IN THE UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF ILLINOIS

EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff and Counterclaim Defendant, vs. BLONDER-TONGUE LABORATORIES, INC., Defendant and Counterclaimant, vs. JFD ELECTRONICS CORPORATION, Counterclaim Defendant.	Civil Action No. 66 C 567

The deposition of PAUL E. MAYES, called for examination by the defendant and counterclaimant, Blonder-Tongue Laboratories, Inc., pursuant to notice and pursuant to the Rules of Civil Procedure for the United States District Courts pertaining to the taking of depositions, taken before Lucile E. Moore, a notary public in and for the County of Cook and State of Illinois, at 30 West Monroe Street, 10th Floor, Chicago, Illinois, commencing at 10:00 o'clock a.m. on Thursday, October 27, 1966.

EM/mbs

APPEARANCES:

MR. WILLIAM A. MARSHALL and
MR. BASIL P. MANN
(Merriam, Marshall, Shapiro & Klose,
30 West Monroe Street, 10th Floor,
Chicago, Illinois),

on behalf of the Plaintiff and Counterclaim Defendant;

MR. ROBERT H. RINES
(Rines & Rines,
10 Post Office Square,
Boston, Massachusetts)

and

MR. RICHARD S. PHILLIPS
(Hofgren, Wegner, Allen,
Stellman & McCord,
20 North Wacker Drive, Suite 2200,
Chicago, Illinois),

on behalf of the Defendant and Counterclaimant

MR. MYRON C. CASS and
MR. SIDNEY N. FOX
(Silverman & Cass,
105 West Adams Street, Suite 1900,
Chicago, Illinois),

on behalf of the Counterclaim Defendant.

ALSO PRESENT:

Mr. Isaac S. Blonder.

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I N D E X

Deposition of Paul E. Mayes

MR. MANN: Before proceeding further, I think we should make a statement for the record.

As you know, Dr. Mayes served in several capacities in this whole situation. He is not actually an employee of the Foundation. He is an employee of the University.

He is a consultant and agent of the Foundation for certain matters. He is also a consultant for JFD.

Therefore, when he is being examined on any particular matter he may well be answering as an agent of JFD or the Foundation and he would be represented either by myself or by Mr. Cass in that capacity.

Now that is a tenuous line there, and we will have to play it by ear, insofar as who is speaking for the witness or objecting on his behalf, when we get to it. If anybody has any comments on how we can make this matter easier, I would like to hear them, or if this proposal is acceptable to you.

MR. RINES: As I understand it, Dr. Mayes will be answering questions in at least three capacities.

MR. MANN: If you ask them in those areas he can answer them in three capacities.

MR. RINES: May we stipulate that each question I ask him, and I think this would simplify your problem, will be answered on behalf of all three organizations that he is associated with.

MR. MANN: I cannot bind the University in this. I represent only the Foundation. Mr. Cass, as I understand, represents only JFD.

And there is no representative of the University here.

MR. RINES: At least insofar as the Foundation and JFD is concerned, may we consider that his answers are as a person speaking for both of them.

MR. MANN: No, you may not. No, that is the point I am trying to get to. In his work as a consultant for JFD he is not representing the Foundation at all.

MR. RINES: In what work is he representing the Foundation?

MR. MANN: As a technical consultant. For example -- and this hasn't come up yet -- in the prosecution of some of our patent applications, technical questions, he acts as our technical

adviser and consultant.

MR. RINES: Are these the same patents and patent applications that are the subject matter of this suit?

MR. MANN: Well, for example, it could have been and I believe he did confer with us on the patent in suit. But he did not confer with us and we did not confer with him with regard to his work as a technical consultant in designing antennas for JFD.

We know nothing about that.

MR. RINES: In connection with the matter of policing the patents under the license agreement between JFD and the Foundation, do you understand that Dr. Mayes will be giving services such as consulting the Foundation on the matter of infringement involved in this license agreement?

MR. MANN: Yes.

MR. RINES: Well, I agree. I think we will have to play it by ear and see what happens.

MR. CASS: It probably is understood but I would like to clarify that by these consulting arrangements Mr. Mayes maintains a completely independent status.

MR. RINES: This remains to come out in the examination.

MR. PHILLIPS: Mr. Cass, we have requested certain documents and other materials from JFD.

MR. CASS: Well --

MR. PHILLIPS: Specifically in our letter of October 24th we have outlined areas in which we would like material.

MR. CASS: When do you want to pick those up, do you want them this afternoon? I have some of them at the office now. I wasn't aware that you wanted to examine Professor Mayes with respect to those.

I thought you wanted to save those for Mr. Finkel.

MR. PHILLIPS: The letter said in connection with the deposition of Professor Mayes we would like that material, and I am sure that some of it -- we would like to have an opportunity to examine it before we finish with Professor Mayes, because some of it may be relevant to areas in which we intend to inquire.

MR. CASS: Could we do it at the 12:00 o'clock break?

MR. PHILLIPS: Is that satisfactory?

MR. RINES: Would it be possible to send over for it now? I can start on some other subject matter.

MR. CASS: I have the prints, I don't want to hold up the deposition of Professor Mayes, but by the same token I want to be present here.

MR. PHILLIPS: Could you call and have the material assembled and brought over?

MR. CASS: You are referring to the letter of October 24th, is that right, Mr. Phillips?

MR. PHILLIPS: I am.

MR. CASS: Now with respect to item No. 1 we will give you the advertisements, circulars, et cetera, that we have at this time, that we have collected and that were given to us.

With respect to item No. 2, we are not going to produce any of the items requested with respect to negotiations of the licenses.

We feel that it is not a matter of any relevancy. The licenses are in evidence and they can speak for themselves.

MR. RINES: Is the objection to producing this that they are not relevant?

MR. CASS: And they are not material to the action as stated; and also, as far as I can see from some of the documents, there are some privileged matters.

MR. RINES: There are others that are not privileged, is that correct?

MR. CASS: I believe there are some.

MR. PHILLIPS: Can you provide us with a list of the documents which you will not produce?

MR. CASS: Well, we are producing none of the documents with respect to negotiations for the licenses. We feel this has no place in this lawsuit as it is now constituted.

MR. PHILLIPS: Will you provide us with a list of the documents, identifying the date, for example, of the letter, who sent it to whom, so we will have some basis for determining whether it is or is not a document which is privileged.

MR. CASS: It would be all documents dated prior to the dates of the various licenses and license agreements.

MR. PHILLIPS: I appreciate that, but some of the documents may very well be privileged, as you say, and others may not.

And I think it is a different situation with regard to the two.

MR. CASS: Well, what difference does it make; if you are going into these documents, it wouldn't make any difference.

I don't understand the reason for going through and listing all these things. If you are entitled to the documents, those that are not privileged, you will get them.
But we are not producing any of them at this particular time.

With respect to the request for all documents, et cetera, relating to the administration of such licenses, I think that the characterization of the documents is too broad.

To my mind, I would like a definition of the precise categories of the documents that you are looking for. To my mind, the administration of such licenses would include royalty reports, and we are not going to supply royalty reports.

So if you will define for me what particular documents you are asking for, then we will consider that request.

Now if you want the same type of documents

that were produced by the Foundation, pursuant to your request and arrangement with the Foundation, we will supply those type documents as well.

MR. PHILLIPS: We will give you a more specific statement on that.

MR. CASS: With respect to policing of the patents, we will provide you with copies of such documents as we consider relevant to this particular issue.

With respect to item 3 we will provide all such relevant documents, and writings, et cetera.

With respect to item 4 we will provide the items requested. I might say at this time I have no items related to that.

MR. PHILLIPS: Will those items be available before the deposition of Mr. Finkel?

MR. CASS: I hope so. Mr. Berliner has a copy of this letter, and we have agreed to produce the items requested in paragraph 4, whatever we have.

With respect to the employment contract with Mr. Mayes, Mr. Mayes is here and you can ask him for it.

I am sorry, the employment contract with the former manager, that must be Mr. Balash.

We will look for it, if we have one. At this time I don't know whether there is one with him.

Item 6, I will give you what I have now, what has been collected and provided me.

With respect to item 7, Mr. Mayes is here. You are certainly going to interrogate him with respect to that document. If he wants to provide it, that's fine. We will provide a copy of that document, but we would prefer, and we will delete certain portions as to the amounts of compensation that he receives. We don't think that should be a matter of public record. He receives certain compensations and for the purposes of this lawsuit the fact that he does receive compensation based upon certain plans should be sufficient for your purposes.

We don't want the amounts to become public information.

Dr. Mayes is here and you can question him. I don't know how he feels about that.

As far as item No. 8, we will produce

any such other agreements, and Dr. Mayes is here.

That's it.

MR. PHILLIPS: When you said you will produce, in connection with the agreements of Dr. Mayes.

MR. CASS: I don't have copies now, but I will say this. Dr. Mayes has a copy of his consulting agreement.

PAUL E. MAYES,

having been first duly sworn, deposeth and saith as follows:

DIRECT EXAMINATION

BY MR. RINES:

Q Would you please state your name, residence and occupation.

A Paul E. Mayes, 1508 Waverly Drive, Champaign, Illinois.

Professor of Electrical Engineering.

Q So you will understand, Dr. Mayes, this proceeding called a deposition is for the purpose of what we call discovery, trying to find out what individuals have what information, what kind of information is available, and having an opportunity to see that information before trial so that no surprises are sprung at a trial.

Counsel for the Foundation and for JFD, for example, required Blonder-Tongue Laboratories to produce laboratory notebooks, information with regard to their activities, advertising material, and so forth.

And spent some three days in examination of Mr. Blonder for this purpose.

And we are presently examining members of the foundation and you for this same purpose. It is important, therefore, that you try to identify for us the organizations that you will be testifying about.

Now you have answered that you were Professor of Electrical Engineering. Would you for the record state where you are this professor?

A The University of Illinois.

Q What are your duties as such professor?

A I teach and I also supervise research.

Q What kind of research do you supervise?

A Primarily in the antenna and electromagnetic theory area.

Q Where do you do this supervision at the University?

A In the Antenna Laboratory of the University.

Q Are you the head of that laboratory?

A No, sir, I am Associate Director.

Q Who is currently the Director?

A Professor Georges Deschamps.

Q How long have you been the Associate Director?

A I don't recall.

Q Well, two years, three years?

A Since about 1957, I believe.

Q Is this the University of Illinois Antenna Research Laboratories, where the series of log-periodic antennas were developed?

A Yes.

Q And did you play a part in that development?

A Yes.

Q Do you know where the funds came from for sponsoring that particular develpment of the log-periodic antennas?

A Most of them came from the Air Force, through contracts with various agencies which are located at Wright-Patterson Air Force Base in Ohio. Although some money was provided by the University of Illinois Foundation.

Q Were any grants, to your knowledge, given by JFD to the University of Illinois for this research, or any part of it?

A Not that I know of.

Q Do you know whether JFD gave any equipment to the University or their research laboratory?

A Not that I know of.

Q Do you know whether the University of Illinois Research Antenna Laboratory undertook any research projects specifically for the benefit of JFD?

A None that I know of.

Q Do you understand what I mean by "for the benefit of"?

A I am not sure.

Q It is our understanding that JFD is an exclusive licensee in the television and FM field, under the University of Illinois Foundation log-periodic antenna patents, the inventions for which issued from the University of Illinois Antenna Research Laboratories.

Is that a correct statement?

A Yes.

Q In connection with that license agreement,

are you aware of any test or other aid given to JFD by the Antenna Research Laboratories, in connection with assisting them in building the commercial antennas that they have marketed under this license agreement?

A No tests.

Q Any assistance?

A Not by the Antenna Research Laboratory, no.

Q By whom?

A Well, by myself.

Q Are you the only one?

A Yes, I believe so.

Q Who does the antenna research work at the University of Illinois Research Laboratories?

A The members of the Antenna Laboratory staff, of which there are seven or eight faculty members and perhaps 20 graduate students and the same number of undergraduate students, employed by the laboratory.

Q Do any of these graduate students have other duties than working in the research laboratories?

A It is possible.

Q Some of them teach?

A Yes, yes.

Q And those people would be considered as part of the staff of the University?

A Yes.

Q Is it your information that none of those students have consulted for or worked on behalf of JFD?

MR. CASS: Will you specify the time that you are talking about?

BY MR. RINES:

Q At any time?

A Do you mean were they employed by the University Research Laboratories at any time and have they subsequently been employed by JFD, or do you mean --

Q I mean any possible combination.

A Yes, yes, there have been such cases.

Q So that other members of the University of Illinois staff, besides you, have from time to time done antenna consulting work for JFD?

A I wouldn't say that; I would say that there have been people that have been employed by the University of Illinois Research Laboratories

who have subsequently been employed by JFD.

Q Are you the only one who still maintains two positions, namely an association with the University of Illinois and some kind of a consulting arrangement with JFD?

A Would you clarify what you mean by "association"?

Q Well, being on the staff, being --

A Employed by the University?

Q Employed by the University, part-time or full-time.

A As far as I know, I am the only one.

Q Were there ever any others who were simultaneously working under the employ of the University of Illinois and doing outside consulting work for JFD?

A I don't believe so.

Q How about Professor Isbell?

A Well, Dwight Isbell left the employ of the University before JFD ever established any connection with the University.

Q What about Mr. Carrel?

A The same is true in that case.

Q Do you happen to know where Mr. Isbell

is now?

