:7,22 71:16 73:14 76:5 78:12 82:11 106:14 122:5 123:8 178:10,21 flowmeter 11:8 12:20 13:22 21:15 31:8 39:22 40:25 41:17 41:23 42:11,16 43:23 44:4 45:23 46:14 48:5 49:10 52:3 57:14 69:14,24 72:15 73:9 75:2 78:17 79:1,23 82:12 82:15 84:14 85:12 85:18 86:6 89:13,19 90:9,18 91:5 94:12 94:13 99:5,8,10,14 99:17 100:5 101:5 105:12 107:21 114:3 117:25 174:21 175:2,4,21 176:5,14 177:12 flowmeter's 44:18 45:22 flowmeters 12:12 13:1 21:18 22:1,7 22:19 23:3 28:16 32:1,7 39:5,8,15 40:11,14 41:6 46:23 47:8,20,25 48:4,18 49:18 50:3 81:2</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

105:15 166:7 181:9 181:17 182:12,13 flows 41:7 44:3 102:3 102:19,22 104:5,22 105:5,14 flowtube 39:21 40:24 41:23 42:11,22 44:3 44:11 48:5,11 49:12 49:19,19 50:4,11,13 50:22 51:13,19,24 53:6,7 56:12 57:4 58:8 61:11 66:23 68:23 71:17 72:23 73:4 74:19 78:13 82:13 91:17 93:20 97:20,22 103:6,15 107:3 110:13,24,24 110:25 114:20,22 115:4,11,13,15,24 116:1,5,15,17 117:1 117:5,6,19,23 121:5 121:10 122:8,13,19 175:3 181:21 182:9 flowtube's 72:25 78:1 flowtubes 39:15 41:2 52:13 81:1 fluid 45:5,21,24 46:15 57:14 68:6,7 68:12,12,19 69:22 69:23,23 70:2 71:23 71:24 76:12 78:7,12 80:5 81:9 93:11 101:24 107:4,7,9,14 107:16 108:11,23 108:25 109:4,15,15 109:18,19,20,24 110:14 111:22 112:18 115:7,13 122:5 123:8 178:10 178:20 fluids 57:18 focusing 28:19 Foley 1:19 2:2 4:15 4:23 14:8,9 18:1 19:21 20:20,25 24:10 27:5,11 34:8 34:22 35:4,25 142:9	142:13 188:6 follow 121:2 164:17 following 40:21 41:21 42:9 50:25 56:25 87:18 102:9 133:2 145:13 150:5 166:11 follows 5:10 99:16 force 79:22 forces 40:15 foregoing 188:5 forgive 65:15 forgot 167:17 forgotten 150:25 177:21 form 8:1 10:9,15 11:4 11:20 14:16 17:4,13 18:18 19:11,14 22:3 22:11 26:20 28:21 29:2,4,24 30:8,21 31:15 33:13,24 34:11,23 36:12 39:23 42:1,6,12 43:19 44:20 45:7,25 46:10,24 47:11 48:14 49:15,20 50:1 50:19 53:24 54:11 55:3 56:14 59:1,16 61:14 63:8,17 66:24 67:6 68:14 69:17 70:7 71:6 73:25 74:4 75:6 76:6,15 77:10,20 78:3,15 80:8 81:13 82:3,6 83:16 84:9,20 85:23 86:10,25 87:23 88:14 89:5,21 90:19 91:2,19 93:22 94:10 94:20 95:4,16 99:3 99:21 100:4,16 102:16 103:7,17 104:14 105:9,21,24 106:18 107:17 109:5 111:3,23 114:11 116:7,21 117:9,17 120:25 121:11 123:4	125:16 126:12 127:8 128:24 129:18 132:8,19,24 133:19 134:10,17 137:15 140:3 141:4 141:15 142:4 146:18 148:4,23 150:1 152:3,21 154:18 155:6,18 157:20 159:8 160:4 161:15 162:11 165:9,17,21 166:14 169:1,6,15 170:8 172:10,14 173:1,9 173:20 175:22 176:15,20 177:6,13 178:24 179:6 180:14 181:2 183:17 formality 5:15 formed 34:1 38:14 former 132:2 formulate 126:25 formulating 156:2 forth 6:17 126:9 forwarded 74:2 forwards 73:24 found 30:5 31:13 34:18 35:5,7 36:25 148:18 179:15 foundation 19:12 142:6 162:12 183:8 four 5:18 6:18 7:6,11 7:17,19,19 17:2,12 17:22 18:2,15 59:12 61:23 86:21 120:9 158:18 159:5 160:16 four-volt 157:16 Fourth 26:6 frame 14:18 40:16 free 6:20 38:5 49:8 112:15 119:5,14 Freedom 2:12 frequencies 165:25 frequency 13:5 48:10 48:12,13 50:14,14	51:8 52:4,12,13,19 52:23 53:1,5,7,21 80:19,21,22,23 81:3 81:8 101:18,19 102:10,12 103:4,5 103:14,15 114:13 114:23 115:5,11,12 115:16,25 116:4,6 116:14,18,20 117:6 117:19,22,24 122:1 122:3 133:17 180:2 front 6:9 7:4 32:17 83:3 97:13 112:13 175:24 176:10 178:2 full 53:2 56:13 57:6 58:10,25 59:15 60:6 61:12,25 62:1 64:11 68:24 69:16 70:6 71:2,2,20,22 72:24 73:6 80:23 81:11,12 82:5 91:6 93:11,21 94:3 112:21 113:23 113:23 115:23 120:6,18,23 121:6 121:10,22 122:9,20 122:23 168:12 169:25 186:1 fully 89:2,15 function 161:14 functions 155:24 156:1 160:12 fundamental 122:3 further 57:13 65:8 101:23 147:2 175:7 180:4 187:12
G			
G 98:11			
gain 131:2,6,25 132:4 132:15 137:14,17 143:15,18,19,20,21 143:22,23,24,25 144:4,6,11,24 145:4 145:8 147:4,10 148:3,3,10,14,17,18 148:20,22 149:3,24			

149:25 150:7,9,12 151:3,9,19,21,25,25 152:10,10,11,19,20 153:2,13,17,20 154:6,6,7,24,25 155:1,13,21 156:17 156:18 157:5,10,24 157:25 158:14 160:1,3,11,14,14 161:20,21,22,23 162:6,8 163:1,2,5 163:20 165:6,10,16 165:20 166:13 gains 161:10,11 gas 43:12 44:2 47:18 70:10 71:18 78:21 80:4 178:20 gas/liquid 43:25 gate 95:8,12 gates 95:21 gauges 180:3,9,16 general 22:5 23:4 44:13 47:13 48:7,17 48:22 49:3,5 50:7 50:21 51:23 54:3 69:19 74:25 75:8 76:16,19 80:9,25 81:24,24 82:1,8 95:7 105:15 125:17 134:12,25 149:9 156:11 159:17 160:17 163:22 165:23 166:2 generalizes 149:9 generally 8:22 9:20 10:24 12:13 14:25 21:11,12 29:17 32:7 39:5 41:9 42:14 49:21,25 50:2 53:10 55:6 71:18 76:3,12 76:14 81:2 144:6 155:23 165:18 166:15 generate 99:11 101:14 137:24 generated 127:22 130:6 171:10	generating 168:3,10 168:15,16,21,23,24 169:12,14 170:6,7 173:23 getting 79:8 155:10 169:16 gigahertz 158:1 give 7:9 9:1,4 13:14 17:14 19:1 21:25 23:6 32:23 37:25 42:3 59:11 64:18 126:21 138:9 152:5 153:8 155:9 159:10 162:24 165:4 175:14 given 27:10 38:13 45:5,20 46:17,23 51:9 85:5 87:15 125:9 164:21 giving 11:1 glad 19:2 47:7 glance 5:18 go 5:24 13:12 15:19 15:25 17:4 30:14 35:15 37:24 40:6 41:18 62:16 63:2,21 65:15 70:8 74:24 75:14 96:15 99:18 108:16 113:7 114:11 131:15 147:9 151:12 155:25 157:3,16 169:24 183:25 184:4,14,23 185:7 185:16 186:5 goal 15:13 34:10 goes 80:20 101:1 130:20 going 17:9 20:7,9 23:17 25:4 38:22 41:18 44:16 52:2,19 53:6 58:6 65:19 68:2 79:5 80:6 99:18 102:15 111:16 112:21 113:22,23 115:21 119:9 124:18,18	140:5 144:18 147:3 155:20 157:15,17 158:18 160:22 162:5 163:20,21 164:3,3,9 184:3,11 184:12,12 good 5:13,14 65:23 82:17 83:1,2 113:20 124:16,17 174:14 govern 164:16 grab 23:16 83:4 grams 44:22 gravity 70:11 72:14 72:25 73:8,11,20 74:20 75:4 78:1,11 78:25 80:4 91:17 94:2,13 Great 5:21 53:17 56:2 60:11 66:5,16 97:5,14 109:12 113:21 114:1,8,22 115:7 greater 81:23 82:2 91:17 159:18 greatly 117:25 ground 12:17 96:13 97:16 grounds 3:8 7:8 38:17 groundwork 137:21 group 12:15 guess 17:9,15 27:2 37:22 51:21 59:6 76:12 83:9 93:9 137:3	happened 21:5 88:17 happening 77:12 happens 81:21 106:4 184:10 happy 32:20 harmonic 52:14 harmonies 121:19 head 163:4 heading 64:5 hear 42:7 56:23 63:18 71:7 80:13 81:14 92:3 117:10 150:3 152:24 158:10 166:8 hearing 99:20 heart 113:7 130:20 heart's 55:17 heavier 53:8 80:5 Heintz 2:12,21 5:3 124:15 125:5,6,21 126:1,15 127:9,14 128:6 129:2,19 132:10,21 133:9,25 134:13,20 135:8 137:2,20 138:11,14 138:25 139:4,5,20 139:23 140:7,13,21 141:9,20 142:5 143:4,7,10,11 145:6 145:21 146:2,19,21 147:15 148:7 149:4 149:16 150:13 152:7,23 153:25 154:16,22 155:8 156:4 157:2 158:3 158:11,25 159:12 160:21,24 161:8,18 162:14,23 163:16 164:18 165:2,3,14 165:19 166:6,9,18 167:25 168:1 169:4 169:10,20 170:10 170:16,18 172:12 172:22 173:3,14 174:1 176:1,16 177:4,7,16,25 178:16 179:4,9
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

H

H 2:6**hammer** 80:11,11
83:15**hand** 56:16 70:17
75:25 97:24 110:18
176:11 187:18**handed** 7:12 23:10
55:14 95:25 118:5**happen** 92:10 105:1,1
105:17 106:4

180:8,20 181:3 183:11,18,22 184:2 184:6,21 185:7 186:5 Heinz 5:3 held 54:18 help 24:11 30:23 136:21 154:21 160:20 166:5 168:7 179:21 helped 19:18 126:20 126:23 142:9,13 helpful 119:17 164:2 164:5,9 176:10 helping 15:8 19:15 126:25,25 helps 117:4 Henry 3:20 30:5,20 31:12 39:4 131:17 132:1,3 Henry's 54:1 55:9 131:9 hereunder 187:17 hertz 157:25 hesitant 165:22 heterogenous 102:3 102:18,22 104:4,21 105:5,13,20 106:22 116:11 high 63:5 101:20 102:13 higher 80:22 137:17 hire 8:19 hired 14:7,9 17:1,6 20:25 history 34:12 hit 12:17 Hmmm 106:13 hold 15:20 75:11 157:15 170:22 holding 57:19 hole 155:20 honestly 9:6 88:7 164:1 hopefully 90:4 104:19 hour 38:22 160:23	185:18 hourly 17:24,25 hours 17:11,16,18 26:9 183:25 184:4 185:12,16,17,21 186:1 house 83:15 household 80:11 Houston 2:10 hundred 157:25 hypothetical 117:24 134:19,25 153:8 156:11 159:16 160:9 181:14 182:20 <hr/> I <hr/> i.e 145:19 146:6 148:6 172:16 idea 113:20 ideal 51:24 157:6 158:4,14 160:9 163:23 173:12 ideally 47:13,20 51:3 114:24 115:3 180:17,22 181:12 182:11 identical 27:19 36:14 identifiable 54:10 identified 3:4 36:7 58:16 109:16 identifier 12:20 identify 38:4 59:12 101:13 176:17 179:20 identifying 7:22 illustrate 156:10 illustrates 110:4 178:9 immune 121:17 impedence 137:10 implement 139:25 implementation 145:19 implemented 67:5 146:16 implications 141:17	141:22,24 169:19 Implicitly 121:12 implies 85:21 89:18 130:23 131:5 150:17 imply 122:24 impressed 146:16 improper 140:9 164:24 inaccuracies 102:17 102:21,24 inaccuracy 90:8 116:3 inaccurate 75:1 84:7 84:18 88:20 91:5,15 91:21 104:7 108:10 108:14,15,15,19,22 109:2,3,23 110:2 111:1,20 116:9 inaccurately 37:19 inappropriate 55:2 106:5 incapable 71:1 116:5 include 10:4 14:23 15:2 22:17 39:15 41:6 50:3 142:1,7 142:20 179:15 includes 58:2 127:24 177:1 including 26:19 52:5 185:1 incomplete 153:10 Incorporated 4:8,9 incorporates 19:4 61:22 incorrect 77:19 increase 116:22,24 117:25 122:15,16 increases 114:13 independent 14:19 34:11 59:8 102:23 157:5 index 7:15 indicate 27:24 28:1 67:12 81:1 indicated 9:14 12:8 31:3 43:7 80:21	128:13 indicates 8:19 103:10 indicating 122:13 148:14 indication 63:15 indicative 109:17 indicator 93:6,10,15 indirectly 187:16 industry 10:24 inevitability 88:9 information 19:8 20:14 35:3 infringement 9:21 19:23 inherently 68:25 150:17 inhibit 62:23 74:12 77:1,7 78:5 92:16 93:7 94:23 95:1 inhibited 92:7 93:14 94:7,18 inhibiting 95:9 inhibition 94:2,14 inhibits 70:13 72:13 73:6,17 74:1,11,18 79:3 92:1 93:19 initial 119:4 123:19 175:10 initially 57:15 123:16 123:21 input 51:19 136:13 147:25 148:21 150:18 151:14,18 151:23 152:1 153:4 153:14,17 156:17 156:18 157:8,16,16 159:2,4 161:25 162:4,10 163:8 165:6 input/output 165:12 inserting 87:5 inside 44:3 100:3 135:18 163:17 instance 1:14 95:6 151:23 165:5 instances 62:13 157:18
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

instant 45:5 46:5 117:21	inventor 11:24 106:20	Jeffrey 2:3,9 5:6	known 28:3,12 52:21
instantaneous 117:20	inverter 137:11	Jennifer 1:16 4:18 187:5	knows 111:19
instantaneously 81:5	145:13	John 2:16 4:17	<hr/> L <hr/>
institution 3:17 127:3 127:17 128:3 129:6 167:14,19	involved 9:20 11:11 12:25 15:15 23:1,2 27:6 139:2	Johnson 2:9 5:6,6 137:1 141:8 163:11 173:21 185:15,20 185:25	L 1:16 2:9,15 187:5
instruction 3:13 55:18,23 56:22 72:17 162:22	involvement 19:9,22 20:4	jumped 119:24 137:22	laboratory 12:14 119:20
instrument 98:6,10 99:14,15,24 100:6 100:20,22 101:6,16 106:22 107:22,24 108:13,19 110:1,5,6 111:24 118:1	involves 33:16	<hr/> K <hr/>	language 28:20
instruments 147:14	IPR 3:8,16 7:7,7 23:19,22 28:3 33:5 124:22 135:13 139:9 149:21 166:21,24	Kalotay 3:18 135:6 135:10,15 136:1,8 136:21 137:23 139:1,8,10,15,25 144:17 145:2 148:13,13 160:19 163:25	Lardner 1:19 2:2 4:15,24 19:21 142:9 142:13 188:7
integration 132:16	IPR-2014-00167 128:4	keep 115:10,14 184:12,12	large 152:10,10,20 155:11,15
intend 183:25	IPR2014-00167 1:6 3:17 140:2 168:19	keeps 81:5	larger 155:16
intended 118:11 182:5,7	IPR2014-00170 1:7 3:19 138:6	kept 116:18	largest 93:9
intention 182:25,25	IPR2014-00178 1:7	kilograms 44:23	lastly 122:10
Inter 125:8	IPR2014-00179 1:8	kilohertz 158:1	law 14:8,9 18:1 20:20 27:5,11 34:8,22 35:4,25
interacting 18:9	IPR2014-167 139:18	kind 39:14 61:20 63:6 80:18 140:5 147:13	lay 137:21 142:6
interaction 22:9	IPR2014-169 4:12	kindly 20:21 42:8	layman's 145:14
interested 187:15	IPRs 3:9,10 5:18 6:5 6:18 7:9,14,17,19 13:11,20 14:12 17:1 17:2,12,22 18:2,10 18:15,21 19:10 20:20 24:5 48:9 156:3	kinds 132:5 149:6	lead 136:13
interpret 69:7 94:15	irregardless 73:11	knocking 80:13	leading 28:4
interpretation 71:22 85:4 87:7,13 88:4 168:21 170:12 171:25	isolated 178:19	know 12:3 18:19 19:25 27:21 29:10 30:18 60:9 64:20 65:11,18 74:15 75:23 84:10 85:6 91:25 93:3 94:25 95:5 103:8,21 111:4 113:5 118:12 132:22 133:3 136:3 140:23 146:19 150:11 151:8 154:19 156:24 163:20 168:7 175:10 181:4	leave 77:23 88:23
intentional 118:11 182:5,7	issue 18:22 19:16 32:22 34:2 39:4 48:18,19 54:2 55:9 57:20 100:10 140:6 152:14 156:14 163:14,18	knowledge 46:17	leaves 75:13 137:1 163:11
intentionally 182:25,25	issues 153:7 156:12		led 37:19 125:24
Inter 125:8	it'll 46:11 72:11		left 28:6 54:20,22,23 61:4,8,20 83:3 107:1 110:18 114:1 114:18 115:3 135:22 136:11,11 136:17 137:4 146:7 178:13 184:5
interacting 18:9	item 68:11 69:11		left-hand 58:4 110:18 115:1
interaction 22:9	<hr/> J <hr/>		legal 4:17 8:15,20 16:12,18 169:19
interested 187:15	James 2:12 5:3		let's 15:25 32:16 57:11,22 64:17,23 67:24 70:21 86:5 96:15 98:2 102:8 107:18 109:9 156:15 157:24 160:23 162:17,19 169:21,24 177:17 178:11 179:10
interpret 69:7 94:15	Jeff 4:23 18:3		
interpretation 71:22 85:4 87:7,13 88:4 168:21 170:12 171:25			
interpreting 89:11 169:9			
interruption 16:10			
intersection 22:15			
introducing 137:17			
introduction 8:3 25:20 35:10 40:10			
introductory 7:16			
invalid 34:9 36:20 38:12			
invalidity 19:15,19 33:17 142:10,12,15 153:7			
invariably 70:4			
Invensys 1:8 4:9 5:1 5:4,7 18:13,16			

184:14	44:2,18 45:2,3	107:23 119:14	89:20 94:22 151:22
letters 98:18 100:1	47:18 53:7 58:7,22	123:13 138:2	manual 3:13 13:24
level 63:5 70:12	66:18 71:16 73:14	156:18 175:13	31:22 55:19,23 56:9
153:22	77:1,9 78:21 81:12	179:24	56:11,22 57:2 59:4
light 93:6,10,15	97:21 106:14 116:1	looked 8:17 12:21	59:5 63:3,22 70:9
lightly 81:2	117:7	21:11 24:1 30:17	72:18
likelihood 116:23,24	liquid/solid 44:1	95:13 97:2	manually 70:18
likewise 80:20 86:22	list 6:11 8:14 21:21	looking 24:22 27:17	March 12:6
117:1	26:9 33:8 36:6 37:9	32:24 33:1 40:7,8	mark 6:25 8:4 128:2
limitation 58:15,18	37:11,18 38:19	40:11 56:19 65:8	170:13 177:17
62:4 68:22 71:14	188:9	83:6 87:14,25 97:14	marked 4:2 5:15 7:2
90:24 120:11	listed 38:17 120:21	97:15,15 98:4	8:7 23:5 55:12,14
limited 185:11	listen 115:17	121:15 125:19	95:23 118:3 124:11
limits 149:18 159:22	lists 3:8 7:7 33:1	166:24 175:23	124:20 125:13
Lindenbaum 3:14	literature 32:11	180:21	128:5 129:3 135:4,5
96:1,8,24 97:2,9,23	litigation 18:12,17	losing 30:25	135:7,10,17 136:3,5
98:2,2,20 99:10,12	19:6,10,20,23 32:8	lot 20:15 109:7	138:6,8 170:17
99:19 100:14 101:4	131:5	126:22,24 148:25	177:19
101:23 102:1 103:5	little 38:7 45:19 52:2	lots 153:19	marked-up 97:7
103:22,25 104:12	52:25 92:12,14	loud 37:12	113:14
105:3 106:1,10,14	119:24 137:21	Louisiana 2:9	mass 25:11 27:12
106:17,20 107:12	151:2,12	low 122:13 132:15	39:10 42:16,19
107:15 108:7	LLP 2:5,8,11 3:24	137:10	44:10 46:25 47:7,17
109:16 110:4 111:2	loaded 78:19	lower 80:23	48:1 53:8 63:16
111:8,14,19 112:12	loading 57:17 67:8,21	lunch 82:18,22 83:12	75:1 81:7 84:4
112:17 114:25	70:19 73:22 76:11	91:12,15	90:13 98:3,8 99:4
116:10	87:17		99:14 100:21,22
Lindenbaum's	loading/unloading	M	101:5,12,16 103:16
101:18 102:11,23	3:13 55:18 56:22	M 2:12 98:13 104:6	104:6 106:21
104:24 107:6 108:9	64:6,13 65:4 66:9	Madam 166:9	107:21 108:12,13
115:14,24 117:8	67:4 75:25 76:10	Maginnis 12:5	108:20,21,24,24,25
line 20:10 62:17 98:5	77:2,7 83:5	magnitude 153:3,13	109:2,3,4,20,22,25
100:18,19 103:25	located 4:15	153:17,22 180:1	110:1,5,6,7 111:12
107:12 111:11	location 54:15,24	main 178:14,22	112:1 114:5 174:21
119:3,19 123:13	76:13,13 101:8	Maintaining 97:20	175:5 179:13,16,17
124:1,1 129:10	logic 95:7,10,21	making 48:20 50:21	180:12,12,19 181:1
136:10 156:19	long 28:3,18 29:22	73:10,12 78:23 84:1	183:6,20
159:16 171:3 172:4	113:1	84:2,5 89:8 95:14	massive 80:5
179:25 180:1 189:2	long-term 51:23	95:17 100:22	material 35:9 40:15
linear 137:10 145:13	longer 151:2	105:14 106:10,17	41:7,12,13,14 42:15
156:16 157:4,7,14	longitudinally 182:16	107:13,14,22,23	43:4,7,24 52:6
157:19 158:4,14	look 6:13 22:24 32:19	108:3,17 109:18	101:25 117:22
159:6 161:11,20,21	32:21 33:4,11 34:8	110:7 111:12	126:22
163:2	35:19,25 37:21 38:5	182:23	materials 41:16
lines 113:1 180:5,6,7	38:8 40:1 59:17,19	manner 85:13,15,22	MATLAB 10:21
linked 60:14	62:8 63:2,4,11,21	85:22 86:1,7,9	12:13,18
liquid 39:9 43:11,12	65:7 67:24 87:25	87:16 88:19 89:14	MATLAB/SIMUL...