A I am not sure, but the last information I had he was employed by the Boeing Airplane Company in Seattle, Washington.

Q Do you know where Mr. Carrel is employed?

A Yes, he is employed with Collins Radio Company in Richardson, Texas.

65 Q We have not yet established the time that you, as associate director of the University of Illinois Research Laboratory, began consulting work with JFD.

Can you pinpoint that?

A The 31st of October, 1962.

Q You referred to some document for that date; could you tell us what that is?

A It is the consulting agreement between myself and JFD.

MR. RINES: Mr. Cass, is this the agreement that you are willing to produce, minus the figures?

MR. CASS: Yes.

MR. RINES: Would you please delete the figure so we can have a look at it.

MR. CASS: Well, I would like to ask

Professor Mayes if he wants the figures published.

BY THE WITNESS:

A This is not the present agreement. This is the first consulting agreement.

There is a subsequent agreement.

BY MR. RINES:

Q Do you have any objection to our seeing this agreement as it stands, and perhaps putting it in the record?

A No, I have no objection.

MR. CASS: What about the amounts?

THE WITNESS: Well, can we take them out some way so it is not a matter of public record?

MR. CASS: I don't think we need it as a matter of public record.

You can look at it if you please.

MR. RINES: May I have a look, first.

BY MR. RINES:

Q Would you state for the record, Mr. Mayes, your education, your degrees, and principal fields of activity?

A You are referring to college education,

I presume.

Q Yes.

A I attended the University of Oklahoma, majoring in electrical engineering from 1946 through 1950, and received a Bachelor of Science degree in electrical engineering in August, 1950.

From there I went to Northwestern and entered graduate school there and was employed in the Microwave Laboratories as a research assistant from 1950 until 1954.

And I received a Master of Science in electrical engineering in 1952 and a Ph.D. in 1955.

Q What did you do your thesis on for the Ph.D.?

A It was on microwave reflectors.

Q And then, after you received your degree did you accept employment somewhere?

A Actually I went to the University of Illinois as assistant professor in 1954, before receiving the Ph.D.

Q And you have been there ever since?

A Yes.

Q What were the duties you assumed when you first came to the University of Illinois?

A I was research -- assistant professor in the Antenna Laboratories.

Q Were there any log-periodic antenna projects going at that time?

A No.

Q Do you recall when the log-periodic projects started?

A In 1957, about 1957, somewhere around there.

Q And who was it that was in charge of those projects, initially?

A Professor R. H. DuHamel.

Q Would it be fair to say that you worked under his direction on these matters?

A No. We were not associated directly on any project.

Q Would you tell us a little bit about what the association was, what kinds of projects you worked on and who supervised them, or maybe you did.

A At what time now; do you mean in 1954?

Q Commencing with the advent of the log-periodic antennas at the laboratories.

A I believe at that time I was working

primarily on aircraft antennas, -- cavity backed slot antennas and other type antennas that were suitable for use on an aircraft.

I didn't become associated with the log-periodic antenna work until the time when Professor DuHamel left the University.

Q Do you remember approximately when that was?

A Approximately 1958.

Q Then at that time what kind of association did you then take up with the log-periodic antenna project?

A Well, I began to work with several students on different types of log-periodic antennas.

At the time most of the work on log-periodics was being done by Dwight Isbell. I would say that he and I never had exactly a well-defined supervisory student relationship, because he was sufficiently experienced to be an independent researcher.

However, Robert Carrel and I worked together on a number of log-periodic antenna designs during his time as a graduate student

at the University.

And since that time there have been several other students who have worked with me on log-periodic antennas.

Q Do I understand that Isbell, at the time of his original activities in the log-periodic antenna field, was a graduate student at the University Research Laboratories?

A No, sir, he was an undergraduate student.

Q An undergraduate student?

A Yes.

MR. RINES: Off the record.

(Off the record.)

BY MR. RINES:

Q Do you recall the circumstances under which the concept of arrays of linear pairs of dipole elements, the length of which varies from the feed end increasingly, in accordance with logarithmic relationship, and the spacing between successive pairs of which increases also from the feed end, do you recall when, in accordance with some log-periodic function, do you recall when this idea first came to your attention?

A I presume you are referring to what we

call the log-periodic dipole array, although I would not describe it in exactly the language you used.

This was developed by Mr. Isbell. It first came to my attention either in the latter part of 1958 or early 1959.

Q Was this an idea that he had that he had come upon just as an undergraduate student, or in connection with his employment by the University of Illinois Antenna Research Laboratories to do research?

A It was on a project, a research project in which he was employed by the University Laboratories.

Q And was that one of the government-sponsored projects?

A Yes, it was.

Q Were any reports rendered on the results of his research on that type of antenna?

A Yes.

MR. RINES: We would like to call for a production of those reports.

BY MR. RINES:

Q Were any technical papers, apart from

these reports, published by Mr. Isbell or other members of the University of Illinois Antenna Research Laboratory, describing this development?

A Describing the log-periodic dipole array?

Q Yes.

A Yes.

MR. RINES: I would like to call for the production of copies of those published articles.

BY MR. RINES:

Q Can you give us the names of any other graduate students you remember, or students, who were associated with either Mr. Isbell's work in developing this antenna or the work that you and Mr. Carrel, as you have stated, did?

A John Koerner, K-o-e-r-n-e-r, was a student technician, who was assisting Mr. Isbell in his work.

Q Do you know where he is presently?

A He is employed by Dalmo-Victor Company. It is in California.

Q Anyone else?

A You phrased the question as to working with Isbell or with Carrel.

Q And you?

A I believe John Koerner also worked with Carrel, and then at a later time a Ronald Grant was employed as a student technician, assisting me and Carrel.

And there may have been others that I don't remember right now.

Q Do you know where Mr. Grant is?

A Yes, he is in Champaign, Illinois.

Q Is he still with the University?

A No, sir, he is employed by JFD.

Q In what capacity?

A Chief engineer.

Q Of what?

A Of JFD research and development labs.

Q Where are they located?

A Champaign, Illinois.

Q Anywhere near the University?

A About 4 miles from the University.

Q Do you know when he assumed these duties at the JFD Laboratories?

A Around the first of December, 1962. That's approximately, I am not sure of the exact date.

Q Do you know when he terminated his employment at the Antenna Research Laboratories?

A No, it was some months prior to that, I am not sure of the exact date.

Q Did any of these gentlemen that we have been referring to, I mean Mr. Isbell, you, Mr. Carrel, Mr. Grant, and the other parties you mentioned, keep laboratory notebooks describing their experiments with these linear log-periodic antennas?

A Yes, sir.

Q Do you know where those notebooks are?

A Not all of them.

Q Which ones do you know where they are?

A I have one of Mr. Isbell's notebooks in my office at the University.

I think probably one of the other of Isbell's notebooks is in possession of the Foundation's attorneys. I am not sure about that.

MR. MANN: Let me confirm that. We do have a notebook.

BY MR. RINES:

Q What about your notebooks, and those of Mr. Carrel?

A Yes, I have several notebooks that Bob Carrel and I used in our work.

Q What about the notebooks of Mr. Koerner?

A They would not have had notebooks as such. They may have made entries in the notebooks that were used by Isbell and Carrel.

Q Mr. Grant also?

A Yes.

MR. RINES: I would like to have access, too, in line with what we have been providing opposing counsel, copies of all pages of the notebooks described by Mr. Mayes, that bear upon the development and tests of these linear log-periodic antennas, developed by Mr. Isbell, Mr. Mayes, Mr. Carrel and these other parties.

MR. MANN: Off the record.

(Off the record.)

MR. MANN: We will agree that we will provide the actual notebooks and you can decide what you want to copy.

We have just agreed among counsel that the Foundation will provide the original notebooks requested by Mr. Rines and he will decide which pages he wants to make copies of.

BY MR. RINES:

Q Mr. Mayes, were there any other writings describing these antennas and this development, including progress reports or interoffice memoranda, or the like, other than the notebooks, the reports to government agencies on the development work, and the publications in magazines, that you are aware of?

A You referred to interoffice memoranda; would that include a disclosure of inventions submitted to the patent committee?

Q I would say exclude for the moment disclosures of inventions.

A Then I don't know of any other.

MR. RINES: With regard to disclosure of inventions, I would like to ask opposing counsel what is their view with regard to the disclosures that specifically led to the Isbell patent in suit and to the Mayes and Carrel patent, which is set forth in the declaratory judgment counterclaim as a basis for double patenting.

MR. MANN: Do you mean do we consider these privileged or producible or will we

produce them?

MR. RINES: I would like to ask for the production.

MR. MANN: May I ask which particular invention do you request?

MR. RINES: Those disclosures that bear upon the invention of the Isbell patent in suit and the Mayes and Carrel patent.

MR. MANN: What position are you taking relative to the Mayes and Carrel patent? Is that in suit or out of suit or what do you consider it?

MR. RINES: Refer to paragraph 18 of the counterclaim. We cited patent 3,108,280 as a ground for the invalidity of the subsequently issued Isbell patent.

MR. MANN: Although earlier filed.

MR. RINES: Although earlier filed, therefore we wish the disclosure of that application as well.

MR. MANN: All right.

BY MR. RINES:

Q Let us return now, Mr. Mayes, to the first employment agreement, dated October 31, 1962,

between you and JFD Electronics Corporation, which you have supplied to us.

MR. RINES: I would like to ask the court reporter to mark this Exhibit B-24, as a group exhibit.

(Said document was marked as Group Exhibit B-24 for identification.)

BY MR. RINES:

Q Am I correct that in accordance with the apparent content of this agreement there was at the time you entered into this agreement with JFD Electronics Corporation in existence something defined as a subsidiary JFD Research and Development Laboratories, Inc., of Champaign, Illinois?

A Are you referring to the date of the incorporation of that subsidiary?

Q Well, whatever information you know, was it in existence?

A I don't know when it was actually incorporated, but so far as its existence as a physical entity is concerned, there was no laboratory at the time I signed this agreement.

Q You mean there was no physical --

A No physical facility in Champaign.

Q This was something that was then however in the contemplation of JFD?

A Yes, it was in the planning.

Q Do you know where JFD was doing its research and development in antennas at this time?

A They were doing it at Brooklyn, the home office.

Q And prior to this October 31, 1962 date, did you assist them in any way, as a consultant or in any other way in that antenna research development?

A No.

Q Do you know whether anyone else on the staff of the University --

A Not to my knowledge, I don't know of anyone else.

Q So it would be fair to say that this is the first agreement for you personally to help JFD on its own antenna research and development?

A Yes.

Q And your title was to be at this time "Technical Consultant"?

A Yes.

Q Were you privy to any of the plans of

JFD with regard to this laboratory before you signed this agreement?

Did they tell you what they planned to put in here?

A Yes, we discussed it before this agreement was signed, certainly.

Q Did they ask you for your recommendations on what the facility might be like, what kind of test equipment you needed?

A Yes.

Q Would it be fair to say that you assisted them in planning the research laboratory from that point of view, to be sure you had the right kind of equipment you were going to need and the program you had in mind?

A Well, there was just a very preliminary discussion held concerning the establishment of the laboratory before this agreement was signed.

And we did discuss what would be required in the way of equipment, staff, and so forth.

Q In connection with your discussion about staff, was it discussed that it would be nice to be able to get some of the people who had been in the University of Illinois Antenna Research

Laboratory into this JFD Laboratory?

A Yes.

Q What people did you consider?

A I don't remember that any specific names were mentioned at the time of the preliminary discussion, I had no particular person in mind and did not know whether there would be such person available, but suggested the possibility.

Q Was there also the suggestion that perhaps others at the University Research Laboratory might, at least initially, be consultants at JFD?

A This possibility was mentioned.

Q Do you know whether anybody besides you at that time did consider being a consultant?

A Not that I know of.

Q This agreement, Mr. Mayes, also seems to reflect an awareness that you were to continue with your duties as an employee of the University, which I presume meant as assistant director, associate director, of the Antenna Research Laboratories, as well as your teaching?

A Yes.

Q At the time that this agreement was entered into, were you doing any direct work or

supervisory work at the Antenna Laboratories of the University of Illinois in the log-periodic field?

A Yes.

Q Did you continue to do such work at the University of Illinois Antenna Research Laboratories after you entered into this agreement of October 31, 1962?

A Yes.

Q And did you also then simultaneously work on these log-periodic antennas at the JFD Research Development Laboratories?

A Yes.

Q At the same time you were working on log-periodic antennas in connection with your other duties at the University of Illinois Antenna Research Laboratory?

A Yes.

Q Under paragraph 3 of this agreement it is noted that you were compensated or you were to be compensated for the work that you were going to do at the JFD Research and Development Laboratories, Inc. on these periodic antennas by lump sum monthly payments and by a percentage of the

sales of the log-periodic antennas that you had developed at the University of Illinois Antenna Laboratories, and for which patents had been applied for by the University of Illinois Foundation, is that correct?

A Yes.

Q So that JFD was undertaking to pay you a percentage of its sales of the antennas that you had previously developed under the employ of the Antenna Research Laboratories at the University of Illinois?

A The way the agreement reads, the design is based upon a prototype developed by Mayes, using concepts which are covered by patents applied for by the University of Illinois.

Q And those concepts were those that you had developed?

A These concepts were, well, any of those which are covered in any of the patents that were applied for.

Q By you?

A By the Foundation.

Q By you?

A By me.