<p>14:23 matter 4:8,10 53:14 78:18 104:19 162:3 185:3 mean 9:19 11:13 18:20 31:17 37:17 45:12 46:25 54:12 80:10 119:1,14 120:22 122:24 125:22 132:12 135:25 137:8,9 143:8,18 144:2 146:13 147:19 149:24 150:8,11,14 151:8,15,19 154:10 154:11 155:12,14 162:16 164:10 169:11 173:7 meaning 46:19 47:7 47:23 130:18 172:8 meanings 154:14 means 43:10 83:25 130:22,23 131:2 137:13 148:20 151:21 155:3,4 157:14 161:23 172:3 meant 6:24 84:11 85:17 86:1 151:13 172:24 measure 39:9,10,11 42:16 46:3,14 47:20 63:16 98:3 103:16 107:6 109:25 154:6 154:23,25 155:17 165:25 178:23 180:12,18,19 182:6 183:6,20 measured 44:11 45:12 63:6 70:14 78:14 94:13 measurement 40:14 44:16 57:13 69:4 70:5 72:13,14 73:10 73:18 74:1,3,14 84:3 90:13 91:9 93:20 98:8,10,21</p>	<p>99:13,17,23 100:6 100:21,23 101:1,2,6 101:24 102:2 104:3 104:6,7,20 105:4,12 106:2,10,17,20,21 107:14,22,23 108:12,14,19,20,22 108:25 109:25 110:4 111:12 114:4 114:9 116:9 171:13 179:17,18 182:24 183:2 measurements 73:7 73:12 75:3 84:1,7 84:14,15,18,19 85:19 86:17 88:21 91:5,15,22 108:10 109:2,3 110:7 111:2 111:22 118:1 measures 40:14 45:23 58:21 111:20 160:10 178:9 measuring 47:25 58:23 59:19 68:12 71:1 78:17 98:6,23 99:15 100:20 101:12,16 102:24 104:13 106:13 107:9 111:8 148:5 153:2 178:18,19 179:3,5,13,16 181:1 mechanical 13:4 15:2 15:12,13 22:16 26:6 54:3 mechanics 22:15 175:18 mechanism 114:20 mechatronic 15:1 22:4,14 mechatronics 23:2 meet 120:11 mention 93:8 mentioned 24:11 27:15 43:16 63:3 69:10 132:11 143:15 145:12 146:5 181:17</p>	<p>mentions 22:25 86:2 merely 131:2 168:22 169:11 170:5 Merit 1:17 187:6 meter 3:13 55:17 66:12,17 68:20 69:3 69:22 74:13 75:3 79:24 83:10,22 84:1 85:25 86:14,16 87:15,15 88:18,21 121:17 122:5 123:8 174:22 175:5 meter's 80:6 metering 102:4 104:5 104:22,23 105:6 108:1,2 meters 63:9 181:21 method 91:25 168:23 169:12 170:5 methodology 102:23 methods 101:12 MG 98:7,10,13,19 99:15,24 100:1,3,20 100:22 101:17 Michael 1:13 4:6 5:8 23:15 60:23 112:6 112:10 161:2,7 187:9 188:4,16 Micro 1:4 4:8,24 10:5 10:19 11:2,16,17,22 12:7 18:8,13,17 19:20 20:23,25 23:14,18,22 25:8,10 25:11 26:19 27:11 27:12 31:19 32:9 35:13 55:15 58:17 61:5 118:6 135:5 181:8,16 182:12 microprocessor 144:13 172:17 mid 17:9 middle 62:17 76:23 79:19 Miller 3:20 175:24 176:5,7,11,13,13,25 177:10,11 178:2,4 178:23 179:19</p>	<p>180:1,24,25 182:4 Miller's 175:20 176:23 177:15 178:9,25 179:5,12 179:14 180:11,16 181:8 182:5 183:5 183:19 Milwaukee 1:20 2:4 4:16 187:2,18 188:7 mince 84:6 mind 6:9,13 8:6 13:13 39:12 43:3 49:7 84:12,22 90:22 140:7 159:14 minimize 68:7 70:2 90:7 minimizes 79:23 83:22 86:14,21 87:2 87:2 Minimizing 102:1 minus 159:18 minute 44:22,23,23 minutes 26:9 65:15 89:3,4 90:17 91:6 109:8 111:17 mirrors 117:3 Mischaracterizes 88:15 90:20 misinterpretation 141:7 misread 174:18 missed 68:7 69:23 70:2 misses 68:12,12 70:4 missing 98:11 118:12 mistake 161:19 misunderstanding 28:13 60:8 misunderstood 12:10 mixed 41:15 mixture 43:14,17,25 44:1,2 71:25 78:22 102:3,19,22 104:4 104:22 105:5,13 106:23 116:11 modal 121:19 mode 13:6 50:15 52:9</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

69:9,13,13 93:18 127:21 128:12 130:7 131:9,11,18 132:7 137:24,25 138:19 139:17 140:1,25 141:14 143:15 167:5 168:3 168:15,21,24 169:14 170:6 171:6 171:9,21,23 172:1 model 3:13 12:19 13:3,22,24 14:1 31:19,21,22,23 55:17 56:5,7,9 59:4 61:22 63:2,7,11,15 63:22 73:23 74:7 75:3 85:16 94:22 95:1 modeled 13:3 models 31:25 modes 75:23 mold 35:17 moment 40:11 45:20 119:12 176:12 momentum 81:6,7 monitoring 57:17 morning 5:13,14 motion 1:4 4:8,24 10:5,19 11:2,16,17 11:22 12:7 18:8,13 18:17 19:20 20:23 21:1 22:25 23:14,18 23:22 25:8,10,11 26:19 27:11,12 31:19 32:9 35:13 50:4,6,10,11,12,13 50:17,22,22 51:1,4 51:5,10,13,20 55:16 58:17 61:5 82:13 118:6 119:20 123:17,22 135:5 146:5 181:9,16 182:12 motor 22:25 move 20:10 54:15 79:5 99:21 106:8 113:19	movement 109:16 moving 76:12 multiphase 41:15 43:18,22,22,24 46:9 46:16,20 47:9,18,24 multiphrase 46:9 multiple 27:7 41:14 165:24 multiplication 144:12 multiplying 143:23 multitude 165:11,24 165:24 Murch 18:3 <hr/> N <hr/> N 2:1,3,15,18 3:2 98:18 189:1 name 4:16 11:14,18 11:22,24 12:5 30:12 names 10:7 11:14 narrow 52:16 166:5 natural 117:24 navigate 97:7 necessarily 43:2 44:6 51:17,25 85:2 86:12 87:9 88:11 106:4 116:23 134:16 137:16 146:8 necessity 91:21 need 5:22 10:2 13:11 13:18 15:19 32:20 37:14 39:19 40:1 53:19 56:18 59:19 63:21 112:22 113:18 126:21 130:7,10 140:20 142:10 155:25 160:24 164:8 184:12,13 needs 72:4,8 130:11 130:14,24 neglecting 146:15 net 74:15 88:23 never 14:9 31:7,23 32:3 108:2 110:6 nine 184:4	node 53:22 54:2,7,9 54:12 136:3 nodes 54:13 noise 90:7 121:17,18 121:20,23 146:16 noninfringement 19:22 nonlinear 149:24 150:7,12,18 151:3,8 151:10,13,17 153:5 156:2 159:1,7 160:11 161:12,22 163:3 nonlinearities 15:4 155:22 nonlinearity 149:15 150:15,17 151:13 152:12 154:14 nonresponsive 32:14 normal 44:10 68:6 85:13,15,20,21 86:1 86:6 88:19 89:14 114:2 Nos 1:6 4:2,12 23:5 Notary 1:18 187:7,22 188:22 noted 174:10,11,15 174:18,25 175:1 188:9 Notice 3:6,6 5:17 noticed 6:7 180:21 Notices 6:4,4,7 nowadays 14:14 nuances 153:11 number 12:19 17:14 17:15 30:13 44:8 51:6 52:5 57:7 79:16 96:5 numbered 64:14 67:2 83:6 numbers 3:9 7:10 23:17 32:23 numeral 135:17 <hr/> O <hr/> O 2:15 189:1,1 oath 5:10	object 8:1 121:16 178:24 objecting 140:14 objection 10:9,15 11:4,20 14:16 17:4 17:13 18:18 19:11 20:9 22:3,11 26:13 26:20 27:7 28:21 29:4,24 30:8,21 31:15 33:13,24 34:20,23 36:12 39:23 42:1,6,12 43:19 44:20 45:7,11 45:25 46:10,21,24 47:11 48:14 49:15 49:20 50:1,19 53:24 54:11 55:3 56:14 59:1,16 61:14 63:8 63:17 66:24 67:6 68:14 69:17 70:7 71:3,6 74:4 75:6 76:6,15 77:10,20 78:3,15 80:8 81:13 82:3,6 83:16 84:9 84:20 85:23 86:10 86:25 87:23 88:14 88:15 89:5,21 90:19 91:2,19 93:22 94:10 94:20 95:3,4,16 99:3,21 100:4,16 102:16 103:7,17 104:14 105:9,21,24 106:18 107:17 109:5 111:3,23 114:11 116:7,21 117:9,17 120:25 121:11 123:4 125:16 126:12 127:8,10 128:24 129:18 132:8,19,24 133:19 134:10,17 137:15 138:23 139:3 140:3,8,15 141:4,15 142:4 145:1,17,24 146:18 147:12 148:4,23 150:1 152:3,21
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

154:18 155:6,18 157:20 158:22 159:8 160:4 161:15 162:11 164:21,24 165:9,17,21 166:14 169:1,6,15 170:8 172:10,14 173:1,9 173:20 175:22 176:15,20 177:6,13 179:6 180:14 181:2 183:7,17 objections 149:12 153:18 154:12 158:9 162:20 163:10 164:19 obliged 164:17 obvious 96:12 obviously 11:5 21:19 29:6 34:16 107:7 137:6 140:11 occur 48:25 73:22 76:8 87:9 102:17,24 104:21 106:2 121:21 122:6,7,18 123:6,8 occurring 116:12,13 occurs 94:2,3,15 173:11 offer 56:24 135:1 183:21 offhand 9:19 12:23 13:9 17:15 31:25 35:8,16 59:20 office 1:1 4:12 6:18 27:1 125:18 126:3 169:23 187:18 offices 4:15 officially 4:3 offset 153:4 154:2 offsetted 131:3 offsetting 132:5 Oh 35:1 37:12 113:2 129:12 138:12,13 138:17 155:5 okay 5:25 6:2 7:13 8:4 13:19 16:23 20:18 21:20 23:13	24:19,23 26:17 30:22,25 31:2 37:13 38:1,7 40:8 41:1 44:10,15 45:3 49:2 49:6,9 52:19,23 54:17,24 55:11 56:19 59:2 60:11 64:3,17,22 65:6,12 65:14,23 66:16 67:2 67:25 70:8 72:4,19 72:21 74:21 76:23 78:16 79:18 82:7 85:7,8 87:8,15 88:6 88:16 89:10 91:3,20 93:5 96:5 97:16 98:4 100:15 104:17 105:10 106:7,19 108:5 110:19 111:4 111:18 112:22 113:21 115:17 119:2,12,18,22,24 119:25 120:14 121:1,15 123:14,18 124:19,24 125:13 126:6,16 127:6,19 128:7,10,15 129:12 129:13,16,24 130:13,20 131:12 131:15 132:11 133:13 134:21 136:9,20 137:3 138:2,12,22 139:4 139:21,24 140:22 142:20 143:4,24 145:15,22 146:11 146:12,23 147:1,5,9 148:24 149:5,11,17 150:21 151:2,11,12 151:12,17 152:2,8 152:15 153:1,12 154:5 155:2,11,19 156:5,15 157:8 158:4 159:1,13,14 159:20,24,25 160:6 161:9,19 162:1,21 163:3 164:9 166:8 166:23 167:17,22	169:16 170:4,23,24 171:2,4,17 172:2 173:4,18 174:4,9,25 175:9,16,17 176:11 177:17 178:1,7 180:9,21 182:3,12 183:24 184:6,11,22 185:7 186:3 once 85:12 86:6 89:13 one-quarter 68:6 one-volt 157:9 ones 5:22 36:7 118:17 120:21 141:25 onset 97:21 open 68:5 79:20 80:12 89:14,15 90:9 91:8 opened 89:2 opening 79:23 83:22 86:13 89:18 90:5 opens 141:6 operate 13:4 operates 67:19,25 operating 73:12 85:25 87:16 97:10 105:15 108:3 111:9 153:21 154:8 155:1 157:6 160:15 operation 13:7 44:4 44:10 62:10 64:13 64:14 67:4 70:10,19 75:23,24 76:3 87:17 88:12 93:18 97:10 99:24 114:2 136:17 143:22 173:24 operational 144:5 opined 33:25 opinion 30:3 31:10 33:19 34:3,9 36:10 36:19,22 37:22 38:11,14 64:8,9 66:20 67:11 72:1 85:6 96:8,12 132:23 133:5 134:21 135:1 164:8 181:5 183:4,9 183:14,21	opinions 28:14,25 34:13,14 56:3,4 85:3 168:20 opposed 14:14 19:10 22:4 24:23 29:15 35:7 47:23 53:2 82:5 109:20 112:19 132:20 173:23 order 3:8 7:8 40:1 122:2 orders 3:7 6:18,22 original 3:23 119:18 originates 121:18 oscillate 48:6 49:13 49:19 117:24 oscillated 117:5 oscillating 40:17 53:21 99:5,9 114:3 114:20 115:10,15 116:5,18 oscillation 48:10,12 97:20 116:12 oscillatory 50:4,5,9 50:11,12,17 51:1,4 51:13,20 81:4 ought 68:20 outline 3:10 7:14 output 62:24 63:10 92:2 99:16 116:19 122:16 136:14,22 137:6 144:24 146:3 146:13,22,24,25 147:4,10 148:1,20 150:18 151:14,18 151:24 152:1 157:11,17 159:3,18 159:20,21 160:3 161:25 162:5,9 163:7 165:7 outside 32:7 36:17 60:15 131:4 163:13 163:22 Overbroad 26:13 27:8 overnight 185:1 oversimplify 152:13 owner 1:10,14 2:7,10
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

2:13 4:9 5:2,5 170:1	89:12,13 90:15 93:9 94:16 98:5,16 104:1 112:22 113:2 123:15,25 125:2,3,5 125:7 136:10 167:20 168:12 170:1 174:9,12 176:22,24	47:17 74:9 passing 108:24 patent 1:1,2,10,14 2:7,10,13 3:9,11,12 3:14,15,16,18,19,20 3:20 4:9,10,11 5:2,5 6:17 7:8 9:15,21,21 10:13 11:25 19:6,23 23:20,23 24:5 27:18 28:18 29:22 30:7,20 32:17,19 33:12,20 34:5,6,7,12 35:6,18 35:19 36:2,8,9,11 36:15,18,24 38:12 41:10 48:21 56:10 56:17 57:1 58:3 59:18 62:5 71:15 72:3 90:25 96:1,9 96:10,24 97:3,13,18 110:11 118:7,8 124:19,22 125:10 125:15,18 126:3,10 126:20,21 127:4 132:1 135:6,10,15 136:1,8 138:6,16,21 139:2,11,15,20,25 141:1,12 142:3,8 144:18 145:3 164:1 166:22 169:23 170:1,14,25 173:11 174:6,7,19 175:21 176:6 177:17 178:5 181:8 183:1	81:17,23 82:1,9,12 157:10 158:17,18 158:19 pending 4:10 people 11:16 22:17 130:22 160:13 percent 34:5 perfect 51:5 186:4 perform 72:13 82:16 performed 133:18 134:11 performing 134:14 135:21 136:16 137:12 performs 99:24 period 9:3 14:20 62:24 83:25 84:13 105:13 108:9 111:19 periodic 50:18 51:2 51:21 person 11:18 90:17 personal 187:11 personally 14:1 perspectives 15:11 pertain 8:2 pertinent 123:11 petition 142:18,19 petitioner 1:5 2:4 4:8 126:16,20 141:13 167:13 petitioner's 4:20 126:17 128:22 129:10,16,21 141:3 Ph.D 1:14 5:8 187:9 188:4,16 phase 41:14 43:8,10 46:8,16,20 47:23 68:19 132:17,22 133:4,8,15 134:2,6 134:7,14 135:18 136:14,15,23 137:7 145:5 phrase 172:1 phrased 20:6 phrases 143:17 physically 101:19
P	paragraphs 3:9 7:10 24:20 41:2 67:2 120:9,15 paralegal 18:6 parameter 130:25 131:23 172:19,23 parameters 165:11 168:23 169:12 170:5 173:12 paraphrase 27:25 paraphrased 58:5,6 paraphrasing 107:7 paren 41:14 parentheses 40:17 parse 169:18 part 19:23 23:19 88:13 112:21 120:4 127:18 128:14,18 131:19 152:11 167:8 169:17 185:23 Partes 125:8 partial 40:12 partially 93:14 94:8 94:12 particular 5:22 12:19 38:16 40:17 48:21 51:9 84:11 91:7 101:12 106:3 114:17 119:23 135:16 148:14 parties 10:3,13 19:6 32:22 34:14 187:14 parts 127:19 161:17 party 11:6 pass 32:20 132:15 passage 101:5 passages 121:8 passes 42:15 43:4	patents 9:18 19:16 28:2,4 30:5 31:12 31:24 32:2,20 35:3 39:4,5 54:1,2 55:9 55:10 100:9 125:19 156:14 160:8 163:14,17 165:8 166:1 181:18,25 path 155:25 Patient 3:18 peak 122:16,17 148:6 157:11,11,18,18 159:2,3,3,4,5,5,6,6 peak-to-peak 81:10	

<p>102:12 114:14 PI 132:16 piece 65:16 pieces 29:12 pipe 43:1,2,3,3,4 49:24 69:14 80:19 Piper 2:5,8,11 3:24 5:1,4,7 pipes 80:13 112:18 place 38:18 63:4 97:16 placed 123:16,21 124:19 placement 100:12 places 57:8,18 placing 119:20 please 4:19 7:1 24:16 41:20 42:4 45:9 50:24 60:8 62:8 63:19 71:21 81:15 83:4,7 92:3 100:13 102:15 118:16 133:1 150:4,23 179:23 plugs 74:7 plus 159:18 point 21:13 59:25 91:16 93:24 100:13 115:1 145:14 153:21 154:8,20 155:1 157:6 160:15 pointed 57:23 pointing 98:12 100:18 119:15 points 60:3 93:25 131:16 156:19 portion 58:5 72:3 74:12 77:1,8 101:23 portions 7:23 120:22 position 54:19 100:12 123:24 positioned 180:9 positive 127:21 128:12 130:6 131:8 131:10,18 137:23 137:25 138:19 139:17,25 140:25</p>	<p>141:13 143:14 167:5 171:20 possibilities 134:23 134:24 149:1,14,19 149:20 possibility 50:16 104:20,24 105:7 106:2 140:18 141:6 181:7,13 182:19 183:3 possible 78:9 88:18 107:14 114:14 134:2 141:17 147:19 149:1 180:10 potential 87:3 91:20 potentially 86:11 87:16 98:19 106:3 162:18 pounds 44:23 power 122:15 powered 68:20 practical 51:25 73:2 162:3,5 practice 8:12 67:13 predominant 52:22 prefer 72:9 97:6 preferably 48:12 67:4 preferred 145:20 preliminary 127:13 127:16 premise 91:4 115:21 149:10 premised 88:17 preparation 12:10 149:21 prepare 19:18 prepared 23:25 preparing 6:8 24:12 141:23 168:18 presence 155:22 present 11:19 88:4 94:23 161:4 presented 88:22 91:12 presenting 137:9,10</p>	<p>presents 131:8 presumably 80:5 114:19,21 presume 18:14 83:25 84:13 85:17 86:1 118:10 155:3 pretty 31:1 105:23 114:1 prevent 77:1,11,17 77:21 prevents 77:8 92:1 previous 10:14,17 86:2,13 99:18 previously 14:9 135:5 principally 35:11 principle 62:10 70:10 98:24 111:10 printed 31:4 prior 10:11 11:25 14:6 28:3,18 29:12 29:12,22 31:3,19,24 34:12,16,19 35:3,5 35:6 36:23,25 46:5 46:17 54:1 55:9 100:10 167:14 181:24 185:1 priority 69:4 182:21 privilege 20:9,16 privileged 20:6,13 probably 73:2 97:12 115:13 probe 180:5 problem 70:23 90:12 130:21 131:3 140:14 159:15 185:13 problems 15:9 146:9 159:25 procedure 77:22 88:9 proceeding 125:9 proceedings 4:1 186:11 188:6 proceeds 174:10 process 67:8 processing 15:5 28:1 28:9,10 29:21 30:4 30:19 31:11 144:11</p>	<p>processor 144:13 172:17 produced 114:5 122:12 136:12 produces 98:7,9 105:12 145:3,8 producing 85:18,19 86:17 91:5 98:19 99:1,19 100:25 107:25 108:19 118:1 product 12:25 15:14 20:13,15 30:12 32:11 products 21:21 29:15 46:18 profession 8:16 16:19 program 11:1 prohibit 74:13,25 project 18:20 projects 18:16 21:9 properties 42:16 property 106:14 107:4,15 108:10,13 108:22 109:14,15 109:19,20 110:14 110:24,25 111:21 111:22 134:15 proportion 14:13 proportional 161:24 proportionate 161:23 proposed 128:22 129:10,16,21 153:9 proposes 99:16 proposition 61:10 97:9 119:4 120:16 183:10 provide 92:7 121:16 159:17 provided 31:18 35:4 36:14 183:24 providing 40:4 proximity 81:19,20 prudent 90:6 91:7 PTO 3:7 6:5,22 23:13 public 1:18 6:5 187:7 187:22 188:22</p>
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>publication 25:8,10 25:18 26:7 27:12</p> <p>publications 31:5,18 32:12 35:4,13</p> <p>published 29:1,13</p> <p>pulse 101:4 116:4,4</p> <p>pulses 62:24,25 63:6 63:15 92:2,7 93:14 93:19 94:7,15,18 95:2,9 98:3,7,9,20 99:1,11,19 100:11 100:25 101:3,14,19 101:20 102:11,13 103:4,16 107:25 114:4,6,9 116:2,19 117:8</p> <p>pump 114:17</p> <p>purchased 32:4</p> <p>pure 146:12,14,23,25 147:24</p> <p>purely 146:8</p> <p>purged 66:17</p> <p>purging 112:17</p> <p>purport 120:10</p> <p>purportedly 13:21 32:3 55:19</p> <p>purpose 3:9 7:9 10:1</p> <p>purposes 56:11 57:2 168:14 169:9</p> <p>pursuant 1:15</p> <p>put 10:11 17:11 18:24 29:11 48:16 59:22 106:13 116:2 141:10 158:17 159:2,4,20 166:4</p> <hr/> <p style="text-align: center;">Q</p> <hr/> <p>qualification 171:21</p> <p>qualified 180:22</p> <p>quantity 148:21</p> <p>question 9:24 11:13 12:3 13:15 16:7 18:25 20:6,7,24 22:21 26:10 27:2 28:7,23 30:1,23 32:14 33:22,23 34:18 36:8 37:24</p>	<p>40:2,3,3,13,20,21 41:20,21 42:3,5,7,9 42:14 45:10,19 47:2 47:13 50:23,25 52:25 53:20 56:23 56:25 59:23 62:22 62:25 63:12,18,20 63:22 65:18 67:15 67:23 69:6 70:15 71:7 72:10 74:22 80:18 81:14,16 89:25 90:3,4 91:4 92:3,4 99:9,18 101:15 102:6,8,9,15 103:13,18,20 104:17 105:19 106:13 107:19,20 108:16,21 109:9,11 110:25 111:5,7,16 113:6 115:19,22 117:11,12 119:18 121:2 125:20 126:6 130:20 132:25 133:2,11,20,22 134:5,8,19 136:21 138:19 139:6,24 140:19 144:16 146:9,20 147:20,23 148:25 149:10 150:3,5 151:1,11 153:11 154:21 156:23,25 157:22 158:7,8 160:17 161:17 162:22 164:11 165:23 166:8,11 167:4 168:6 169:5 170:4 173:4 174:16 175:15 176:3 181:15 182:20,22</p> <p>questioning 20:10 185:11</p> <p>questions 49:5 66:4 113:8,12,18 156:6 159:16 163:21 164:7</p> <p>quick 111:16</p>	<p>quite 12:8 67:23 70:14 90:2</p> <p>quotation 122:10</p> <p>quote 28:3,5 57:14,17 58:6 62:22,24 66:12 66:13 70:1,3 76:25 77:3,8,8,16,17 83:21,23 85:12,13 88:25 102:1 104:9 105:3,6 110:14 120:22 121:16,21 122:6,11 127:22,24 168:14,15 171:10 171:11,12 176:25 177:1,1 179:1,2 180:1</p> <p>quote-unquote 130:7 155:24 171:10</p> <p>quoted 122:25</p> <hr/> <p style="text-align: center;">R</p> <hr/> <p>R 2:1,15 189:1,1</p> <p>radio 165:25</p> <p>range 147:19 149:13 149:18 156:12 166:3</p> <p>rapidly 80:12</p> <p>rat 155:20</p> <p>rate 17:19,25 39:9,10 39:11 42:17,19 44:10,17 45:6,24 46:4,15,19,25 47:1 47:7,22 48:1 58:7 58:22,23 59:13 60:5 61:11,24 63:16 64:10 66:21 71:1,15 73:14,24 74:3,8,18 75:1 78:13 84:4,7 90:14 93:20 94:18 98:3,20 99:11 103:16 108:24 109:17,21,22,24 110:2,8 114:5 120:5 120:17,24 121:4 148:11 174:22 175:5 178:23 179:3 179:5,13,16,17</p>	<p>180:12,13,18,19 181:1 182:6,23 183:1,6,20</p> <p>ratio 148:20 149:2 151:25 157:14</p> <p>raw 101:25</p> <p>re-read 112:22 120:12</p> <p>read 27:21 33:21,23 40:19,21 41:4,19,21 42:5,9 45:8,10 46:2 50:25 56:25 62:15 62:21 63:20 64:18 64:20,22,24,25 65:10,14,24 66:1 68:2,3 71:18,20 74:22 77:16 81:16 83:21 92:4 93:2 101:22 102:7,9 103:20 104:1,2 105:2 106:4 107:18 107:19 109:9 117:12 118:20 123:2,15,25,25 133:2,22 150:5 152:24 156:21,23 166:11 176:24 188:5</p> <p>reading 34:11 85:5 87:20,22 88:1,5 89:6,7 109:7 113:2 167:10</p> <p>reads 40:13 100:19 129:10 135:17 174:9 175:1</p> <p>ready 128:7 170:19</p> <p>real 51:25 152:14</p> <p>real-life 52:3</p> <p>realize 150:23</p> <p>really 5:21 22:14,18 29:25 69:5 80:10 132:2 149:20 156:13 164:4 182:21</p> <p>realm 22:20</p> <p>Realtime 1:17 187:6</p> <p>reason 67:15 106:16</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