Q I note also that JFD is undertaking, in paragraph 3(b) to pay you a percentage on the new concepts that you might develop while working for JFD Research and Development Laboratories, but that were not the property of the University of Illinois?

A Correct.

Q Can you tell me whether you have received any payments, as provided in paragraph 3 of this agreement?

A Yes, I have.

Q Do you know whether Mr. Isbell has a similar arrangement with JFD?

A Not to my knowledge.

Q Mr. Carrel?

A No, not that I know of.

Q Are you familiar with your joint patent with Mr. Carrel, 3,108,280, later reissued as RE 25,740?

A Yes.

Q Can you tell me, if you know, whether any of these payments that have been made to you by JFD, under paragraph 3, were on account of the concepts covered by this Mayes and Carrel patent?

A Yes.

Q Can you explain to me why you are paid a royalty under this agreement, but I think that you testified Mr. Carrel is not?

MR. CASS: I object to the characterization of it, of the payment, as a royalty.

BY MR. RINES:

Q Mr. Mayes, would you say that the provisions of paragraph 3(a) and (b) were royalty payments?

A No, sir.

Q What would you call them?

A They were compensation in return for consulting services performed. I would call them a consulting fee.

Q Well, looking at 3(a), doesn't that refer to developments you already made at the University of Illinois?

A No, the work that was done for JFD is what I would call engineering design work, which is considerably different from basic research performed by the University.

This is compensation for the conversion of the basic concepts which were developed in the

University research laboratory to an engineering prototype which is suitable for manufacture and sale as a commercial product.

Q Do you still have in the possession of the Foundation the antenna that you and Mr. Carrel built, which was the basis for your application for the Mayes and Carrel patent?

A Yes, we have several models.

Q Do you have any photographs of this?

A Yes.

MR. RINES: I would like to call for -- and let's be very careful what is produced here now --

I would like to call for the production at this time of photographs of the antennas developed by Mayes and Carrel, bearing upon their patent No. 3,108,280, as they existed both prior to October 31, 1962, and if there were any subsequent thereto, subsequent to that date.

BY MR. RINES:

Q What was the first antenna, Mr. Mayes, that JFD put on the market, to your knowledge, embodying these log-periodic concepts?

A I am not sure which one of the models in the series was actually produced first, but the series went under the designation of LPV.

MR. MANN: May I interrupt. I was thinking about your request concerning the photographs, and I would like to inquire of the witness, do you have these photographs in your possession and, if so, in what capacity?

THE WITNESS: They are in my file at the University Research Laboratory. I believe I have a photograph that was supplied to me by a newspaper reporter.

MR. MANN: What I am driving at, these are University documents, are they not?

THE WITNESS: Yes.

MR. MANN: Rather than Foundation documents?

THE WITNESS: Yes.

MR. MANN: As I indicated to you some days ago, Mr. Rines, all documents which are the property of the University must be produced by subpoena. We are not in a position to obtain these for you.

BY MR. RINES:

Q Mr. Mayes, are you under any restrictions from the University to show me for reproduction these photographs which you stated you had in your files?

A Yes, there was an instruction of the University attorney that matters of this type of documents, University documents, should not be produced except by subpoena.

MR. RINES: Let the record show this is the first item of subpoena that we will subsequently prepare.

BY MR. RINES:

Q Do you have any personal copies of these photographs, not the property of the University?

A I presume you would mean if those would be in my personal files, say in my home?

Q Anywhere, at your home, at JFD, any personal files of yours as distinguished from the University property.

A No.

Q Are there any at the Foundation so far as you know?

A I don't know.

Q Will you look?

A Yes.

MR. RINES: If there are any at the Foundation I call for the production of those photographs from the Foundation files.

MR. MANN: To the extent that they are in the Foundation files they will be produced.

BY MR. RINES:

Q Did any of these antennas ever physically leave the premises of the University Laboratory?

A Yes.

Q Describe that to us, please.

A One of the antennas that was constructed as a full scale VHF television and receiving antenna was taken to my home and used as a receiving antenna there for several months, in a matter of doing test work on it, connected in actual operation on a receiving set.

Q Was this an antenna that was built by you and Mr. Mayes and the others at the University Laboratory?

MR. MANN: Counsel, I think you misspoke -- by you and Mr. Mayes?

MR. RINES: By Mr. Carrel, excuse me.

BY THE WITNESS:

A Yes.

BY MR. RINES:

Q Do you have any pictures of that yourself?

A Yes -- well, not myself; again this is the same antenna I referred to a little while ago. However, in the laboratory files there are some pictures.

Q Do you have any pictures of it on your house?

A On my house, no.

Q Or in any other testing, off the University grounds.

A No, sir.

Q Was this antenna shown to officials at JFD?

A Yes, it was.

Q When?

A I don't know the exact date. It was sometime during the time that I was away on sabbatical leave, that I took in the fall of 1961.

Q Will you tell us the date of that leave?

A September 1, 1961 to February 1, 1962 -- no, excuse me -- yes, that is right.

Q Who was charged in your absence with the control of these models of antennas, in your absence?

A Well, when my house was rented the tenants were in control of the models.

Q Was this your personal property at this time?

A No -- well, I believe my agreement with the Foundation did state that in return for our services the antennas that we constructed would be considered to be our personal property.

I am not sure of that matter, but I think we had an agreement with the Foundation to that effect.

Q A written agreement or an oral agreement?

A Written, yes.

MR. RINES: I call for a production of that written agreement.

It is becoming increasingly evident that it is difficult to conduct this examination, apparently because of, I hope, some misunderstanding on the documents that we asked to be produced.

I am going to try and conserve Mr. Mayes' time, but obviously without the material that

I believe we have clearly asked for, this is going to take a longer time.

MR. MANN: Off the record.

(Off the record.)

BY MR. RINES:

Q From your recollection, Mr. Mayes, and we are not going to hold you to it if it turns out to be wrong, will you tell us what you think the substance of that agreement was, for the record?

A Well, we asked them for a sum of money to enable us to buy materials to construct an antenna that would operate in the television frequency band.

This was not the prime purpose of our antenna research at the University, and we thought there was a possibility of commercial application of the concepts, and we wanted to test the feasibility of building and constructing a full scale antenna for operation at VHF frequencies.

We asked the Foundation for money to do this and they gave us a grant, and we subsequently constructed the antenna.

Q By "we," you mean?

A Bob Carrel and myself and some

technicians in the lab.

Q Would you tell us which technicians you used on that project?

A I don't remember.

Q Can you check it?

A I don't think that there is any record on it.

Q Do you think Mr. Carrel would know?

A He might.

Q Would you ask him and see if you can identify for us these technicians, their names and addresses.

MR. MANN: Mr. Carrel, you will appreciate, is not at the University; he is down in Texas someplace.

BY MR. RINES:

Q To make sure I understand, Mr. Mayes, while the work of the antenna laboratories of the University of Illinois was in this log-periodic field, it was you and Mr. Carrel who felt that this work had some application in the commercial home television receiving market, and therefore you asked the Foundation to grant you and Mr. Carrel funds to adapt this to a prototype for that home

television receiving market?

A Yes, yes.

Q And this is what that agreement would relate to?

A Yes.

Q Where was the work done in doing this adaptation?

A In was done in the University Laboratory.

Q Of the University of Illinois?

A Yes.

Q In other words, you used their facilities?

A Yes.

Q Was it done during your regular working hours?

A Well, part of it was and part of it was done probably in off hours.

At the time, when we say, regular working hours, it is hard to distinguish when you sometimes work a 12-hour day, whether you are working regular working hours or whether you are not.

Q And these technicians that you used, they were members of the staff of the University of Illinois Laboratories?

A Yes.

Q And I presume you used the test equipment of the University of Illinois?

A Well, actually, we do not have facilities at the University of Illinois to test antennas completely in this frequency range.

We usually use scale models and work at much higher frequencies for our antenna testing there.

We did perform some tests, such as were possible with the equipment that we had.

Q Did you use any of the machine shop facilities of the University Laboratory?

A Yes.

Q Was it your understanding that this agreement you had with the Foundation gave you permission to use these facilities?

A There was no specific mention of the use of facilities.

Q What was your understanding, that they had any objection to that?

A They had no objection.

Q Did you ask the University of Illinois' permission to accept this grant from the University of Illinois Foundation, or wasn't this necessary?

A I don't believe it was considered necessary. I don't recall ever discussing it with them.

Q Can you tell me why -- I am trying to get at your understanding of the relationship between the University and the Foundation, what that might be; will you tell me why you did not consider this necessary?

A Well, as I understand the Foundation is established for the purpose of promoting the interests of the University.

Therefore, the interests of the University and the interests of the Foundation are closely related.

Q Do you draw a distinction in your mind between them, though they are labeled separate organizations; insofar as the operation is concerned, do you draw a distinction?

A I think the distinction is primarily a legal one.

Q In actual fact then I gather you feel that they work together as a unit?

A Well, not in all matters. In certain matters they do.

Q In these kind of matters, is that right?

A In matters pertaining to raising funds for the benefit of the University, the Foundation is charged with these responsibilities.

Q And you would characterize that they are working as a unit in that fund-raising capacity with the University?

A Well, I would say that they are primarily, they have this responsibility, and not necessarily the University has that responsibility.

Q When you received the grant from the University Foundation, did you presume that this was all right with the University because it was the Foundation?

A Yes.

Q Was this grant actually written as a personal contract between the Foundation and you and Mr. Carrel, as individuals?

A No, I don't believe so. The only document I believe is the request that we sent to the Foundation.

Q And how did you know the request was accepted?

A Well, we got the money.

MR. MANN: Mr. Rines, apparently there

seems to be some question as to what the nature of this agreement might be that Dr. Mayes mentioned earlier as being in existence.

BY MR. RINES:

Q Well, let me say this, Dr. Mayes. You are going to look for whatever agreements there are, call it a request, or whatever document, a receipt for money or whatever it may be.

This is what we are generally talking about.

A Yes, I understand.

MR. RINES: I would also like to call upon the Foundation for any copies of any minutes that may reflect this transaction, or other writings.

BY MR. RINES:

Q Would you be good enough, Dr. Mayes, to look at the bottom of Page 2 of the agreement B-24.

I note there is a reference to an Exhibit A, which does not appear with the six sheets of this group exhibit.

I would ask you, in cooperation with

your counsel, to modify that Exhibit A to delete from it any confidential patent application information, and otherwise to supply us with a copy of that exhibit.

A I may say, I don't believe that Exhibit A ever existed.

Q Well, since the compensation to be paid under paragraph 3 bears upon what was listed in Exhibit A, can you tell us what your recollection is of which were the inventions and discoveries that you and they had in mind of those that you worked on prior to this agreement?

A These would have been inventions which are the subject matter of patents applied for in the name of Mayes and Carrel, and later Carrel and Mayes.

Q Would they be these two patents that I show to you, to the best of your knowledge?

A Yes.

MR. RINES: I would like to read the numbers into the record as RE 25,740, which was reissued from 3,108,280, and 3,150,376.

BY MR. RINES:

Q Do you feel that there were any others

or are you reasonably sure these were the only two?

A There was another application. There is another issued patent which was applied for prior to the date of this agreement, but which has not been used in any way by JFD.

Q So you would not have been paid under that?

A No.

Q Now, so that I am clear, what did Mr. Carrel do, subsequent to October 31, 1962, if anything, in connection with your activities of development for JFD Research and Development Laboratories?

A Nothing.

Q To your knowledge he never gave any consulting help or other information to JFD subsequent to this date?

A No, sir.

Q Would you look at patent 3,150,376, and tell me, -- Carrel and Mayes, and tell me what the filing date was?

A April 3, 1964.

Q Where was Mr. Carrel in this period, to

your knowledge, between October 31, 1962 and April 3, 1964?

A He was employed by Collins Radio Company.

Q Do you remember the circumstances of the filing of this April 3, 1964 application, while Mr. Carrel was at Collins Radio?

A Well, what sort of circumstances?

Q Well, your first case was filed in 1960 and this one was filed four years later.

Do you remember what event or circumstance delayed the filing of the two cases?

A I don't remember why it was delayed.

Q What would you characterize as the distinction, from a technical point of view, between this Mayes and Carrel patent and the Carrel and Mayes patent?

A The concept of multiple zones.

Q Which appeared in which patent?

A In the Carrel and Mayes, the later one.

Q Was that embodied in the model which you built under this grant, that you and Carrel built under this grant?

A No, it was not.

Q Do you know when that idea was conceived?

A I don't remember exactly the date, no.

Q Do you know whether you had that idea at the time that you were building these models under the grant from the Foundation?

A I don't recall.

Q Will these notebooks that we referred to, to the best of your recollection, contain entries as to when you and Mr. Carrel came upon this multiple zone idea?

A Yes, they should.

Q Was this multiple zone idea of the Carrel and Mayes case actually transformed into a physical piece of working antenna?

A Yes.

Q Do you remember about when?

A No.

Q Would you remember about when relative to the time you were building the model under the grant from the Foundation?

A No.

Q Was it before or after?

A I don't remember.

Q Was the model of the Carrel and Mayes multiple zone concept in existence at the time that

you entered into this consulting agreement of October 31, 1962 with JFD?

A Yes.

Q Was it shown to JFD?

A I don't remember.

Q At any time?

A It was discussed with them, I don't remember whether the model was actually shown to them or not.

Q Did they ever build, to your knowledge, a piece of commercial equipment that embodied the invention you believe to be covered by the Carrel and Mayes patent?