141:10 reasonable 125:9 148:9 169:3 170:12 reasons 16:24 38:12 44:9 91:8 106:12 recall 8:16,17,21,22 9:4 10:16 11:1,6,11 11:14,15 13:7,9 18:7 21:10 35:6,16 36:24 63:6 66:9 83:11 98:14 119:2 126:23 143:16 181:23 receive 17:22,23 32:11 74:3 received 7:19 17:22 recess 38:25 60:24 82:22 112:7 124:10 161:3 recession 16:11 recognize 11:24 118:8 recognizes 78:24 103:2 recollection 12:8 56:1 59:21 recommended 90:16 record 4:4 5:15 6:4,6 15:25 16:2,3,5 23:13,14,19,21 38:23 39:2 60:21 61:1 62:21 68:3 75:15,16,18,20 82:20,24 83:21 96:15,17,19,21 104:2 112:4,9 124:8 124:13 143:2,5 160:25 161:6 184:15,16,18,20,23 185:8,10,14 186:6,8 recorded 187:9 recovery 79:24 83:11 83:20,23,24 84:12 86:2,15,16,23,24 87:11,12,13,18 88:10 redirect 144:17	reduced 187:10 reduces 79:24 83:23 86:14,23 87:11 refer 13:22 25:4 28:12 34:16 51:15 52:19,20 53:11 54:25 81:18,19 97:11,17 100:1 101:21 107:6 112:16 113:19 135:12 174:11,12 174:17 179:19 reference 13:23 19:4 25:2,17,23 26:2 29:10 35:24 40:16 56:21 59:4 60:14 70:25 77:18 105:3 111:2 112:13 117:4 118:14,23 119:5 135:12,17 136:20 153:21 174:15 176:23 referenced 21:8 60:15 111:13 181:19 references 25:14 27:3 27:9 93:6 123:10 referencing 61:4 referred 13:24 26:19 35:14 43:17,21 63:1 88:13 182:13 referring 48:11 53:15 65:1 80:15 89:3 110:9 119:7 123:2 129:1,3 131:20 142:15,23 167:1 179:8 refers 21:14 38:15 80:3 83:20 122:22 reflected 146:6 refreshed 119:1 regard 25:6 79:6 regardless 46:15 77:5 121:18 150:20 157:15 162:8 163:2 Registered 1:16 187:5	regulation 82:15 relate 9:20 38:16 39:5 67:18,18 related 12:24 32:9 67:14 97:23 117:22 149:3 166:1 relates 14:20 15:8 21:21 22:14 23:19 31:19 84:13 113:3 123:9 140:6 174:19 177:9 relating 56:11 57:3 97:18 155:21 relationship 150:18 151:14,18 161:24 161:24 162:4,9 163:7 165:6,12 relative 155:16 187:13,14 relatively 54:19 109:9 Relevance 150:2 152:22 155:7 160:5 162:12 relevant 12:16 61:24 64:9,12 66:20,22,25 67:11 68:22 111:6 153:6 reluctant 135:1 140:18 149:8 163:22 rely 29:13 61:8,15 120:16 relying 28:17 31:4 67:10 remainder 186:2 remains 82:8 remember 12:22,23 35:1 126:19 140:23 171:20 remind 184:24 rendering 85:3 rephrase 106:12 142:14 report 29:16 33:10 36:7 37:15,24 46:4 124:21 125:20	174:6 176:4,12,18 177:8 reported 74:10 reporter 1:17,17 4:18 4:21 166:9 170:13 170:15 177:22 180:6 187:6,6 reporting 70:13 72:13 73:7,18 74:16 74:18,25 78:5 79:3 reports 8:20 represent 4:20 101:4 representation 20:18 representative 21:21 reprinted 26:1 request 16:17 requests 16:20 required 89:1 requires 121:4 Reserve 32:13 resistors 144:7 resolve 15:9 resonant 13:1 48:13 50:14 52:4,12,19,22 53:1,5,7,21,23 54:16 80:19,21,23 81:3,8 114:23 115:5 115:11,12,15,25 116:6,13,18 117:6 117:18,21 resonate 52:13,14 respect 3:19 11:23 21:16 23:15 35:23 36:15 38:17 127:3 138:3,5 139:8 164:14 176:7 181:6 182:8,14 respectively 24:5 respects 167:6 respond 106:22 159:15 responding 153:11 182:20 response 38:2 49:4 117:13 122:1 150:25 175:10 restate 136:6
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>Reston 2:13 restrict 101:10,13 restricted 177:14 restriction 45:17 130:3,4,17 131:8 141:6 result 51:10 78:6 79:2 90:10 178:21 resulting 15:10 Returned 3:24 reverse 113:22 review 125:8 168:5 reviewed 14:5 33:14 33:16 92:25 127:2 128:8 revisit 10:2 61:19 Rick 12:5 18:3 right 7:13,20,25 8:9 12:12 14:1 17:19 18:24 19:21 20:8,16 23:11 25:9,25 26:8 29:15,23 31:5,8,14 31:23 32:5,13 33:2 33:3 34:18 35:14 38:21 39:6,9,16 43:1,5,8,11,12,13 43:18 48:13 49:14 49:19,25 50:18 51:2 51:16,21 52:8,24 53:17 55:23 56:8,10 56:13 57:6 58:3,10 58:12,18,25 60:7,10 61:13,25 62:3,6 63:25 65:17,21 67:5 68:4,9,10,13,22,25 69:12,16 71:13 72:1 73:4 75:24 77:9 78:2 79:21 80:1,7 80:17,24 82:2 85:22 86:9 89:4,20 91:18 92:1 94:9 95:2,12 95:13,14 96:9,14 97:11,14,24,25 98:3 99:9 100:25 103:1 104:9,16 105:20 107:8,10 110:20,21 113:5,11,14,24</p>	<p>114:6,8,10,16,20,23 115:5,7,8,23 118:23 119:5,8,9 120:2,6,8 120:11,15 121:8,8 123:20,23 124:4,6 125:7 128:2,23 129:5,7,9,15 130:1 134:21 139:15,16 142:20 143:1,1,10 144:8 145:11 147:2 147:8,24 151:15 152:17 154:9 156:8 156:16 157:3 158:6 159:1 160:21 163:3 165:4 167:3 168:2 168:12 169:24 170:19 171:5 174:2 174:7 175:19 176:8 178:3 182:10 183:22,23 184:9 185:24 right-hand 97:24 ringing 81:5 Romano 3:15 96:12 118:7,14 119:3,19 room 75:13 80:13 137:1 141:8 163:11 173:21 rotating 40:16 Ruesch 58:19,21,23 59:3,11 60:15 61:15 61:21 ruled 168:13 169:23 171:9 rules 164:15,18 ruling 171:25 rulings 6:18 run 66:17,18 185:20 running 12:17 rush 175:17</p> <hr/> <p style="text-align: center;">S</p> <hr/> <p>S 2:1,15,15 189:1 sake 5:16 113:10 sample 178:19 sampling 122:1 San 2:7</p>	<p>satisfies 58:17,19 72:2 90:24 satisfy 72:4,8 Saucedo 25:21 saw 90:25 saying 22:13 29:20 50:5 66:16 74:6 79:12 81:6 109:2 123:7 148:12 says 8:3 57:12 58:11 67:20 68:5,17 70:1 77:16,19 79:25 86:13,21,23 87:11 93:10,13 94:6,11 105:8 107:1 110:12 110:22 123:24 130:10 148:13 172:15 scale 44:24 schematic 92:8 147:18 Schering 25:22 Schmaling 1:16 4:18 187:5 scientists 10:25 scope 101:11 138:24 138:24,25 139:3 140:4,4,6,9,15 145:1,17,24 147:12 148:23 150:1 152:3 152:21 155:6 156:13 157:20 158:22 159:8 160:4 162:12,18 163:14 163:17 181:2 183:7 seal 187:18 second 13:14 15:19 23:7 62:12 63:25 64:18,23 65:1 66:8 72:16 75:11 79:9,11 80:2,22 92:23 96:7 96:16 118:2 129:10 131:21 132:7 146:11 169:25 170:22 174:9 seconds 66:2 secret 9:22</p>	<p>section 40:10 58:20 62:11 64:8,25 65:1 66:8 70:17,25 79:17 83:5,9 85:9 87:14 119:22 sections 3:10 7:14,16 8:3 35:10 62:9 64:14 see 19:8 25:7,16,17 27:20 28:5 39:25 42:4 53:17 62:10,11 62:13,15,19,20 64:6 64:15,16 66:11,13 66:18 67:24 68:8 69:9,12 77:3,18 87:9 89:15 90:12 93:11,15 95:12 104:9 107:4 110:11 110:15,19 119:21 119:22 125:11 135:18 136:24 142:10 144:21 153:6 155:25 156:15 161:19 168:3 170:2 171:5 172:6 176:22 178:11 179:11 seeing 11:18 seeking 49:3 seen 11:22 32:4 55:20 65:21 96:2 sends 74:11 sense 20:16 51:24 54:4 73:3 113:4 131:21,22,23 181:22 182:2 sensed 72:14 senses 171:18 sensor 15:3 25:11 27:13 58:11 73:14 93:11,13 98:25 99:2 101:7,8,8,9 107:2,3 107:3 110:12,13,23 110:23 127:23,24 127:25 130:11,14 130:17,24 131:24 135:22 137:5 146:6</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