A Yes.

Q Was this the first antenna they built of a log-periodic type?

A No.

Q Was it within that first series you started to talk about, the LPV series?

A No.

Q Do you remember about when they came out with this?

A I don't have the documentation. There are some documents in possession of JFD's attorneys

indicating the date.

I don't remember the exact date at this time.

MR. RINES: I would like to call on Mr. Cass for the documents.

MR. CASS: For the record, the documents that I am going to give you now, Mr. Rines, are documents which were given to Mr. Mayes by direction from myself to Mr. Grant at the JFD Laboratories in Champaign to bring with him to this deposition.

But as I understand it, these were not in your possession?

THE WITNESS: That's right.

MR. RINES: While Mr. Mayes is looking at those documents I would like to mark as Exhibit B-25 the Mayes and Carrel patent document RE-25,740.

And as Exhibit B-26 the Carrel and Mayes patent 3,150,376.

(Said documents were marked for identification as Exhibits B-25 and B-26.)

BY MR. RINES:

Q Have you had a chance to refresh your recollection?

A Yes.

Q Would you please tell us the answer, as best you can?

A Would you rephrase the question; I am not sure of the question.

MR. RINES: Would you refresh us both?

(Record read by the court reporter.)

BY THE WITNESS:

A Do you want the date when it was being developed, when the earliest date of development was, or when it was actually --

BY MR. RINES:

Q You have been shown some documents, Mr. Mayes; can you answer when the first work was done by Mr. Carrel and you relating to Exhibit B-25?

A No, I don't remember the first date of that work.

Q How about Exhibit B-25?

A That work was done in the summer of 1959. It was begun in the summer and carried into the fall of 1959.

Q When was the first antenna of the type covered by Exhibit B-26 made by you and Mr. Carrel?

A I don't remember.

Q Do those notes help you to ascertain whether there was in existence an antenna of the type shown in B-26 at the time that you entered into the October 31, 1962 contract with JFD?

A No, they don't bear upon that point.

Q Do you know the answer?

A I believe the answer is yes, that there were such antennas in existence, but I don't remember.

Q What pertinence are these documents, in refreshing your recollection as to the models corresponding to B-26?

A These documents have to do with the models that were constructed by JFD at their laboratories.

Q Where?

A Beg pardon?

Q Where, which laboratories?

A In Champaign, Illinois.

Q And those dates are what?

A The drawing in here indicates the date

of November 18, 1963.

I don't believe that this is the earliest date. In fact, I'm almost sure that it is not.

This is a drawing of a multiple zone antenna, such as covered by Exhibit B-26.

Q Would you consider or do you know whether JFD had any earlier drawings relating to that antenna?

A I do not know whether they do or not.

Q Did you see this particular drawing, to the best of your recollection, about contemporaneously?

A Yes.

Q Is any of that in your hand?

A No, I don't believe so.

Q Do you know who drew it?

A The initials indicate that Ron Grant drew it.

Q And he is now the chief engineer in the JFD design laboratories?

A Yes.

Q This sketch, labeled VU LPV-18-L, dated 11-18-63, carries the initial, it looks like "E.G." or "E.J."

Can you tell us what that is?

A I believe it is E.J., and I have seen him sign documents such as this with such initials.

Q Seen who sign it?

A Ron Grant.

Q So his real initials are R.G. and he signs E.J.?

A Sometimes he does.

MR. MANN: Off the record a moment.

(Off the record.)

BY MR. RINES:

Q Mr. Mayes, your counsel has invited your attention to the fact that the Carrel and Mayes patent, B-26, although filed in April, April 3, 1964, was, at least in part, originally filed upon back in December, December 15, 1960, in a first application, which in column 6 of the patent, it is indicated was abandoned.

And that it was refiled in a second application called a "continuation in part", 299,715, on August 5, 1963.

And that that in turn was abandoned.

And that therefore the application of April 3, 1964, had some bearing on the earlier filed cases.

That may clarify it for both of us.

Can you remember right now whether there was any additional matter added to the application that matured B-26, that was not present in the very earliest filings, back on December 15, 1960?

A I don't remember.

Q Do you have any recollection of the fact that this application had to be refiled?

A Yes, I remember now that this procedure of filing was pursued.

Q Do you remember why?

A I don't remember the details of why it was pursued.

Q Do you recall whether the first case had been allowed and it was just not allowed to issue?

A I don't remember.

Q Do you know whether it had anything to do with the subject matter of delaying the issuance of the patent until a more basic patent could issue?

A No, I don't remember. I don't believe that was the case.

Q I notice on this document, this temporary sketch, VU LP18-L, 11-18-63, just below the center,

the language "3/4 inch booms", and a showing of two rectangular cross sections, with circles inside them, shown vertically spaced by a distance defined as "S", and with a formula to the right indicating a ratio $\frac{S}{D}$, where "D" is indicated as the diameter of the circle within this cross section, equals 2.0.

And I would ask you if you would explain to us what that represents?

A That represents the method of constructing the antenna was indicated from this drawing to be two booms which were rectangular, or square cross sectioning, rather, 3/4 inch dimensions on the side, which were separated by "S" center-to-center spacing. It had the indicated approximate value of $\frac{S}{D}$.

I don't believe that is the exact, but at least the 3/4 inch booms and the value of "S" is indicated there.

Q So, from the mathematics here "S" would be 2 times 3/4 of an inch or about an inch and a half on centers, is that correct?

A Well, no, there is a separation between the two booms in addition to the three-quarters.

Q Oh, could you tell me what the separation between the two booms, from that mathematics, was to be?

A It is not clear from the drawing exactly what dimension "D" is.

Q I interpreted the parenthesis, when it said 3/4 inch booms, to be the value on the side.

A Yes, I think that would be correct.

Q So if we assume --

A This "D" that is shown here is not --

Q Well, doesn't that form a right triangle, as being the hypotenuse, where two sides meet?

A Well, that is what it looks like, but I think it would be more appropriate to have it here, going up and down. I am not sure what the final dimensions are that were used.

Q Do you remember approximately what the dim ensions were?

A As I remember, the center-to-center spacing that was recommended for the construction of the insulator mold earlier in this program was 1 and 3/4 inches.

I am not sure that that was carried

through to the final antenna.

Q Who made that recommendation?

A I did.

Q When?

A I don't remember exactly, but I remember that it was somewhat prior to actually going into the engineering of these models, in order to give them time to tool up for some production parts early, so to speak, before the engineering prototypes were actually available.

Q Had you seen, prior to this recommendation, any other log-periodic type antennas having two spaced booms like this?

A Yes.

Q What and where?

A In the Antenna Research Laboratory of the University.

I think almost without exception all our antennas were built using this type construction.

Q Now, so we understand each other, what type construction?

A With the two booms spaced-apart, one above the other.

Q Will this be true of the antennas that you show in the photographs we have asked for production?

A Yes.

Q And how were these antennas held spaced-apart?

A With dielectric spacers.

Q Can you tell us why this construction of the two booms was used?

A In our University research models?

Q Yes.

A The original work that Dwight Isbell did called for investigation of a number of different models of the antenna, in which several perimeters describing the antenna construction were to be varied.

He devised this method of feeding the antenna with two rigid conductors in order to make it easier for him to change the perimeters of the antenna.

He used snap-on type dipoles, which could be moved back and forth on the antenna without rigid mechanical contact. I mean, they made a wiping contact with the booms. This proved

to be a very simple method of construction of antenna laboratory models so we maintained that method of construction throughout much of the experimental construction program that went into these antennas.

Q Would it be fair to say that Figure 2 of the Mayes and Carrel patent and the Carrel and Mayes patent, in the description of those constructions, corresponds to what you mean by saying that, these two booms in these antennas?

A Yes.

Q Is there anything wrong, technically, in the description in the two patents or either of the patents B-25 and B-26, with regard to Figure 2 of those patents, as far as you know?

A Not as far as I know, no.

Q Is there anything left out of these patents that, to your knowledge is necessary to the practice of the invention as you and Mr. Carrel and Mr. Isbell had conceived the invention at this time?

A We believe the descriptions to be complete.

Q And you did not conceal or withhold any information with regard to the operation of these

antennas that you felt was essential to make them work?

A No.

MR. RINES: Off the record.

(Off the record.)

MR. RINES: We have just been informed that with respect to the JFD LPV VU series of antennas, this sketch VU LPV-18L is the earliest documentation found to date relating to JFD's development of this LPV VU series.

I would ask the court reporter to mark this sketch B-27. It is a sketch of 11-18-63.

(Said sketch was marked for identification as Exhibit B-27.)

BY MR. RINES:

Q I think we can leave the matter of your first agreement for the time being, Mr. Mayes.

And I do note that this agreement was to terminate under the provisions of paragraph 4 in two years, or, at the option of JFD it could be renewed or extended for an additional three-year term.

Can you tell us whether this agreement

is still in force, whether it has been extended?

A It has been supplemented; I mean, it has been replaced by a new agreement.

Q Do you remember approximately when?

A I believe it was about 6 or 8 months after the renewal. This agreement was renewed at the end of the two-year term, and then it was subsequently replaced by another agreement sometime afterwards.

MR. RINES: I would like to ask your counsel, do I understand that we are going to have produced all subsequent agreements?

MR. CASS: Yes, with the amounts of money deleted.

BY MR. RINES:

Q Under this new agreement, since we don't have it with us, Mr. Mayes, what kind of changes were made in the relationship between you and JFD or the JFD Research and Development Laboratory?

A There were two types of changes. One of them was, of course, relative to the dates of the agreement.

The other one was relative to the

compensation, in which an additional type of compensation was defined, wherein the recognition could be given to other individuals employed by JFD in the matter of compensation for inventions.

Q It is not quite clear to me why one would have to make an agreement with you, why JFD had to make an agreement with you to compensate other employees.

A What it amounted to was a change in the amount of compensation, so that this could be possible.

Q Oh, a reduction in your royalties percentage?

A Yes -- well, not a royalty, a fee.

Q Well, what do you think a royalty is?

MR. CASS: Do you want this on the record?

MR. RINES: Yes.

MR. CASS: Are you asking him what his definition of a legal term is?

BY MR. RINES:

Q What do you consider to be a royalty, as a scientist, what is the word of art?

A Well, a royalty is a payment which is

made to the holder of a patent, in return for a license under which he can manufacture.

Q Do you know that the word royalty is used for other things than patents?

A Well, it used with regard to copyrights, I believe, also.

Q Do you know that it is used in other ways besides copyrights?

A No, I did not know that it was used in any way other than I have described.

Q I would like to ask you, Mr. Mayes, to put yourself back mentally to the first time that Mr. Isbell informed you of his design or concept that is shown in his patent 3,210,767.

Do you recall, roughly, how this disclosure to you took place?

A I don't recall the specific instance, but I know that the relationship between Dr. Isbell and me was such that we could discuss, incidentally, at most any time when we happened to bump into one another in the laboratory, what he was working on.

And in some cases, upon the examination of some of the experimental equipment that he was

using and the models, we would talk about what he was doing.

Q But there is no event that stands out in your mind as the day when he came to you and said, here is a good idea?

A No, no, I don't remember that it happened that particular way.

Q What type of work in log-periodic antennas had preceded this concept by Mr. Isbell at the laboratories of the University?

A These antennas were primarily of a different type of construction, employing sheet metal, from which various geometric configurations were cut and employed as antenna elements.

Q In connection with the sheet metal antenna elements, and I am now talking exclusively before Mr. Isbell came up with the concept of his patent 3,210,767, so far as you were aware, in connection with the sheet metal antenna elements had there been prior work by others suggesting the use of a plurality of these antenna elements in-line, the length of which successively decreased toward the feed end, logarithmically?

A The geometric configuration that was used

when the sheet metal antennas were built obeyed the same arithmetic laws that the linear elements, the log-periodic type of array.

However, there was no instance of a conventional dipole element being employed in these antennas prior to the work that was done by Isbell.

Q I notice you used the word "conventional". We certainly could characterize some of the sheet metal devices as dipoles, but they were planar dipoles as distinguished from a rod or a wire dipole?

A There was no readily distinguishible dipole as such in the sheet metal structures.

Q Do you teach a course in elecmetric wave theory?

A Yes, I do.

Q Do you teach mathematics?

A Yes.

Q What is a mathematical concept of a dipole?

A A mathematical concept? I am not sure that I would say this in terms of mathematics. It is always in terms of physics.

Q Fine, fine, physics. What is the physics

definition of a dipole?

A Well, it depends on what kind of field system you are talking about, whether you are talking about an electromagnetic field system.

Q Well, let's talk about an electromagnetic field system, a radio wave field system; what would be the generic definition of dipole?

A This would be an element which is composed of two parts, which is usually excited by applying alternating current generator, usually a radio frequency, to the gap between the two parts of the dipole.

Q Can one of those parts be grounded?

A Generally we speak of a dipole in terms of a balanced system, in which case the potential of each half of the dipole with respect to the ground is sustained, except for side.

Q There is no such thing as an unsymmetrical dipole?

A Yes.

Q Tell us about that.

A In the unsymmetrical dipole the two parts of the dipole are not necessarily the same dimension.

Q Or the same potential at the inner points of the feed?

A Well, it would still be fed, usually, with a balanced generator.

Q You know of no dipoles that are fed unsymmetrically?

A I just described one which is fed unsymmetrically in my understanding of the term "unsymmetrical dipole."

Q Let's accept your understanding for the moment.

Suppose I took a dipole element and connected it to one terminal of generator, and then I used as my other dipole element a counterpoise or ground surface, which I connect to the other terminal of a generator.

Is that any less of a dipole?

A I would call that a monopole.

Q A monopole; in other words, the distinction in your mind is that if I have a ground plane, as distinguished from a plane that is above ground, that you would only refer to the plane that is above ground as a dipole element?

A Well, I would refer to a dipole as only

those elements where there is a similarity between the two halves of the element.

And in this case, a ground plane or a vestigial ground plane of some type would be a, as you put it, a counterpoise, or a ground plane part of a monopole, rather than -- not a dipole.

Q Now let's discuss its function. Would, for purposes of a lay judge, it be fair to say that this counterpoise or ground plane acts as a mirror to give sort of a mirror image of the dipole element?

A Yes.

Q So that this system of a dipole element and a ground plane acts electrically as if it was not just a monopole but two dipole elements.

Is that true?

A In part of space.

Q Yes.

A In certain regions of space this is true.

Q Now, is this an unusual definition of dipole that we are discussing, or is it something that is accepted and understood?

A Well, I am not sure exactly what your

point is.

Q Our discussion up to now.

A Because you seem to refer to what I would call a monopole you want to refer to as a dipole. This is confusing.

Q I will use your terminology. Is it correct that a monopole acts in the same fashion as a dipole, and that the ground plane acts, in effect, like a mirror image of the monopole element in space?

A If it is large enough.

Q Well, I am assuming that we are designing an antenna that is going to work.

A Well, it can work and still not give a mirror image. I mean many antennas which are monopole antennas to my way of thinking have ground planes which do not make perfect mirror images of the monopole element.

Q And there are many that do make a perfect mirror image?

A Well, they are pretty few and far between. Most of them don't make a perfect mirror image.

Q Let us take my condition now for a moment, where they do make a mirror image.

A This is an idealized case.

Q Does this get any analogy at all to your description of the sheet metal elements with the proper log-periodic tapered dimensions that you say were being used prior to Mr. Isbell's work?

A I don't see it.

Q Will you describe to us by means of a sketch what you were talking about in terms of the planar dipole elements?

A Planar, log-periodic elements?

Q Yes.

A These are hard to draw.

(Whereupon, this deposition was recessed until 2:30 o'clock p.m. of the same day.)

IN THE UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF ILLINOIS

EASTERN DIVISION

THE UNIVERSITY OF ILLINOIS FOUNDATION, Plaintiff and Counterclaim Defendant, vs. BLONDER-TONGUE LABORATORIES, INC., Defendant and Counterclaimant, vs. JFD ELECTRONICS CORPORATION, Counterclaim Defendant.	Civil Action No. 66 C 567

30 West Monroe Street, 10th Floor
Chicago, Illinois

Thursday, October 27, 1966,

2:30 o'clock p.m.

The taking of the deposition of PAUL E. MAYES was resumed pursuant to recess.

PRESENT:

Mr. Mann
Mr. Marshall
Mr. Rines
Mr. Phillips
Mr. Cass
Mr. Fox

PAUL E. MAYES,

having been heretofore duly sworn, testified further as follows:

DIRECT EXAMINATION
(Resumed)

BY MR. RINES:

Q Before our luncheon recess, Mr. Mayes, you were making some sketches on a yellow sheet of paper.

MR. MAYES: May I ask the court reporter to mark this sheet as Exhibit B-28 for identification.

(Said document was marked for identification as Exhibit B-28.)

BY MR. RINES:

Q Would you describe what you have drawn, sir?

A These are rough sketches -- sheet metal variety of log-periodic antennas that were under investigation in our lab prior to Isbell's development of the log-periodic dipole array.

The two sketches here are examples of the type that were being worked on. These are typical, but not necessarily the only variety

under investigation.

In particular, just before the discovery of the dipole array, Isbell was working with log-periodic antennas with multiple elements, that is, with more than the two elements which are shown in each one of these two cases.

Q Now, would you, alongside the upper sketch, give us a sort of a side view of that antenna, off to the right?

A These two elements were arranged in various configurations during the investigation.

In one instance they were planar, side view being just two straight lines. And in other instances they were non-planar, in which there was an angle orientation, other than 180 degrees between the two elements.

In still other instances there were more than two elements used in the configuration.

Q Would you label the non-planar side view with the words "non-planar."

And am I right that if I were looking at this antenna in the orientation of the antennas we are talking about in this litigation, I could take

the yellow sheet and turn it on its side, and then the upper line would represent, say, the upper portion of the first sketch you have drawn, and the lower, downwardly slanting line, would represent the lower portion?

A Yes.

Q Would you label the upper portion "A", and the lower portion "B", and do the same on --

A Yes.

Q Now, on the sketch to the right, A-B, will you show us where the transmission line feed was connected?

A (Indicating.)

Q You have labeled that "feed" at the close end?

A Yes.

Q Might we label the antenna elements of the part "A" that go to the left, 1, 2 and 3.

And those that go to the right as 1', 2' and 3'.

Would you similarly, starting with the largest elements on "B" label them 4, 5, 6 and 4', 5' and 6'.

Would you be good enough to put those

numbers at the corresponding places, make dots or points, or whatever you wish on the side view sketch.

And the ones underneath, please.

Thank you.

Now, would you label the feed end on the first sketch.

Starting at that feed end, can you tell us how this prior log-periodic antenna was designed in terms of the length of the successive antenna elements 3, 2, 1, coming backwards from the feed?

A One of the simplest ways to describe it -- it is not a very good sketch for that purpose -- is in terms of a virtual apex point, from which radial lines could be drawn, from which each of the elements terminate.

Q Has that anything to do with the formula you referred to a little earlier?

A Yes.

Q Would you explain that relationship for the record.

A Well, the length so described would be related by the corresponding dimensions of adjacent elements on the structure, being in the ratio which remains constant for all adjacent pairs of elements.

Q Dr. Mayes, if I took, for example, any one of the elements 1, 2, 3, and said that in connection with, say, the intermediate element No. 2, that we call that length L_n.

A Do you want to refer to that as L_n, rather than L_2?

Q I think we will make this L_n.

A And which length?

Q The length of the element 2.

A On which side?

Q Either side.

Now the next adjacent smaller antenna element would be 3, is that correct?

A Yes, on this side.

Q Would you call that length $L_n + 1$.

Can you give me the mathematical formula of the log-periodic antenna of the type that you state had been worked out before Mr. Isbell made his contribution that relates those lengths L_n and $L_n + 1$.

You have written $\frac{L_n + 1}{L_n} = \text{Tau}$.

Would you tell us what Tau is?

A Well, it is the ratio of $L_n + 1$ to L_n. $L_n + 1$ and L_n could designate any two

adjacent elements, of course, not particularly elements 2 and 3.

73 Q Along the whole array?

A Yes.

Q Could you tell us what values of Tau were used in the work at the University of Illinois, prior to Mr. Isbell's invention?

A No, not specifically.

Q Don't you know that some of them were less than 1?

A Yes, but I am not prepared to give a lower bound, necessarily.

Q But they were less than 1?

A Yes, in this definition.

Q Now, I would like to ask you to give the separation between the element 2 and the element 1, the nomenclature $\triangle S_n$

Q Now, would you mark for me the spacing corresponding to the next element $\triangle S_{n+1}$?

Would you tell me what relationship for those spacings between successive antenna elements of this log-periodic antenna, -- what relationship those quantities have had to each other in the prior work at the University of

Illinois?

A Do you want the ratio of these two spacings?

Q Please, the ratio of $\Delta S_n + 1$ to ΔS?

A It is the same as the ratio between the lengths.

Q It equals Tau?

A Yes.

Q I don't think it is necessary to illustrate any further details at the feed, but is it a fair statement that those antennas are fed in series by a common feeder?

A What antennas are you referring to?

Q All of the elements, 1, 2, 3, and so forth.

A Well, these two sheet metal pieces are elements in the sense of the antenna. Here is the feed point.

Q Yes, now what I am saying is, are the elements 1, 2, 3, and the elements 6, 5, 4 all fed in series by this feeder?

A No, I would not say so.

Q How would you say they were fed?

A Well, I would say that these are two antenna elements here (indicating), which are

excited by a balanced generator at the feed point.

Q Does the feed alternate in phase along the antenna, viewing both these elements together as the antenna?

A There is no distinct transmission line as such on the structure on which you can make statements about phase. In fact, there is very little known about the actual current distribution on this type antenna, in order to be able to make any definitive statement, as far as I know, about the phase currently being employed on that structure.

Q Could you draw me a simplified equivalent diagram of that particular antenna, to show me how the feed connects to the successive dipole elements?

A Well, this is the only diagram that I can draw of this particular antenna. I don't know how you could draw any simpler diagram.

Q Is it true that the elements 1, 2 and 3 are all connected at successive points in series along the element 8-A?

A I would not use that language to describe it, no.

Q Well, is it not true that first 3 is fed, and then next in the series is 2?

A Well --

Q And then the next in the series is 1?

A Well, I think what you are trying to construe is, this is a transmission line, that this part of the element is a transmission line, in which case I would not describe these elements as being in series with that line.

Q No, I didn't use the words "transmission line."

The transmission line I mean is what is going to come into the feed point.

And from that feed point is it true that 3, 2, 1, et cetera, are fed in series as the current passes along the antenna -- A?

A The definition of a series connection of elements has to be with respect to some other circuit wiring of some kind. I don't see that we can necessarily apply that description to this structure.

Q Would you trace for me the path of the current coming in the two feed points, energizing this antenna and launching into space.

A No.

Q You don't know?

A I don't know. In fact, I don't think that anybody can describe what the actual current distribution is on this structure, except in terms of the fact that we do know that it dies off quite rapidly beyond a certain point on the structure. This is about all that is known about the current distribution at the moment.

Q So that as the current progresses from the feed point, past the successive antenna elements, its value decreases?

A That is true.

Q Therefore, is it fair to say that each of the successive antenna elements has extracted a current as the current has passed along?

A Yes, I think that is a reasonable way to describe it.

Q You mentioned that the antenna A-B had been operated in these tests prior to Mr. Isbell in various orientations. And you illustrated a side-by-side or planar orientation to the right, and then underneath that one you have labeled "non-planar."

Was the angle of this non-planar thing varied from the particular angle you show?

A Yes.

Q Within what limits was it varied?

A Well, of course at 180 degrees it becomes a planar structure, which was one of the types that was investigated.

It was decreased from 180 degrees to some value which I don't recall now, as being the minimum value, but the point that was being illustrated was the deterioration performance, particularly at input impedance as a function of that particular angle.

That was not carried to, for example, to zero value.

The investigation was terminated before the angle was allowed to go to zero.

Q All right, would you draw me, for example, some of the limits, realizing that we don't know the precise angle, to illustrate to the court how the "V" was tested at different angles, because I am going to ask you how the pattern deteriorated.

If you will, please, and perhaps you should do it on a second piece of paper.

A Well, starting with the planar structure, and then we change this angle successively, something

probably approximately like that (indicating).

Q Well, when you said, zero, would you illustrate what the zero condition would look like?

A The zero condition would be like this (indicating).

Q All right, would you indicate the feed points for me, on each of those, by black dots.

A Yes.

Q Thank you.

Now, the antenna elements in the view you have shown would extend toward me out of the plane of the paper, and into the plane of the paper at positions corresponding to those you have numbered on B-28?

A Well, there is some difference of opinion about what constitutes antenna elements here, which we have going back and forth, so perhaps it would be best to say the parts of the structure labeled 1, 2 and 3 protrude in those directions.

Q If I looked at it from the top, for example, what might it look like in connection with any one of these?

A Well, what are you defining as "top"? Is this looking at it from the top?

Q Yes, all right; in other words, if I looked at it looking down at it it would be a view somewhat similar to "A", showing elements 1, 2 and 3 going out to the side, is that right?

A We had better label this Figure 1, since "A" appears in several places.

Q "A" in Figure 1?

A Correct.

Q Now, will you tell us what happened as the "A" and "B" elements were brought closer and closer to what you described as the zero angle point?

A Well, first of all, in this planar configuration the radiation pattern is, by symmetry, equal on both sides.

Q Would you label that?

A You have drawn a Figure 8 to the left, and to save time, would it be a fair statement to say that this plots the radiation received or transmitted by this antenna at different successive angles in front and in back of the antenna in the

plane shown?

A You can't distinguish front from back in this particular antenna, but one side to another, yes.

Q Opposite sides?

A Yes.

Q Now, what would the similar radiation pattern look like in connection with the next items, where you have bent these two elements toward each other?

A Maybe we should label these.

Q Yes, you are calling that one (b)?

A Yes.

This is a reference line, it has no connection with the antenna structure, except for reference directions in space.

Q It now appears, talking about "forward" as being above the line you have drawn, and "back ward" being below for the moment, that more radiation is being directed forward than rearward because the rearward circle is smaller than the forward circle?

A Yes.

Q What happens now in case (c)?

Well, now we find there is even less rearward radiation in our connotation?

A Yes.

Q And in case (d)?

A In case (d) there is almost negligible rearward radiation.

Q Now you mentioned that some point like that was reached where there was deterioration in performance, so that when you reached the condition "e" the performance was deteriorated.

Could you tell us what that deterioration was?

A That was in the impedance characteristics.