146:7 171:11,14 172:18,20,21,23 173:24 180:4 sensor's 94:8 sensors 100:2 122:13 179:20,23 182:4,14 182:22 sentence 62:18,21 66:16,20 70:1,3 76:24 77:16,19 79:6 80:2 83:10,20,21 85:14,21 86:3,5,13 87:5,14 100:18 105:2,7 123:1 174:9 174:25 176:24 sentences 83:6 separate 7:20 59:8 September 3:14 55:19 sequence 117:3 service 16:18 services 8:15 servo 14:24 22:25 set 6:17 12:14 23:1 33:17 39:14 118:25 126:8 160:12 163:23 187:17 set-up 90:16 sets 14:22 setting 93:25 94:4 settings 92:17 seven 19:16 183:25 185:11 186:1 shaking 163:4 shape 51:16,17 sheet 6:20 32:25 38:15 sheets 32:18 shelf 32:4 shift 132:22 133:4,8 134:2,6,7,14 135:18 136:23 shifted 132:17 133:15 shifter 136:14,15 137:7 145:5 shock 79:23 80:2,14 80:18 83:10,12,22	86:14,15,21,22 87:2 87:3,9 88:9 90:7,10 short 13:23 56:9,9 short-circuit 38:3 show 61:16 shown 54:7 112:20 139:24 180:10 shows 54:18 112:17 176:13 sic 164:6 side 18:24 58:4 110:18 114:1,19 115:2,3 120:15 121:8 Sidman 1:13 4:6 5:8 5:13 6:7 8:9 21:7,7 23:10,15,23 32:16 37:20 38:4 39:4 41:25 55:14 56:16 60:23 61:2,4 66:8 75:22 83:1 95:25 96:23 112:6,10,12 112:25 118:5 126:2 128:7 135:9 161:2,7 161:9 164:3 165:4 166:25 184:22 186:10 187:9 188:4 188:16 Sidman's 3:11,12,15 sidman.com 8:10 Sigmund 161:9 signal 15:4 28:6,9 29:21 30:4,19 31:11 51:11,12,15 58:11 62:18,22 73:14 74:8 74:12 82:7 101:1,2 104:8 127:23,24,25 130:11,14,17,24 131:2,24,24 132:13 132:14,14,17 133:8 133:15,18 134:7,9 134:12,14,15,16 135:22 136:2,5,7,12 136:17 137:5,10,14 137:24 143:19,20 143:21,22,25 144:1 144:4,11,13 145:4,8	145:15,16,23,25 146:12,14,17 147:4 148:17,20,21 151:24,24 152:1,1 152:10,10,11,19,20 153:4,14,17,20,22 154:7,24 155:1,3,11 155:12,14 156:17 156:19 157:8,11,16 157:17,18 158:17 158:19 159:2,3,4 160:3,14 162:4,5,10 162:10 163:7,8 165:7,7,15,20 166:12,16 168:3,10 168:15,16,21,24,25 169:13,14 170:6,7 171:11,12,14 172:5 172:16,17,18,20,21 172:24,25 173:5,6 173:19,23,25 175:14 signal's 133:16,17 signals 51:18 107:2 110:13,23 122:12 127:22 130:6,10 146:6 148:6,18 153:23 155:14,15 155:15 165:25 171:10 181:11 signature 14:12 24:7 Sikorski 2:6,21 4:25 4:25 5:12,20,23 6:3 6:19,25 7:3 8:4,8 10:10,18 11:9 12:2 15:16,20,25 16:8 17:7,17 18:23 19:17 20:3,8,15,17 22:6 22:12 23:6,9 24:18 24:20,24 26:16,21 27:16 28:24 29:8 30:2,11,24 31:20 32:13,15 33:18 34:4 34:21,25 36:16 37:5 37:7,10,16 38:21 39:3,24 40:19 41:19 41:24 42:2,18 43:20	45:1,8,14 46:1,12 46:22 47:4,15 48:23 49:16,17,23 50:8 51:14 54:6,14 55:11 55:13 56:15 57:10 59:9,24 60:18 61:3 61:18 63:13,24 65:5 65:9 66:1,5,7 67:1,9 68:16 69:25 70:20 71:4,9 74:5,23 75:14,21 76:9,22 77:13,24 78:10 79:4 80:16 81:22 82:4,17 82:25 83:19 84:16 84:23 86:4,19 87:4 88:2,24 89:9,24 90:21 91:10,24 92:11,19,21 94:5,17 94:24 95:11,24 96:6 96:15,22 99:7,25 100:7,24 102:7,14 102:20 103:12,24 104:15 105:18,22 106:6,9,24 107:18 108:4 109:6 111:15 112:2,11 114:15 116:16,25 117:15 118:2,4,22 121:3,13 123:12 124:6 161:4 similar 36:13 117:14 simple 38:8 43:1,22 95:7,8 109:9 114:1 simpler 144:16 156:15 simplicity 41:8 simplify 152:4 simply 7:22 29:13 37:20 78:24 105:6 132:17 simulation 21:14 simulations 15:1 SIMULINK 10:21 12:13,18 13:3 simultaneously-occ... 122:4 sine 159:20,21 160:11 173:11,12
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>single 41:13,14 43:8 43:10 46:8,16,19 47:23 68:19 99:8 152:20 single-phase 47:9 78:20 sinusoid 146:23,25 147:24 148:1 157:9 sinusoidal 50:13 51:4 51:11,16,17,18 136:11,14 145:23 146:8,12,14 153:23 sir 62:25 108:16 124:18 125:1 127:15 128:9 135:14 139:7 151:7 157:3 164:19 166:19,22 168:4 170:19,25 174:4 177:5 185:5 sit 36:9 sitting 26:25 47:21 63:5 66:6 situated 180:17,18 181:12 situation 68:18 69:1 77:15 78:9,11 90:6 91:7 108:18 112:17 114:9 121:9 122:22 153:9 160:9 six 120:9 sixth 122:10 size 89:12 slow 79:23 83:22 86:13 slowly 68:4 79:20,22 89:14 90:5,9 91:8 112:19 slug 3:13 13:24 14:2 55:18 56:10,21 57:2 57:16 58:15 59:5 60:3,16 61:5,9 62:5 63:1,7 64:1,8 66:21 67:19,25 68:11 69:1 69:7 70:4,9,12 72:2 72:10,12,17 73:6,17 73:25 74:1,7,11,17</p>	<p>75:22,24 76:3,24,25 76:25 77:6,6,7 78:14,22,24 79:6 83:3 85:10,16 88:20 90:23 91:12,25 92:12,15,16 93:7 95:1 small 152:10,19 153:20 154:7,10,23 154:25 155:2,11,13 155:14 160:14 software 22:17 solid 43:12,13 44:2 someplace 26:25 somewhat 162:6 sorry 13:11 15:18,22 21:3 24:6,17 33:21 35:1 37:2 48:2 95:3 96:4 108:16 124:24 134:4 135:25 136:18 138:18 143:13,25 144:10 150:20 151:5,10 154:10,24 159:6 160:2 161:9 163:3 167:17,23 169:13 169:21 170:16 172:3,14 173:15 174:6,23 176:18 177:8 185:3 sort 7:15 12:11 25:7 25:17 52:22 53:3 113:9 114:4 117:3 182:23 sounds 37:14 86:20 source 13:5 49:13 116:3 sources 121:20 speak 7:15 21:4 50:17 51:2 53:8 speaking 21:6 49:25 76:3,12 164:19,21 164:24 169:22 specific 11:7 12:22,24 18:25 29:10 31:25 38:17 62:4 70:11 72:14,15,25 73:8,11</p>	<p>73:19,20 74:20 75:4 77:25 78:11,25 80:4 91:17 94:1,13 95:6 121:16 123:10 154:21 160:19 specifically 9:24 21:22 22:22 32:9 40:12 47:3 48:4,11 67:19 69:10 84:12 92:9 97:19 125:14 126:8,24 136:11 specification 33:15 112:16 125:11 specifies 94:1 speculate 84:22 149:19 speculating 86:20 speculative 140:19 spend 126:24 Spohnholtz 2:16 4:17 spot 118:11 spring 81:7 SS 187:1 188:1 stage 39:14 standard 92:17 start 23:17 27:25 32:16 64:23 70:18 141:16,21 167:15 179:10 185:1 start-up 66:13 67:8 67:13,13,20 68:8,13 69:9,9,13,21 70:2 77:22 90:16 112:19 113:22 117:1,3 123:3 starting 62:17 67:8 122:22 starts 56:20 66:9 state 1:19 4:19 34:13 38:10 57:15 58:9,10 59:14,15 61:12 68:24,24 71:17,20 103:23 116:8 137:11 175:3 187:1 187:8,23 188:1 stated 34:2 35:22 40:6 43:5 107:12</p>	<p>163:24 statement 8:13,24 22:8,10 24:13 32:6 36:21 39:7,17 45:16 45:18 48:20 51:23 59:7 69:20 72:5,11 75:8 76:19 86:8 89:8,23 90:1,3 104:18 105:11,14 111:6 121:16,25 149:8 157:1 166:2 statements 48:16,21 50:21 163:22 states 1:1 4:11 41:12 57:16 66:12 121:25 125:7 136:10 174:19 180:1 stating 104:25 stationary 123:24 stay 20:9 steam 178:20 step 68:3 71:10 78:16 steps 67:10,12,18,24 69:2 stop 107:23 183:23 184:3,11 stopping 174:24 stops 108:2 110:6 straight 43:3 181:9 181:16 182:12 straightforward 31:1 strain 180:3,9,15 strange 184:10 stray 52:21 Street 2:6 strike 32:14 34:6 36:9 39:20 40:23 42:20,21 43:21 50:23 91:13 92:14 99:22 106:8 structure 51:9 52:10 52:18 54:5,16 structures 52:12 81:3 struggling 42:4 students 11:10 subject 156:10,12 185:2</p>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