Q And so that a lay court can get an idea, would it be fair to say that you couldn't any longer efficiently feed energy into or extract energy from this antenna if you went to position (e)?

A Yes.

Q It would not work?

A Yes.

MR. RINES: I would like to mark this sheet of sketches Exhibit B-29.

(Said sheet was marked for identification as Exhibit B-29.)

BY MR. RINES:

Q Would you please on (c) put the same numbers, 1, 1', 2, et cetera.

So that neither you nor we will be criticized for any inaccuracy, you have actually drawn the forward radiation circles or patterns about the same in each of the cases a, b, c and d.

If you were drawing on the same relative scale, would these lobe patterns be of the same amplitude?

A I don't quite understand the question; are you trying to take into account the variation in gain which might be present in an antenna because of impedance by mismatch, for example?

Q Yes.

A No, they would not necessarily be the same. These are all more or less normalized to a maximum field intensity.

Q So that the court understands that, normalized means that you have taken a ratio of these things so that they may be plotted on the same scale?

A Yes.

Q In actual fact what happens to the

directivity pattern of this lobe in the forward direction, as we take the condition of the straight extensions (a) and (b) and move them into the V's as shown in (b), (c) and (d) of successively smaller angles?

A Well, in terms of an absolute gain this would become larger.

Q That is the directivity of the forward pattern becomes sharper, narrower, and the gain becomes longer?

A I don't know that the directivity of each individual pattern varies to a great degree, but I thought what you were asking was what the relative gain between these patterns would be, in which case, in this case where we have no back lobe, we would have a greater gain at this particular point for that angle than we would in this case up here, which has two lobes, one on each side of the structure.

Q Is it a fair statement then that the antenna with the two sides (a) and (b), extending in a line, has less forward gain than the antenna where the two sections, (a) and (b), have been

formed into a "V"?

A Yes.

Q Was this a discovery of the University of Illinois Foundation or had that general principle of taking an antenna from a straight in-line position and making it into a "V" to improve gain been known before?

A In connection with a log-periodic antenna or a log-periodic structure of elements such as shown in Figure 1 of Exhibit B-28, this phenomena was a discovery of the University of Illinois Research Laboratories.

With regard to other types of elements, such as linear dipoles, a similar sort of behavior, which is, however, phenomenally different had been known before.

Q Had been known before?

A Yes.

Q This discovery that you have shown in 29, in connection with log-periodic antennas, that you say was first done to your knowledge at the University of Illinois, was known before Mr. Isbell started his particular television work?

A Well, actually Mr. Isbell did this work

also, on the non-planar log-periodics of the type shown in Exhibit 28.

Q Yes, I think you testified that Mr. Isbell and others had worked on the type of antenna, talking about B-28?

A Yes.

Q Now the question I am asking is, that work had preceded the work in connection with his dipole antennas for television purposes?

A Yes.

Q In fact, the work on Exhibit B-29 Mr. Isbell did with others too, did he not?

A Not that which is shown in Exhibit B-29. This was his own research project.

Q Did he publish on that?

A Yes.

Q Do you know when he published?

A No, I can't say now. I can't say exactly when it was. I know that an antenna similar to that shown in the second figure on Exhibit B-28, which I will mark Figure 2, in a non-planar configuration, was used as a reflector feed at the University of Illinois, I believe in the summer of 1959, so that the work on the non-planar

antennas would have been done paid for that?

Q Was any of this work submitted to Government purchased and used by the Air Force, to your knowledge?

A Yes, I am sure it has been.

Again, I don't have the documents at hand to say, but we do have some documents -- a survey that was made, as a matter of fact, of all of our contractors, indicating military systems, and so forth, in which our antennas have been used.

Q Do you have a copy of that survey?

A At the University Laboratory, yes.

Q Would there be a copy at the JFD Laboratory?

A No, I don't think so.

Q Would there be a copy in your personal files?

A No.

MR. RINES: I make a call for a copy of this survey if it is in the Foundation files.

If not, it becomes item No. 2 on the subpoena.

MR. PHILLIPS: Do you know if any of the material in this survey is classified?

THE WITNESS: Some of the systems in

the survey are classified, but the survey itself is not classified.

BY MR. RINES:

Q Do you know who made the survey?

A We distributed questionnaires to most of the companies on our Air Force distribution list, and I believe that I wrote the cover letter that went out with this questionnaire.

Q In what capacity did you write it, for the University or for the Foundation?

A As the Associate Director of the University Research Lab.

Q You mentioned Fig. 2 of Exhibit B-28; would it be a fair statement that the only appreciable distinction between Fig. 1 and Fig. 2 is, instead of having substantially rectangular extensions to the right and left, like 1, 2, 3, 1', 2' and 3', that the extensions are tapered, so as to get smaller at the free ends in Figure 2?

A Well, they are also tapered so that they come to zero spacing at the inner ends thereof.

Q Was it known, before even the University of Illinois Antenna Laboratories began working on

log-periodic antennas, that antenna arrays could be constructed of planar strips, and surfaces?

A Yes.

Q That antenna arrays could also be constructed of wires?

A Yes.

Q That antenna -- multi-element antenna arrays could also be constructed of tubular extensions?

A Yes.

Q If one skilled in the art, like yourself, even prior to the beginning of the work of the University of Illinois Research Laboratories, was asked to construct a multi-element in-line antenna array to produce a particular radiation pattern, did not the art tell such a man skilled in the art what would be the performance if he decided to use tubular antenna elements or flat strip antenna elements, or just wire elements in a particular configuration?

A I would say there would always be certain differences in performance, depending on the types of elements that were used; and the amount of the difference would certainly depend upon the array

configuration chosen.

So it would depend strictly upon individual designers whether or not you could, before testing, tell how much difference was going to be present by substituting one type of element for another.

Q Certainly one skilled in the art at that time would know that he could construct an antenna using dipole elements, for example, of different diameters, and know generally what the performance would be, subject to exact correction once he built it and tested it.

Is that a fair statement?

A Well, once again, it would depend upon not just the elements that were used in the array, but the array configuration, how the elements were connected, how they were individually fed, these all would have a bearing on the difference in performance that would be expected when elements are substituted, one for another.

Q Yes, this is a fair criticism of my question.

Let us assume that we decide on some

particular kind of configuration that is going to involve a plurality of successive antenna elements, spaced longitudinally along some feed part.

And that this is the same configuration that we are going to talk about throughout. We predetermine this.

Now, I say, wasn't it a fact that people who were skilled in the art at the time in question, even before the 1950's, that they knew that if they used dipoles, for example, of one diameter, they would have a certain impedance relationship as a result; if they used dipoles of a bigger diameter, bigger tubes, it would give a different impedance relationship, and a certain kind of performance.

Or if they used flat, planar strips, what kind of performance would occur with that configuration?

A I think it would be a fair statement to say that I don't know of anyone who could have absolutely predicted the difference that he would expect in performance between substituting one of these type of elements for another.

He would know in general what kind of difference to expect, but so far as being able to

give a quantitative measure of a difference, I sincerely doubt that this would be possible.

Antenna design has always been largely a matter of experimental work, and I think, whereas he could predict what sort of trends to expect, so far as being able to evaluate exactly the difference in performance of the various elements that it would have been very difficult.

Q He certainly would know, for example, would he not, that if he made the array with dipoles of one diameter that he could get a system that would work if he decided to double the diameter of the tubes?

A I would not necessarily say that because the frequency response of the individual elements is related to the diameter of the elements, and therefore this becomes a perimeter in the design. One antenna that has a certain size element would not work the same with different diameter elements in it.

Q Would not theory be able to tell him what his impedance relationship would be and what the radiation patterns would be if he changed spacing, or changed size?

76 A For most of the antenna arrays, where you get into having a multiplicity of elements the theory is inexact.

I don't think you could rely strictly upon computations to evaluate the performance in this way.

Q So you couldn't even know whether you were going to have an impedance that would work, except by taking and adjusting and trying the thing out, you couldn't predetermine it?

A I don't think so, not if you have a complicated array where you have a number of elements in the structure.

Q Thank you.

(Recess.)

BY MR. RINES:

Q In order to make the thing very clear, would it be a fair statement to say that without having tried the different orientations of the antenna elements A and B, as shown in Exhibit B-29, that you just could not theoretically predict in advance what would have happened?

A That is quite true; as a matter of fact, we were very surprised.

Q What surprised you?

A The direction of the radiation.

Q Were you surprised that you couldn't get to the point (e) and still have the thing work?

A Not necessarily, that was pretty evident.

Q Why do you say that was evident?

A Because the impedance decreases -- it is the capacitance between the elements that becomes quite large as you decrease the angle between.

Q You were not surprised when you found the two antenna sections (a) and (b), when they were in the position of (e) parallel to each other, one above the other, it didn't perform; you could have expected that from the theory you had?

A Yes.

Q I believe you stated that the first antenna that JFD made was the LPV series?

A Yes.

Q Addressing myself just to these log-periodics, you understand that?

A Yes.

Q I believe you also stated that the,

is it fair to say the prototype or the initial version of that antenna resulted from the work that you and Mr. Carrel did on your grant from the Foundation to adapt this kind of technology that had been evolving at the University Laboratories to the problem of home television reception and the like?

A Did I understand you to say that evolved from that?

Q That you were using those principles?

A Using those principles, yes.

Q And in the Foundation grant to you you adopted those principles to the specific problem of the home television type antenna?

A Yes, but I would like to indicate that there was considerable work done in modifying the work that we did on the antenna that was constructed for the Foundation.

In other words, the LPV series was not a strict follow-on of the antenna that was constructed at the Foundation.

Q Who did that work of taking what you had produced on the grant and converting it to the LPV form?

A To the best of my knowledge it was done by Mr. Holzman.

Q Would you be able to tell me his first name or initial and who he was and where he is working?

A His first initial I believe is "S", I am not sure -- Simon, perhaps, I am not sure of his first name.

Q And he was a JFD employee?

A Yes, he was.

Q In Brooklyn?

A Yes, in Brooklyn.

Q And he had the benefit of seeing the version that you had built?

A Yes.

Q Did he have that in Brooklyn?

A No.

Q Did he come out here to see it?

A Yes.

Q And did you consult with Mr. Holzman in connection with your duties in the design of the LPV series?

A Not to any great extent. I think there may have been one or two telephone calls where he

called and asked for some information.

But there was no extended consulting, as such.

Q Is it a fair statement to say then that the JFD engineers, on their own, really without any substantial help from you, did the design to convert your antenna, as you developed it on the grant, into the actual form of the LPV series?

A In the first series, yes.

Q In the first series?

A Yes.

Q Do you know whether you were paid by JFD, under your agreement, for any sales made in the first series?

A I was not.

Q You were not?

A No.

Q You are sure of that?

A Yes.

Q Were you paid in the next series?

A Would you identify the next series?

Q I was going to ask you.

A I believe that the first antennas that we developed at the Champaign laboratory

were either the LPV U or the LPV ZU antennas, which I have received a percentage of the sales from those antennas.

Q And it is my understanding that you are receiving those because of the design assistance that you gave JFD's Champaign laboratories to make those new models?

A Yes.

Q Were you familiar, however, with the LPV series?

A Oh, yes.

Q Were you familiar with the fact that antennas of that series, while having the link variation given by the formula on B-28, had constant spacing of successive elements?

A Yes.

Q Were you consulted by JFD in connection with its advertising literature describing this LPV series and its relationship to log-periodic antennas?

A I don't recall whether this particular series -- whether I was consulted about the advertising or not.

Q I trust you would be concerned if your

name were on an advertisement of JFD that had an erroneous description of the antennas that were advertised there, would you not?

A Yes.

Q You don't recall any of this having been called to your attention?

A Well, there were some indications that -- or objections raised to the advertising by various people over a period of time after the first series came out.

Q Did you yourself raise some objections, at least orally?

A I don't recall whether there were any so-called objections raised to this particular advertising series.

There were some modifications made in some of the advertising at my request, but I am not sure it was the LPV advertising.

Q Were those modifications in the interest of presenting something more accurate?

A Yes.

Q You did not feel that what you had seen was technically accurate?

A Well, it wasn't as accurate as it might

have been.

Q Weren't some of the things that you saw inaccurate?

A Well, this is difficult to say.

Q But in your judgment as a scientist?

A Well, in my judgment as a scientist I would have said it differently than the way the advertising people would have said it.

Q My question was whether as a scientist you wouldn't have considered the way it was said as inaccurate, and you wanted to change it for that reason?

A It was not scientifically precise.

Q I would like to show you an advertising brochure that counsel gave us, discussing "At the moment of truth the JFD log-periodic LPV series."

And I would ask you whether you recall having seen that particular advertisement?

A Yes, I have seen this one or something very similar. I am not sure that it is exactly the same brochure.

MR. RINES: I would like to have this marked as Exhibit B-30.

(Whereupon, the said exhibit was marked for identification as B-30.)

BY MR. RINES:

Q That is your picture that appears in the lower right-hand corner, is it not?

A Yes, it is.

Q Can you tell us what antenna that is that you are looking at?

A It was one of the very early scale models of the LPV VU series.

Q And about when would that have been taken, to your knowledge?

A Oh, it was taken before we had facilities for doing VHF testing at the Champaign laboratories, so it was 1963.

Q Was there such a thing as the VU series in 1963?

A We were working on it.

Q Had you adopted that nomenclature?

A Yes.

Q I believe that the first sketch that was found, and I may have misunderstood this, with regard to the VU series, was dated 11-18-63.