subjected 54:15	sure 6:14 9:8 11:13	92:16 93:2	12:23 30:14,15 32:1
submitted 14:11 19:5	12:3 13:10,16,20	take 9:5 13:11,18	32:10 48:8,19 49:11
Subscribed 188:19	18:20 27:18 28:13	21:25 38:22 60:19	111:13 166:17
subset 34:18 35:20	28:17,22,25 30:25	71:10 112:2 124:7	181:10
substance 43:11 44:3	47:2,5 59:23 67:14	128:8 138:2 156:17	tell 35:8 70:3 89:11
46:7 52:7 53:3	67:23 68:1 69:4,5	160:23 174:18	92:8 109:3 155:10
68:21 76:5	70:14 71:10 72:19	179:24 185:17	167:17 168:6
substances 46:20	74:24 79:10,11,17	186:1	telling 6:10 90:15
47:9,10,24	82:19 90:2 92:24	taken 1:14 4:7,14	temperature 39:11
substantial 86:15	97:7 105:25 110:17	38:25 60:24 72:5	180:4
substantially 56:12	112:23,23 118:13	82:22 112:7 124:10	ten 160:23
56:13 57:5,5 58:9,9	119:2 120:13 121:4	161:3 188:6	term 50:9 54:2 55:5,7
58:24,25 59:14,15	129:22 133:11	talk 98:2 110:21	55:8 80:1 84:25
61:12,12 62:1,1	138:4 142:23	120:23,24 124:19	85:20 127:21
68:23,24 69:15,16	162:16,25 163:15	162:6 163:1,5	128:11 129:11,14
71:17,20,22 72:23	168:6 174:16 176:2	184:15	132:12 140:1
73:5,5 97:21 121:5	185:13	talked 148:17 151:3	143:15 151:21
121:6,17,22,22	surmise 84:21	157:8	163:20 171:8
122:3,8,9,19,20	swear 4:21	talking 70:22 76:20	181:20,23
successful 164:23	switch 92:17 93:25	79:14 99:12 105:16	terms 42:22 43:1,22
sudden 80:20	94:4 112:2 124:18	112:20 128:16	44:22 53:25 56:9
suffice 173:17	sworn 5:9 188:19	132:2,2,4 133:23	77:17 86:8 100:2
sufficiently-large	synchronous 13:8	144:3 146:1,3	125:19 126:3,19
122:14	synonymous 42:22	153:23 154:17,20	test 179:22
suggest 174:11	137:17	155:13 160:8	testified 5:10 9:9,12
suggests 67:20	synonymously 42:24	161:10 162:9 163:6	9:14,25 28:15 31:7
Suite 2:6,9,12	synthesis 171:5,9,23	166:17 173:4	testimony 91:11,14
suits 10:1	172:1 173:11	185:23	186:8
summarizes 38:13	synthesized 104:8	talks 68:4 71:15	Texas 2:10
summary 3:7 6:21	171:12 172:3,5,9,16	75:22,24 80:2 83:10	text 93:2 113:19
32:18 168:13	173:7,7	98:23 119:19 120:5	119:10
supplement 3:13	synthesizing 172:24	121:24 123:1	textbook 25:9,19,19
55:17 56:6,8,22	173:5	tanker 57:18	26:2,24
57:13,16 58:16 59:5	system 15:3,3 41:9	tanks 57:19,19	textbooks 29:2
60:4,17 61:9 62:6,9	44:24 81:7 90:11	tape 160:24	Thank 10:3 13:19
63:1,7 64:2,9 68:12	115:10,14,23 153:4	taught 10:20 11:6,17	14:4 15:17 16:9
69:7 70:4 72:2	171:13 179:14	12:9	18:1 19:1 21:6
73:17,25 74:1 75:22	systems 1:8 4:9 5:1,4	teach 10:23,24	42:19 48:4 49:9
76:24 83:4 85:10,16	5:7 15:1,12 22:5,15	teaching 14:21	56:2 60:18 65:13
90:23 91:13 92:13	22:17,25 25:20,21	technical 10:21 14:20	97:25 98:15 125:23
92:15	26:1 28:1,10,11	15:7,9,10 16:25	127:15 136:20
supplemented 59:5	29:21 30:5,19 31:12	technically 33:15	144:15 158:13
supplied 27:5 35:7	155:22	technique 67:8,13,20	166:19 170:11,24
36:25		69:21 90:16	178:8 180:21
suppose 149:14	T	technologies 12:25	183:22 185:7
159:17	T 2:15 189:1	23:1	Thanks 23:23
supposed 60:19 74:3	table 7:15 56:18	technology 11:8	then-appropriate

117:5 theoretical 157:6 160:9 163:23 Theoretically 161:23 theory 51:3 155:21 thicker 56:6 thin 166:22 thing 33:25 39:8 53:22 90:6 91:7 93:24 95:19 175:19 176:4,21 things 12:16 13:9 29:14 39:12,13 69:8 70:22 85:5 113:19 132:6 144:2 think 9:19,23 12:6 13:14 15:6,24 19:13 20:5,13 22:8,21 24:13 25:9 26:23 31:16,24 32:6 35:21 36:4,21 38:13,18,18 39:7 42:24 43:2 45:16 46:3 47:21,21 48:7,15,19 50:6 52:9,17 53:10,25 55:7 56:1 59:6,18 60:10,10 63:2 64:12 66:25 69:18 70:16 72:8 73:2,9 75:8 76:2,16,17,18,20 80:14,25 81:18 87:10 91:6 96:16 97:14,15 98:10,13 98:16 102:5 106:4 111:6 115:20 117:10 125:17 126:7,14 127:20 129:13 130:16,20 131:4,7,9,17 134:18 138:4 139:1 141:5 143:3 148:9 153:22 154:3 155:1,9,12,19 157:13 158:23 160:7 161:13 163:12 164:1,1,4,8 164:12,14,20,25 165:15 167:9	169:17,18 171:24 172:23 173:2,22 174:14 175:24 176:7 177:14 180:18,23 181:11 181:12 182:4,24 184:9,14 185:12 thinking 51:7 52:22 173:16,17 third 15:6 93:9 121:15 172:4 thought 15:20 31:1 134:19 176:9 three 18:21 44:1 59:2 68:3,11 113:1 120:8 three-day 12:7 14:25 threshold 72:16 73:20 92:6 93:24 94:1,14 time 11:11 14:12,18 17:11 42:8 45:5,20 46:5 50:24 51:4,9 65:8 69:22 71:8 74:21 78:18,23 79:1 79:24 81:15,20 82:17 83:11,20,23 83:24 84:1,8,12,13 85:25 86:2,15,16,23 86:24 87:11,12,13 87:18 88:10 89:1 95:19 97:2 101:24 102:2,18,21 104:4 104:21 105:4 106:15 107:13 108:1,2,9,21 111:19 114:18 117:21 126:24 128:9 133:1 133:21 135:2 140:5 140:20 150:4 162:22 165:20 166:12 175:14,18 183:10 184:5 time-based 172:21 times 8:25 9:2,11,12 110:2,3 today 7:18 14:6 17:3 18:22,24 19:3 21:19	24:11 36:10 47:21 60:1 63:5 80:22 96:2 97:3 112:21 165:8,15 171:17 184:4,7,24 today's 4:4 65:20,20 186:8 told 30:16 60:18 138:18 141:1 143:13 150:14 151:13 154:7,23 165:15 167:4 171:17 tomorrow 184:1,4 185:1,11,16 186:1 top 56:20 58:1 64:5 65:10 122:11 128:11 topic 20:10 21:19 40:8 52:2 79:5 topics 8:20 total 88:23 totalized 78:6 totally 115:20 tracking 116:13 trade 9:22 32:11 Trademark 1:1 4:11 training 10:21 12:14 14:23 transcript 4:1 61:20 188:5 transition 56:11 57:3 58:8,24 60:5 61:24 64:10 68:23 70:5 71:2,16 73:4,15 80:4,20 82:18 84:17 87:19 120:6,17,23 121:21 122:7,19 123:6 transitions 59:14 61:11 66:22 69:14 69:15 81:11 121:5 121:10 transmitter 74:8 94:22 transports 57:19 travel 81:10	trial 1:2 3:18 4:10 8:21 9:9,25 tried 29:11 tries 108:7,17 trouble 67:16 174:23 true 29:17,19 43:13 46:7,11,13 48:7 53:10 80:10,25 103:4 183:4 188:8 truly 157:4 trustworthy 75:5 try 21:4 45:19 52:21 133:14 151:2 162:24 trying 13:12 38:7 52:16 65:19 69:6 76:17 84:6 88:4 90:2 113:4 129:25 140:22 148:15,19 156:9,9,10 159:15 174:12 175:12,17 179:21 184:8 tube 41:13 50:3 52:23 54:18 81:4,5,11,18 82:2,9,11 101:25 102:4 104:5,22 105:6 115:25 117:23 180:2 181:9 181:17,20 182:13 tubes 13:2 119:5,20 122:17 123:16,21 177:2 turbulent 121:19 turn 112:15 125:1 128:8 135:14 167:18 171:2 174:8 two 5:16,18 6:5,7 10:7 13:2 14:22 24:8,21 29:1 39:19 41:6,10 42:22 55:22 70:22 75:23 89:2,4 90:17 91:6,22 98:5 111:17 120:8 148:2 148:10 152:5 156:19 157:10,11 158:14 159:3 161:17 171:18
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p>two-phase 68:25 69:2 71:24 78:20 91:23 97:11 102:3,18,22 104:4,12,22 105:5 105:13,20 106:11 106:16,23 116:11 124:3</p> <p>two-to-one 157:15</p> <p>type 41:13 63:10 80:14 154:14 175:2</p> <p>types 41:14,16 95:21</p> <p>typically 66:13 89:2</p> <hr/> <p style="text-align: center;">U</p> <hr/> <p>U.S 3:11,12,14,15,18 3:19,20,20 4:17 96:1,1 118:7 135:6 138:5 170:14 174:19 177:17</p> <p>Um-hum 72:7 85:11 153:15 159:19</p> <p>umbrella 10:12</p> <p>unacceptably 101:20 102:13</p> <p>uncertain 77:17 86:8</p> <p>understand 10:3 13:17 18:22 28:22 29:25 33:15 36:17 58:14 59:10,25 69:5 79:15 85:3 100:1 113:9 120:10 125:8 129:12 140:13 142:12 145:18 147:21 148:15 149:1 156:5,6 162:3 163:5 164:5 181:5 182:1 184:2 185:5,6 185:22</p> <p>understanding 60:2 74:17 83:24 85:14 87:1 93:23 98:25 115:12 130:18 145:7 171:8 172:2,8 184:6</p> <p>understood 18:1 29:12 49:11 144:6 152:13</p>	<p>unequivocal 105:2,23</p> <p>United 1:1 4:11</p> <p>units 44:22,24 94:1</p> <p>unity 137:18 147:6,7</p> <p>university 25:19</p> <p>unloaded 78:19</p> <p>unloading 57:18 67:21 70:19 72:17 73:22 76:11 87:17</p> <p>unnecessary 130:3,4 130:16,17 131:8 141:5 167:11</p> <p>unquote 102:4 122:18 127:23 128:1 177:3</p> <p>unrelated 90:13 91:8</p> <p>untrustworthy 114:10</p> <p>unusual 95:19</p> <p>unwanted 76:4,8</p> <p>up-and-down 54:25</p> <p>upstream 79:20</p> <p>upward 178:12,12</p> <p>USC 1:15</p> <p>use 28:20 32:17 42:24 53:19 55:4,6 56:5 95:7,21 137:18 147:14 181:10,20</p> <p>uses 85:19 95:1 98:2 137:23 175:2</p> <hr/> <p style="text-align: center;">V</p> <hr/> <p>valid 33:20 34:3 36:11,20</p> <p>value 122:2 151:23 156:17,18 158:17</p> <p>valve 44:9 68:5 79:20 80:12 89:1,15,19 90:5,9 91:8</p> <p>variation 122:4,21 123:1,7</p> <p>variety 147:23</p> <p>various 3:7 6:22 8:20 41:16</p> <p>Varying 121:25</p> <p>velocity 82:14 100:12 101:8 122:12</p>	<p>135:22 136:12,17 137:4 146:7</p> <p>verb 56:5 72:9 92:1</p> <p>verified 118:9</p> <p>version 55:24 97:7</p> <p>versions 24:2</p> <p>versus 4:9 15:13 18:16 28:10 52:16 131:24</p> <p>vibrate 49:13 177:2</p> <p>vibrating 21:15 53:20 103:14 122:14</p> <p>vibration 53:23 54:5 54:16 55:1 81:4 103:6 119:4 123:19 175:2 180:2</p> <p>vibrator 177:2</p> <p>vibratory 13:2 51:8 122:17 123:17,22</p> <p>video 1:13 60:19</p> <p>videographer 2:16 4:3,17 15:18,21 16:1,4 38:23 39:1 60:21,25 75:16,19 82:20,23 96:17,20 112:4,8 124:8,12 160:25 161:5 184:16,19 186:7</p> <p>view 60:1 73:24 145:14</p> <p>Virginia 2:13</p> <p>VL 135:23 136:2,5,7 136:12 146:1,12</p> <p>vocabulary 140:22 148:15</p> <p>voice 167:13</p> <p>volt 147:25 159:2</p> <p>voltage 62:19,23 144:4 145:4,8 147:4 148:3,14 149:3 157:24,25 159:22</p> <p>voltages 149:2</p> <p>volts 148:2 157:11 159:3,5,5,18</p> <p>volumetric 39:11 47:1</p> <p>vs 1:7</p>	<hr/> <p style="text-align: center;">W</p> <hr/> <p>wait 86:8 96:7 151:2</p> <p>waiting 113:8,12</p> <p>walk 64:2,17 86:5</p> <p>walls 59:12 61:23</p> <p>want 6:15,21 19:1 27:3 28:12,16 31:10 40:3 49:8 53:11,19 55:4 56:16,17 61:19 72:5 82:19 89:25 90:12 97:11 103:10 112:16 119:15 131:12,15 140:15 142:24 150:22 152:4,6,12 160:18 164:15 166:2 168:7 176:2 179:24 180:23 181:5,14 182:19 184:8,24 185:13,15</p> <p>wanted 65:18 76:7 184:7</p> <p>wanting 183:3</p> <p>wasn't 15:23 72:19</p> <p>waste 175:18</p> <p>water 80:11 83:15</p> <p>wave 159:20,21 160:11 173:11,13</p> <p>way 20:5,12 36:19 37:19 38:7 40:4 47:13 50:5 54:4 67:7 69:7 70:17 74:9 83:7 93:23 98:10 101:15 116:3 123:7 126:9 133:13 135:2 137:7 139:10 139:13 140:19 141:10 145:12 148:6 156:11,11 160:18 165:23 166:15 168:10,15 180:19,23</p> <p>ways 147:20,23 153:2 153:12,16,20 154:5 154:7 165:24</p> <p>we'll 6:6,25 63:25 83:9 184:12,15</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