A That's right.

Q Is there any other material relating to the VU series that you are aware of before that sketch, Exhibit B-27?

A I believe there is.

Q Will you look for it, please, and produce it?

A Yes.

Q Now, in connection with these antennas, was it your job, as technical consultant to JFD, to assist them in evaluating the performance of these antennas technically?

A Yes.

Q And to this end were measurements made in the gain, forward-backward ratios, and things of this sort?

A Yes.

Q Would it be fair to say that they were relying on your supervision of these tests for their information on performance?

A Not direct supervision.

Q Your aid?

A Some aid, yes.

Q I will call your attention, Exhibit B-30,

to the statement, "The LPV-11 maintains a front-to-back ratio of 35"--which is in heavy letters, "DB, on each" -- in heavy letters -- "each VHF channel".

And I will ask you if you know where they obtained that performance information.

A I don't know.

Q Was that a true statement, to your knowledge, at that time?

A I would object to the use of the word "maintain."

Q How about the 35 DB on each channel?

A It is quite possible it could have had 35 DB at some frequency on each channel, but I don't know that it did.

I think it unlikely that it would have maintained 35 DB.

Q What is the difference between the word "channel" and the word "frequency"?

A Channel is 6 megacycles wide, as far as frequency is concerned.

Q Do you know of any antenna in the TV field that you have had any association with whatsoever -- forgetting the word "maintains", that produces a front-to-back ratio of 35 DB on each VHF channel?

A No.

Q Another circular of JFD, given to us by your counsel, entitled "Revolution in the Air" --

MR. CASS: As a matter of accuracy, we don't represent Mr. Mayes.

MR. RINES: So the record is clear, my understanding is that you are here, Mr. Cass, as counsel for JFD.

MR. CASS: Right.

MR. RINES: And that one of Mr. Mayes' functions is the direction of the JFD Laboratories here in Champaign, and that certainly, to this extent, he has been produced by you and you represent him -- am I wrong?

MR. CASS: Well, I think you are.

Would you like to have that statement read back?

MR. RINES: Please do.

MR. CASS: I was not aware that Mr. Mayes was the director of the JFD Laboratory in Champaign.

This is your statement.

MR. RINES: We will come to whether I am in error with the word "director" in a moment.

He is certainly an employee of the laboratories.

MR. CASS: But what evidence do you have?

MR. RINES: Oh, let us proceed with the testimony.

BY MR. RINES:

Q What is your position at the JFD laboratories in Champaign?

A Technical consultant.

Q No other position?

A No, sir.

Q As technical consultant, what do you do there?

A I assist in the design and engineering of prototypes of antennas for various purposes.

I work in cooperation with the engineering staff in constructing and testing and evaluation of these antennas.

Q Is it your position that you are a member of the team of the JFD University Labs, or an outsider?

A I don't understand your terminology, JFD University Labs.

Q Have you seen any of the advertisements

that characterize your work at the JFD Research Laboratories in Champaign?

A Yes.

Q Do you agree with the characterizations of what you do that appear in the JFD ads?

A I don't think I necessarily disagree with it as the description of the work that is performed.

Q Is the following a correct statement: "Here", and that is referring to the JFD Laboratories at Champaign, Illinois, "(home of the University of Illinois) a team of scientists, graduate engineers, and technicians, under the direction of Dr. Paul E. Mayes, who helped develop the log-periodic antenna concept, continue to break through to new reception horizons."

Do you agree with that statement?

A I would say at the particular time in the history of the laboratory when this description was applied that it was fairly accurate in terms of the actual duties I was carrying on as consultant to the laboratories.

Q That is the "team of scientists, graduate engineers and technicians" were working under your

direction at the JFD Laboratories at that time?

A Well, they followed my suggestions, if that is what we can construe it means by the language "direction."

Q Well, you tell me.

MR. CASS: I object, Mr. Rines.

MR. RINES: You may object; may I ask my question?

MR. CASS: No, let me get my objection on the record. I object to the line of questioning that has been undertaken at this particular time with a witness who has appeared here without being subpoenaed, and who has in an effort to cooperate with the litigation appeared voluntarily.

And I don't even know where his expenses are coming from at this time. But the court should realize that this witness has appeared here voluntarily to assist in this litigation.

I believe it is eminently unfair to characterize certain relationships by what may have legal connotations in this lawsuit with this type of witness, and then badger him and push him into a corner and make him

admit things.

If you are interested in information, ask him about factual information, but not his opinions as to what may be legal relationships, which may in the position of the client you represent have some legal effect in this litigation.

And I want to make this objection of record in that respect.

MR. RINES: I won't comment upon the accuracy of your representation.

MR. CASS: I am pointing particularly to the statement that you made that this man is the director of the JFD laboratories by virtue of the statement that you read from that piece of literature.

Let's go on with the discovery.

BY MR. RINES:

Q Is that a correct statement of fact, Dr. Mayes, that at the time this literature came out a team of scientists, graduate engineers and technicians were "under your direction" at the Antenna Laboratories of JFD in Champaign, Illinois?

Is that or is it not the fact?

A What is the date of the literature? Let me just make a statement to the effect that when we began the laboratory --

Q Please, may I just have a yes or no answer and then you may explain.

I asked if it is a correct statement of fact. I realize some thing are difficult to answer yes or no.

Please answer it as best you can, and then explain.

A Would you repeat the question.

(Question read by the court reporter.)

BY THE WITNESS:

A I would say "no" with this qualifying statement, that the duties that were expected from me by the JFD management at the beginning of the laboratory were very similar to what might be expected of someone who would carry the title of Director of Laboratories.

This was out of necessity from the standpoint of the fact that we had inexperienced personnel to begin with and they required a greater amount of supervision than has been true in later instances.

Q Then things changed since this 1964 date?

A Yes, in terms of what my duties are, yes.

Q Will you tell us what was the change in your duties since 1964, then?

A Well, the engineers there have taken on more responsibility for the design of the antenna products, and we confer only about more basic and fundamental matters, rather than the details of designing and testing.

Q Would you say that certainly after 1964 a statement that a team of scientists, graduate engineers and technicians were under your direction at the laboratory would not be correct?

A It is very difficult to try to put an exact time on something which is a gradual more or less evolving situation, and say that is right today and wrong tomorrow.

I would not want to put it at a certain date.

Q Would it be right as late as 1965?

A Well, I would not apply it today, I will put it that way. I would not think that it would be as accurate a description certainly now as it was earlier.

Q I would like to invite your attention to

the fact that a substantially similar statement appears in 1965 in the following ad, "Get The Lion's Share", does it not?

A Yes.

MR. RINES: I would like to mark as Exhibit B-31 the 1964 JFD bulletin -- "JFD LPV".

(Said bulletin was marked for identification as Exhibit B-31.)

MR. RINES: And I would like to mark as Exhibit B-32 the 1965 JFD bulletin "Get The Lion's Share".

(Said bulletin was marked for identification as Exhibit B-32.)

BY MR. RINES:

Q I note that the back page of this advertising brochure, B-32, of JFD is a reprint of an article appearing in the News Gazette, Champaign, Illinois, Thursday, July 23, 1964.

And I will ask you if you remember that article?

A Yes.

Q Do you remember being interviewed for it by Mr. Hokamp?

A Yes.

Q Would you say that generally this was an accurate description of the facts?

A As accurate as I would expect out of the non-technical reporter.

This was in some respects a rewrite of his attempts to describe accurately what we reported to him.

Q Do you find anything in that article as you look at it that you feel is unfair to you or anyone else, or just not true, or gives a wrong impression?

A Well, there is an inversion here of responsibility on the statement with respect to licensing.

It says "JFD extends exclusive rights to the University of Illinois Foundation," whereas it is the other way around.

Q Yes.

A I don't see anything else particularly inaccurate.

Q I show you a 1966 brochure of JFD, B-14, and ask you whether you would have the same comment with regard to their characterizing you that late as follows: "Scientific engineering under the

direction of Dr. Paul E. Mayes"?

A What comments did you allude to?

Q Do you feel that by now that is no longer the case, in 1966?

A I would say it is less true now than it was before.

Q Getting back to the LPV series again, I would ask you whether you had seen this circular of JFD that I now hand you, which bears your picture on the inside page, identifying you and the Antenna Research Laboratories of the University of Illinois, and then has some performance data on the folded over page.

Had you seen that before?

A Yes.

Q Can you tell me who took the data on the basis of which the "actual gain curves" were obtained?

A I don't know.

Q The document says, "The actual gain curves measured for the LPV 11, in the JFD Antenna Research Laboratories".

You do not recall -- this is in 1963 now -- you do not recall that those curves were taken

under your particular direction and supervision?

A They were not.

Q Will you look at those curves and tell me whether you think they are scientifically correct, from your knowledge of the LPV 11?

A No, sir.

Q You do not think they are correct?

A No.

MR. RINES: I would like to have you mark this as Exhibit B-133.

(Said document was marked as Exhibit B-33 for identification.)

BY MR. RINES:

Q As a man whose picture is being used on the literature, does this disturb you?

A Yes.

MR. CASS: Would you identify that?

MR. RINES: That document is B-33.

MR. CASS: Would you characterize it so we have something in the record?

MR. PHILLIPS: It is entitled "Revolution in the Air - JFD Log-Periodic LPV TV Antenna."

MR. RINES: I would like to call on JFD for the production of the data on which the

gain curve of B-33 was produced, and the names of the parties who took such data, and copies of the data.

BY MR. RINES:

Q Mr. Mayes, what was the next line of antennas, to your recollection, that JFD came out with, after the LPV series?

A I believe it was the LPV U and the LPV ZU, I am not sure which came first.

Q And am I correctly stating your testimony in saying that these are antennas in which you did contribute to the design and for which JFD, under its agreement with you, pays you a percentage of their sales?

A Yes.

Q Thank you.

Returning for a moment, Dr. Mayes, to Exhibit 32 and the article, do you remember whether you or some members of the Foundation or JFD contacted the News Gazette to suggest this article, or vice versa?

A I don't believe there was any contact made from the University or the Foundation or the JFD personnel; with regard to some of the articles

I know this is not the case. I am not sure about this particular one.

I do know that I received several telephone calls from newspaper reporters relative to the matter of television antennas, and they contacted us and requested interviews.

But this particular one I do not recall.

Q Do you know whether the Foundation gave to JFD approval to reprint this article and use it on its advertising literature?

A I don't know.

Q Do you know whether the Foundation or the University of Illinois gave its permission to JFD to use your picture on their advertisements?

A This was discussed at one time between personnel of the Foundation and personnel of the university, and particularly there was one professor of journalism who was asked to come over and act as a consultant to the Foundation on the matter of advertising.

This was one of the matters which was discussed and the decision of that meeting was that the Foundation had no objection to my actions as a private individual, as long as the association,

my association with the University, was divorced from any references to me or use of my picture in advertising.

Q Who was this consultant from the journalism department?

A I don't remember his name.

Q Was he being consulted, do you recall, on the matter of language to be used in these advertisements in connection with your name and the University?

A Yes.

Q Was he helping to work out language that was satisfactory?

A Yes, I believe this was the case.

Q Do you know whether the policy that you stated you thought was established at this meeting, namely, I think as you put it, divorcing the use of your picture and name from your connection with the University, was followed by JFD in its subsequent advertisements?

A I believe it has been. I was not asked to police the advertising, but just from my knowledge of what has been published I believe they have followed that policy.

Q Is it fair to say that the language that is now being used, or the language that was used in the JFD advertisements in connection with your name and the name of the University, was the language agreed upon at this meeting?

A That is now being used in advertising -- I think that it is. This is my understanding.

79 Q Do you know when that meeting took place, approximately?

A No, I don't.

Q Did you have any correspondence, or the Foundation to your knowledge, with regard to that meeting or the events that came out of that meeting?

A Yes, the Foundation did. I did not.

MR. RINES: Mr. Mann, do we have all of that material that the Foundation has?

MR. MANN: In connection with the ads, I have obtained copies of a small number of additional documents, which I had intended to give you, and apparently had not done so. But I have them here now.

To my knowledge, this is all of the documents pertaining to advertising that we have.

I might as well take this opportunity to give you notices of infringement which were sent to Finney, which are apropos of nothing at this time, but we might as well put it on the record.

BY MR. RINES:

Q Counsel for the Foundation has handed us two letters. In one of them, dated October 14, 1964, from the Foundation to Mr. Finkel of JFD from Mr. Colvin, it is mentioned that apparently you and a Professor Jordan were away at some engineering meeting, so you did not have time to confer with him about quotations from the literature that JFD had been using in its advertisements, as given in a letter of October 5, 1964, to both the University of Illinois Foundation and the University of Illinois from Mr. Finkel.

Could you tell me who Professor Jordan was?

A He is the head of the Electrical Engineering Department.

Q At the University of Illinois?

A At the University of Illinois.

Q And was he one of those present at this

conference, if you remember?

A I don't remember that he was there.

Q What other representatives of the University of Illinois were present at the meeting where this matter of your picture, and so forth, was discussed?

A I don't recall that anyone was present, other than Mr. Colvin, and the journalism professor and myself.

Q Do you know whether the president of the University of Illinois was consulted or informed about this advertising use?

A I don't know, I don't know.

Q You do not know the regulations or policy at the University with regard to this?

A No.

MR. RINES: I offer in evidence as B-34 the letter of October 5, 1964 to the Foundation and the University from JFD, A-00346, through -8.

And as Exhibit B-35, the letter of October 14, 1964 from Mr. Colvin, of the Foundation, to Mr. Finkel, A-00349 and 00350.

(Said documents were marked Exhibits B-34 and B-35 for identification.)

BY MR. RINES:

Q I may have asked you this before, but I have forgotten.

Can you recollect approximately when this meeting took place to decide on the use of your name and picture?

A Yes, you asked it before and I don't recall exactly or approximately when it was.

Q I see; might I ask you, please, to try to ascertain from your records when that meeting took place and who was present.

I believe it was your recollection, Professor Mayes, that you didn't have much to do with the LPV.

I would like to show you an advertisement entitled "Revolution in the Air", and there is an ink notation on this, supplied us by Mr. Cass, it says "4 page folder reprinted from NEDA Journal."

Do you recall ever having seen that?

A I don't recall having seen this particular one.

Q Would you agree or disagree with the statement in the last sentence that "Professor Mayes subsequently made some modifications in the LPV design so as to make it more suitable for UHF and VHF television coverage"?

A Subsequent to what?

Q I don't know, would you read it in the context and tell me if you recall that?

A I cannot recall what might have been a particular reference which is made in this last paragraph as to what modifications they are discussing.

All I can say is that we continued to work all during this period of time on various models of the antennas generally and scale models for various applications to television and other possible uses.

Q I think I neglected to give the date in the handwritten note, the handwritten notation here. It was the NEDA Journal for November, 1962.

MR. RINES: I would like to offer in evidence this as B-36 -- "Revolution in the Air."

(Said document was marked Exhibit B-36 for identification.)

MR. MANN: Off the record a moment; didn't we already have a "Revolution in the Air," B-33?

MR. RINES: Let's call it "JFD Presents the Log-Periodic LPV."

BY MR. RINES:

Q Could you tell us what is meant by the words "scale" in several of your answers?

A Scale models were referred to in several answers.

Well, this is a principle that is widely used for convenience in antenna testing, where the model is built with dimensions which would differ from the actual antenna dimensions that would be used in practice. And a testing frequency is changed to compensate for the difference in size, so that the results are an accurate indication of how the antenna would behave if it were built with a different set of dimensions or used at different frequencies.

Q And if phenomena occurred that could not be scaled, then you could not be sure, could you, in testing that one frequency that a mere scaling of the antenna would give the same operation

in a widely different frequency?

A Well, I don't know what sort of phenomena you are referring to.

We are primarily concerned with the dimensions of conducting elements, and generally the conductivity elements do not necessarily have to be scaled in order to get a good indication of the performance at some widely different frequency.

So it is a matter primarily of changing the dimensions of all of the element structures.

Q Well, is it not true, for example, that even the physical length of connecting bolts and screws at one frequency are of no electrical significance, but if used at a much higher frequency are appreciable portions of the wave length and introduce electrical variations?

A You don't have a scale model unless you scale the sizes of the nuts and bolts and all the pieces that are used in the antenna.

Q So that the antennas that you state were made in scale models were scaled even down to the size of the nuts and the bolts?

A Attempts were made to do this; it is not always possible to do it extremely accurately.

Q Can you tell me, was the scale model such that you were making a piece of equipment smaller than or larger than the intended commercial piece of equipment?

A In most cases smaller than.

Q At what frequency range were the scale models to operate?

A Generally about 500 megacycles. In some instances maybe from 100 megacycles up -- probably 500 megacycles and above.

Q Could you give me a specific illustration, for example, in connection with an LPV VU antenna, intended for operation in the VHF band, what frequency was the scale model designed for?

A I think in some instances we used a 10 to 1 scale factor so that the scale model would work from 540 to 2160 megacycles.

Q This would be in the UHF band, would it not?

A Right, it would encompass that, and then some.

Q So that a scale model, constructed in the UHF band, would actually at the same time be an actual model for the UHF band, but something

that could be scaled for the VHF band?

A Yes.

Q Do you remember the first commercial antenna of JFD that you designed, after you became associated with the JFD Laboratories?

A Well, I don't remember precisely which one was first. As I said several times, the LPV ZU series and the LPV U series were among the first that were put into production.

There were other varieties of antennas that we looked at in those early months in the laboratory, which never reached production.

Q Let's take the LPV VU series first.

Do you recollect, roughly, how many elements were in the first scale model that you made?

A No, I think there is a picture in some of the advertising brochures of that antenna.

Q May I give you a brochure and ask if you would try to pick out -- I am not asking you for the very first, one of the first.

A Are you asking for antennas that were put into production?

Q No, Mr. Mayes, I was interested in what

was one of the first types of LPV VU antennas that you designed for commercial use.

A Well, we discussed that this morning. You were given a drawing which was made in the Champaign Laboratories, of one of the very earliest LPV VU antennas.

Q That would be the LPV VU-18?

A Yes.

That was one of the early ones.

Q Would you explain what the number 18 means?

A That refers to the number of elements on the antenna.

Q And were we to speak of an LPV VU 6, that would be 6 antenna elements?

A Well, for the most part I think this is an indication that has been followed in most of the model numbers. It may or may not have been faithfully followed, but it was at least a designation that was put on the original engineering prototypes to refer to the number of elements.

Q Subject to correction if there may be a deviation from this general policy, is it fair to state that if we speak of an LPV VU piece of

equipment with a number after it that that number represents the number of antenna elements in the array?

A Yes.

Q Can you tell us the salient differences in construction between the LPV VU-18 and the LPV series of antennas?

A Well, the LPV series of antennas had a single aluminum boom that supported all the elements. The elements were placed on the boom and held there by means of dielectric insulating members.

And there was a transposed feed line that was used to connect all of the elements together.

The LPV VU's, and I believe the first series was that produced for sale by Sears, were constructed --

Q Excuse me, do you mean Sears Roebuck?

A Sears Roebuck, yes, were constructed with two booms, which were used both for mechanical support of the elements and also for connecting the succession of elements to the transmission line leading to the receiver.

The 2-boom antennas were -- let's see -- the two booms were separated with a number of

dielectric spacers and the connection of the elements to the individual booms was by means of metallic brackets.

In the LPV series there were a certain number of driven elements, and then additional parasitic elements which were not connected with the transmission line.

In the LPV VU series there were no parasitic elements.

Q I show you an advertising sheet, identified as Sears LPV, at the top, which was BT-32, and ask you if what is shown there has any bearing on your last testimony.

Is this the kind of antenna, the LPV VU antenna you are talking about?

A The one at the top of the page is that type of antenna.

MR. RINES: I would like to put in evidence this document, which seems to be page 1272 of a Sears catalog, and I don't know the date, as Exhibit B-37. And this is BT-32.

(Said document was marked Exhibit B-37 for identification.)

BY MR. RINES:

Q You used the words "transposed feed line". Perhaps I can call your attention to a blueprint of the LPV-6-L, drawing 50451, supplied by counsel, updated to October, 1966, and ask if you would indicate on that diagram what was the transposed feed line of the LPV series?

A The use of the word "transposed" in this instance had a mechanical connotation, in which the two conductors of the line actually cross over to mid-point between adjacent elements on the antenna.

Q Would those be the crosses that appear between successive antenna positions, for example, the reference numeral 11 terminates on one of the elements of this transposed feed line?

A Yes.

MR. RINES: I would like to put in evidence as Exhibit B-38, this LPV-6-L blueprint.

(Said document was marked for identification as Exhibit B-38.)

BY MR. RINES:

Q I would like to show you, Mr. Mayes, the two JFD Electronic Corporation drawings Nos. 52720, LPV VU-15, and 52730, LPV VU-18.

And I would just like for you to confirm that these are the antennas of the series that you are now talking about.

A I am not sure that these drawings are accurate as to mechanical detail, but these are at least similar in appearance to those which were developed for Sears Roebuck in the fall of 1963 and placed on sale in early 1964, I believe.

I think we can refer to this document here with regard to the sale.

I will correct my recollection about when they were placed on sale. The dates given are December 31, 1963, February 11, 1964 and January 8, 1964.

These drawings were made in December, 1963, they were developed in the fall of 1963 and placed on sale in late 1963 and early 1964.

MR. RINES: I would like to mark 52720 as Exhibit B-39 and 52730 as Exhibit B-40.

(Said documents were marked Exhibits B-39 and B-40 for identification.)

BY MR. RINES:

Q I note, Professor Mayes, that you used as a reference for these dates a summary that was

handed to you by Attorney Cass, giving the dates of first production of the various JFD models.

I would like to put that sheet in evidence as Exhibit B-41.

(Said document was marked Exhibit B-41 for identification.)

BY MR. RINES:

Q This may be of no significance, Mr. Mayes, but you seem to have some reservation in a recently previous answer to the mechanical dimensions perhaps not being the same.

I just wonder is there any significance to that statement?

A Well, the way these brackets are shown I think is not accurate with respect to the type of brackets that we used in the construction of the antenna.

Other than that, I think the dimensions are probably correct.

Q You mean this is not a blueprint from which the actual antennas were manufactured?

A Well, it could be very well, it is just the matter that the picture, since it is perspective drawing, would show different detailing with regard

to the brackets. And it may be that they used different brackets when they assembled the antenna to these dimensions given on the drawing.

Q Might I ask you to indicate on the drawing, in red, and I am referring now to Exhibit B-40, the two booms that you have referred to?

A Indicate how in red, with arrows?

Q I was going to suggest maybe we could make some numbers -- 1 and 1'.

You mentioned some insulating spacers. I wonder if you could just number them "Figure 2."

One of these insulating spacers seems to be at the far end.

A There is one at each end.

Q One at each end?

A Yes.

Q Calling your attention to the spacer at the small end of the antenna, I notice a section of transmission line that seems to be held by a member to which the arrow "No. 12449.0001" is applied.

Can you identify those parts for us?

A In what way?

Q What is the function and purpose of that

number to which that arrow is indicating?

A That is a dielectric support member for the purpose of holding a rigid wire transmission line transformer in position.

Q And the position that it is being held in is a position from underneath the lower boom, 1', up in front of the antenna, then back and to a pair of means that connect that transmission line to the booms?

A Yes.

Q Is it necessary that this construction that we have just described be kept relatively rigid, relatively fixed in position?

A The principal requirement for support is to maintain the separation between those two conductors as accurately as possible.

Q You wouldn't want it to vary with the wind vibration or anything of this sort, would you?

A No.

Q Now the antenna is supported on the mast about where?

A In this position.

Q Would you sort of draw the mast in so

that we can see the position of support?

Okay.

And I notice there is an insulating spacer you have also given the number 2 there, and I presume it is for the purpose of keeping the booms at a desired distance apart?

A No, it has a multiple purpose.

Q Tell me about that.

A It also insulates the mast from the booms themselves.

Q And the region of mounting to the mast is at that insulator in this case?

A Yes, that is actually a pair, in this case two insulators, of the same variety that are used elsewhere on the antenna.

Q We seem to have a plurality of dipoles that are connected to the upper boom and a plurality that are connected to the low boom, is that a fair statement?

A Well, I would say halves of the dipole are connected to one boom and halves to the other boom.

Q Does this diagram indicate how far the booms are spaced apart?

A I don't believe it does on this particular drawing. There is a reference to a part number on the insulating members, which should be dimensioned.

MR. RINES: May I call for the production of that, please.

MR. CASS: What is that part number?

THE WITNESS: The part number is 12395-0001.

BY MR. RINES:

Q Would it be a fair statement that the LPV VU-15 antenna of Exhibit B-39 has the same construction of the upper and lower booms, 1, 1', the spacing insulators in substantially the same positions, the transmission line feed at the end as you have described, the rigid part 12449 extending below the boom and connected thereto rigidly; the insulator back from the end of the boom at which the mast mounts the antenna, and the pluralities of dipole elements, one set connected with one boom and the other set connected with the other boom, and extending generally in opposite directions to form the pairs of dipoles?

A Well, I would say dipole halves where you said dipole elements, and I would change the

statement a little bit with regard to dimensions. The number of dipoles are different on this antenna with regard to all of the dipole elements and the transmission line transformer that is employed on the front.

Q But apart from the number of elements my statement is a fair statement of the correspondence between these?

A With the changes I suggested, yes.

Q Can you tell me when you first saw either the Blonder-Tongue DART or GOLDEN ARROW antennas, Plaintiff's Exhibits U-1 and U-3?

A No.

Q Did you ever see them?

A Yes.

Q Do you think you saw them shortly after they came on the market?

A I don't know. I don't know when they came on the market so I couldn't say the first time I saw them.

Q Do you recall the circumstances under which they were called to your attention?

A I believe they were sent to the JFD laboratory by someone in Brooklyn, probably, at

some time after they became available.

MR. RINES: I would like to call for the production of the documents associated with the sending of the antennas, if there are any, and any purchase slips or invoices relating to the purchase of these antennas that the witness testified were sent to the laboratories here in Chicago from Brocklyn.

THE WITNESS: In Champaign.

MR. RINES: In Champaign from Brooklyn.

MR. CASS: As far as he knows.

MR. RINES: Yes, the witness just testified that he receives these, he thinks, from Brooklyn.

THE WITNESS: Well, they were not sent to me, they were sent to the JFD Research Laboratories, not to me.

MR. RINES: That is all I have at this time.

AND FURTHER THIS DEPONENT SAITH NOT.

(Whereupon, this deposition was adjourned at 5:00 o'clock p.m. sine die.)