we're 7:18 16:1 17:2 28:2 48:8,8,24 49:11 60:18 62:3 70:22 87:14 109:10 124:18 128:16 129:3,8 138:4,15 144:3 150:19 155:12 160:8 166:17,24 173:4 176:2 184:3 185:17 186:8	75:7 76:7,16 77:11 77:21 78:4,16 80:9 81:14,17 82:7 83:17 84:10,21 85:24 86:11 87:1,24 88:16 89:6,22 91:3,20 92:5 93:23 94:11,21 95:5,17 99:4,23 100:5,17 102:17 103:8,18,21 105:10 105:25 106:19 107:20 111:4,24 114:13 116:8,22 117:10,13,18 118:18,20 121:1,12 123:5 125:17 126:13 128:25 132:9,20,25 133:7 133:20,23 134:11 134:18 137:16 138:13 139:22 140:17 141:5,16 145:2,18,25 147:13 148:5,24 149:13 150:3,11 152:4 153:19 154:13,19 155:19 156:24 157:21 158:10,23 159:9 160:6 161:16 162:13,21 163:12 165:10,18,22 166:15 169:2,7,16 170:9 172:15 173:2 173:10,22 175:23 176:21 177:14,23 178:7,25 179:7 180:7,15 183:9 184:10 187:17	150:9 162:13 167:10 171:19,24 172:3 180:22 words 19:18 28:6 29:22 35:24 72:24 73:6 84:6,17 116:2 132:3 171:5 172:5 173:5 184:1 work 10:14,17,20 14:13 15:7,14 17:1 20:13,15 22:1 worked 20:20,24 67:21 working 18:2,9,15 29:6 works 25:12 27:13 64:3 93:24 139:11 139:14 world 51:5,25 52:1 worrying 141:17,21 167:15 wouldn't 45:17 75:7 85:2 116:1,17 117:7 127:11,11 146:13 159:5 Wow 106:7 wrap 184:7,13 writing 187:10 wrong 43:10 72:2 111:20 wrote 33:9 155:2	<hr/> Z <hr/> zero 80:4 148:6 160:15 <hr/> 0 <hr/> 0.5 73:1,8 74:19 75:4 78:1,12 91:17 <hr/> 1 <hr/> 1 4:5 33:1 36:1,17 37:3 38:11,15 54:17 58:2,5 60:22 62:5 67:11 70:9 71:11,14 72:3 90:24 120:3,4 1:15 82:24 1:43 96:18 1:45 96:21 10 3:17 57:22 128:3 157:25 158:1 10:17 38:24 10:27 39:2 100 34:5 38:9 1000 2:9 1002 23:14,18,22 1006 118:6 1008 135:5 1014 55:16 58:17 61:5 102 57:9,22 60:2 61:17 71:12 103 57:21 104 174:12,19 175:3 109 125:2,4,5 139:15 145:3 11 179:24 11:13 60:22 11:22 61:1 11:53 75:17 11:54 75:20 114 174:9,25 176:22 176:25 118 3:15 11911 2:12 11th 187:19 12 33:1 36:1,18 37:3 38:11,16 12:08 82:21
we've 22:9 26:15 27:9 38:21 111:16 112:20 118:5 137:4 160:22 165:8 184:23	100:5,17 102:17 103:8,18,21 105:10 105:25 106:19 107:20 111:4,24 114:13 116:8,22 117:10,13,18 118:18,20 121:1,12 123:5 125:17 126:13 128:25 132:9,20,25 133:7 133:20,23 134:11 134:18 137:16 138:13 139:22 140:17 141:5,16 145:2,18,25 147:13 148:5,24 149:13 150:3,11 152:4 153:19 154:13,19 155:19 156:24 157:21 158:10,23 159:9 160:6 161:16 162:13,21 163:12 165:10,18,22 166:15 169:2,7,16 170:9 172:15 173:2 173:10,22 175:23 176:21 177:14,23 178:7,25 179:7 180:7,15 183:9 184:10 187:17	<hr/> X <hr/> X 2:18 3:2 159:18 <hr/> Y <hr/> yeah 6:23 16:1 22:14 24:22 28:6,8 48:24 54:23 64:20 66:1,11 93:12 98:13 119:14 129:3 131:14 year 17:9 years 9:7,13 10:22 11:2,17 12:6,9,21 16:11,14 21:17,25 Yep 25:1 110:19 136:19 152:16 Yesterday 97:4	
web 21:13	165:10,18,22 166:15 169:2,7,16 170:9 172:15 173:2 173:10,22 175:23 176:21 177:14,23 178:7,25 179:7 180:7,15 183:9 184:10 187:17		
website 8:9,11,14 21:7 22:24	wondered 90:22 wondering 11:15 14:13 19:7,9 21:15 30:17		
well-known 95:10 111:13	word 21:6 52:15 72:4 72:8 75:24 87:5 128:20,21 130:1,19 131:7,19 141:2,18 143:13,14 149:25		
weren't 150:23			
What'd 125:3			
whereof 187:17			
wings 113:13			
Wisconsin 1:19,20,20 2:3,4 4:16,16 187:1 187:8,19,23 188:7,8			
wish 38:6 113:14			
withdraw 146:19			
witness 4:22,24 5:9 6:17 8:2 10:16 11:5 11:21 14:17 16:6,13 17:6,14 18:19 19:13 20:1 22:4 26:14 27:9 28:22 29:5,25 30:9,22 31:16 33:14 33:25 34:24 36:13 37:14 41:1 42:7,13 44:21 45:12 46:11 46:25 47:12 48:15 49:21 50:2,20 51:3 53:25 54:12 55:4 57:7 59:2,17 61:15 63:9,18,21 65:7 66:25 67:7 68:15 69:18 70:8 71:7			

124 2:21 3:16	2017 3:8 8:5,7 35:25	112:10 113:3	145:5,9,16 146:4,14
128 3:17	2018 3:11 23:5,10,13	135:15 136:1,7	146:17,23,25 147:5
135 3:18	23:18 56:20	137:22 139:14,25	147:11
136 135:13 138:3,9	2019 3:12 23:5,11,21	144:17 145:19	438 136:15,22 137:3
139:19	40:9 41:5 53:16	161:1 178:4,8	144:20 145:3,8
138 3:19	101:22 109:13	179:10,11,19,20	147:3,25 148:2
14 53:12,15 54:8	20190-5602 2:13	180:10,11,16,24	149:15 156:2
15 33:2	2020 3:13 55:12,15	183:5,19	439 137:11 145:13
16 10:22 11:2,17 12:6	58:16 60:4 61:5	3.2 64:5,25 65:2 66:8	44 180:7
12:9,21 21:17,25	92:6	70:17 79:17 83:5	469 178:5
160L 136:12 146:7	2021 3:14 95:23,25	85:9	49 118:15
167 3:16 124:22	96:5	3.5V 62:23	
166:21	2022 3:15 118:3,5	3:11 124:9	5
17 119:3,19 123:13	2023 3:15 124:11,20	3:26 124:13	5 2:21 3:6,6 33:1 85:9
124:1	125:14 126:6 174:5	30 66:2	88:25 92:18,19
170 3:20	176:23	300 2:12 17:16	97:18 110:10,21
1700 2:6	2024 3:17 128:2,5	316(a)(5)(A) 1:15	112:20 117:2,4
177 3:20	129:4 138:21	32 98:5	5,009,109 3:18 135:6
178 3:6 6:1 23:22	166:20,24 167:7,19	33 100:19	5,224,387 3:14 96:1
179 3:6 23:16,19	169:24	34 24:16,17 25:2	5:47 184:17
19 25:15,22 33:2	2025 3:18 135:4,7,11	26:22 53:12 103:25	5:48 184:20
1965 26:1	2026 3:18 138:4,7,8	107:12 170:21	5:49 1:22 186:9,11
1968 25:17,22	170:13	171:3	50 25:15
1977 26:2	2027 3:20 170:15,16	35 1:15 111:11	52 25:23 176:22
1987 3:14 55:19	170:17	37 1:15	53202 2:4
1990 25:8,10	2028 3:20 177:17,19		54 26:4
1992 14:18	177:20	4	55 3:14
1996 26:7	21 26:3	4 36:1,18 37:3 38:15	
2	219 38:10,19	62:17 79:7,19 83:9	6
2 33:1 61:2 62:8 70:9	22 171:3	87:14 98:12,13,17	6 1:21 3:7 97:16
72:17 92:16 93:2	223 57:21	113:3 128:11	112:15,16,25 113:3
100:18 107:24	23 3:11,12 40:12	157:24 161:7 180:5	113:21 114:2,8,19
111:11 112:5	25 9:13 41:2,5 118:15	186:9	115:2,4,7 116:9
2.0 62:10 70:25	118:18,19	4,679,947 3:20	117:3,14 187:10
2:22 112:5	25-year 9:2	177:18 178:8	188:6
2:35 112:9	26 41:2,12 43:16	4,697,947 178:5	6,311,136 3:19 138:6
2013 17:10 22:1	118:15,18,19 119:3	4,934,196 3:15 118:7	60 119:10,13,16
2014 1:21 3:6 4:2,5	119:19 123:13	4:37 161:1	120:1
5:17 6:1 16:17	124:1	4:45 161:6	61 120:4 122:25
187:10,19,25 188:6	28 187:25	40 179:25 180:1	614 41:10
188:12,19	2800 2:9	401 2:6	62 122:11 180:2
2014-170 4:12	29 136:10	41 135:23 136:3,13	646 24:3 27:18 32:16
2014-178 4:12	3	42 124:1	32:18 33:12,20 34:5
2014-179 4:13	3 64:3,4 69:11,11	42.53(d) 1:16	34:6 35:6,23 36:15
2015 3:6 4:2 5:17	76:23 79:7 103:25	43 180:5,7	56:10,17,19 57:1
2016 3:7 6:25 7:2	107:12,24 108:1	431 135:17 136:1,6	58:2 62:4 67:11
		136:14,23 144:25	71:15 72:3 90:25
			96:9 119:8,9,13

120:5 679 178:6 6th 4:5	109:13 110:10,17 92 179:22 180:3,9,16 92101-4297 2:7 94 56:21 180:5 947 181:8 182:25 96 3:14 98 12:7 99 27:17		
<hr/> 7 <hr/>			
7 3:10 167:18,20,20 167:25 170:20 171:3,6 172:4,13 7,124,646 3:11 23:20 7,136,761 3:12 23:23 7,505,854 3:20 170:14 174:20 761 24:3 35:18,22,23 36:1,9,11,18,24 37:2 38:9,12 40:9 53:16 96:10,12 97:13,15,18 110:11 110:21 119:7 77002 2:10 777 1:19 2:3 4:15 188:7			
<hr/> 8 <hr/>			
8 41:5 169:24 854 3:16 124:19,21 125:15 126:10,19 127:4 138:15,20 139:2,19,20 140:25 141:12 142:2,8 166:22 173:10 174:6,7 175:3,4,21 176:6 88 97:16 89 97:18			
<hr/> 9 <hr/>			
9 33:1 36:1,18 37:3 38:16,16 128:8,10 128:11 129:8 136:9 167:2 168:11 9:16 1:21 4:4 9:35 16:2 9:37 16:5 90 136:13 179:22 180:3,9,16 90-degree 135:18 136:23 137:7 91 101:21 106:25			