

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SILICON LABORATORIES, INC.
Petitioner

v.

CRESTA TECHNOLOGY CORPORATION
Patent Owner

Case IPR2015-00615
Patent 7,075,585

Title: Broadband Receiver Having a Multistandard Channel Filter

Case IPR2015-00626
Patent 7,265,792

Title: Television Receiver for Digital and Analog Television Signals

**DECLARATION OF DOUGLAS HOLBERG
IN SUPPORT OF REPLY TO PATENT OWNER'S RESPONSES**

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	QUALIFICATIONS AND COMPENSATION.....	1
III.	MATERIALS CONSIDERED.....	2
IV.	THE '585 PATENT	3
A.	Person of Ordinary Skill in the Art	3
B.	Claim Construction	4
	Board's Previous Constructions	5
	Patent Owner's Proposed Constructions	6
V.	OPINIONS RELATING TO EACH OF THE GROUNDS.....	24
A.	Ground 1: Claims 11 and 12 are Obvious.....	25
	Grumman Renders Claim 11 Obvious	25
	Thomson Describes a Single Adaptive Filter, Not Two Parallel Filters	27
	Harris Describes a Reprogrammable Digital Filter.....	28
	Grumman Describes Two Complete Sets of Filter Coefficients	30
	I Provided a Clear Reason to Combine	41
	Grumman Renders Claim 12 Obvious	42
B.	Ground 2: Claims 13, 15, and 20 are Obvious.....	45

Zenith Describes a Select Signal Indicative of the TV Format45

The Proposed Combination with Zenith is Obvious.....52

Zenith Detects Carrier Signals Just Like the ‘585 Patent52

C. Ground 3: Claim 14 is Obvious.....53

VI. SECONDARY CONSIDERATIONS55

VII. CONCLUSION55

VIII. ACKNOWLEDGEMENT.....56

DECLARATION BY DOUGLAS HOLBERG

I, Douglas Holberg, hereby declare, affirm and state the following:

I. INTRODUCTION

1. The facts set forth below are known to me personally and I have firsthand knowledge of them. I am a U.S. citizen over eighteen years of age. I am fully competent to testify as to the matters addressed in this Declaration. I understand that this Declaration is being submitted along with and in support of Petitioner's Reply to Patent Owner's Response in Case No. IPR2015-00615 regarding US Patent No. No. 7,075,585 ("the '585 patent") as well as IPR2015-00626 regarding U.S. Pat. No. 7,265,792 (the '792 patent').

2. In this declaration, I was asked to respond to the opinions expressed by Dr. Opris in his Declaration Regarding the Validity of US Patent No. 7,075,585, Exhibit 2032 (hereafter "Opris Dec."). As described in detail in this Declaration, it remains my opinion that claims 11-15 and 20 are unpatentable, Dr. Opris's opinion notwithstanding.

II. QUALIFICATIONS AND COMPENSATION

3. I set forth my qualification and compensation in my previous declaration. See Exhibit 1009, ¶¶3-5.

4. Since submitting that declaration, the Board issued its Final Written Decision in IPR2014-00728 also involving the '585 patent. In that decision, the

Board concluded that I was “an expert in the relevant field of the invention.” Final Written Decision, IPR2014-00728, Paper No. 53 at 14 (Oct. 21, 2015) (hereafter “FWD”). Ex. 1062 at 14.

5. I previously testified that I am being compensated at my normal rate of \$275 per hour for the overwhelming majority of my work in connection with this matter. As I testified at IPR2014-00728, I am compensated at \$400 per hour in pre-deposition and deposition work. I stated again in IPR2015-00615 that I was compensated at \$275 per hour for analysis work and \$400 per hour for deposition work. It should be obvious for even the casual observer that I have two rates: one for when I am in my office doing analysis and writing reports, and another when I am preparing and providing testimony. There is no difference for the Northern District case. In my declarations in that case, I state that my charge is \$400 per hour for trial preparation work. That is a fact. This compensation is not dependent in any way on the contents of this Declaration, the substance of any further opinions or testimony that I may provide, or the ultimate outcome of this matter.

III. MATERIALS CONSIDERED

6. In forming the opinions expressed herein, I have reviewed and considered numerous documents, including the following materials:

A. Exhibits submitted by Petitioner: Exhibits 1001-1040.

- B. Exhibits submitted by Patent Owner: Exhibits 2001-2016, 2020-2023, and 2025-2037.
- C. Patent Owner Response, Paper No. 16 (Nov. 19, 2015) (hereafter “POR”).
- D. U.S. Patent No. 6,369,857, titled “Receiver for Analog and Digital Television Signals,” to Balaban et al. (hereafter “Balaban”). Exhibit 1053.
- E. IEEE Standard Dictionary of Electrical and Electronic Terms (Sixth ed. 1996), Exhibit 1054.
- F. Satellite Receiver User’s Guide, General Electric GRD33G2A, published 1996 by Thomson Consumer Electronics, Inc. (“GE”), Exhibit 1055.
- G. K.G. Jackson & G.B. Townsend (eds.), “TV & Video Engineer’s Reference Book,” Butterworth-Heinemann (1991) (excerpts) (“Jackson”), Exhibit 1059.
- H. Transcript of Deposition of Ion E. Opris Ph.D., in IPR2015-00615 and IPR2015-00626 (Jan. 13, 2016), Exhibit 1060.
- I. Final Written Decision, IPR2014-00728, Paper No. 53 (Oct. 21, 2015) (hereafter “FWD”), Exhibit 1062.

IV. THE ’585 PATENT

A. Person of Ordinary Skill in the Art

7. In my original declaration, I testified that, as of September 17, 2001,¹ a person of ordinary skill in the art at the time of the alleged invention of the ’585

¹ For purposes of this Declaration, I have been asked to assume that the challenged claims are entitled to the benefit of the priority date of the provisional application. However, I have not investigated and have formed no opinion on whether the provisional applicable provides an enabling disclosure of those claims.

patent (“POSITA”) would have held at least a Masters of Science or higher degree in electrical engineering, have at least four years of experience with mixed signal system design, including analog front ends and subsequent digital signal processing of various analog and digital signal formats of video and audio content. Since that time, the Board issued its Final Written Decision in IPR2014-00728 in which it adopted this same level of skill. FWD at 14. In addition, the Board concluded that I qualified as “an expert in the relevant field of the invention.” *Id.* Accordingly, I continue to view the patent and the prior art through that prism.

B. Claim Construction

8. I am informed that the claims in an *inter partes* review should be given their “broadest reasonable construction in light of the specification” as commonly understood by a person of ordinary skill in the art. In forming my opinion, I have been informed that a claim construction that excludes the preferred embodiment of the invention is “rarely, if ever, correct” and would require “highly persuasive evidence.”

I reserve the right to express the contrary opinion that those claims are not entitled to the priority date of the provisional application.

Board's Previous Constructions

9. In its Final Written Decision in IPR2014-00728, the Board construed the following terms as follows:

- **“input RF Signals”**—“Signals that are input having a frequency between 10 kHz and 100 GHz”;
- **“Tuner for receiving input RF signals”**—“a tuner that receives signal that are input having a frequency between 10 kHz and 100 GHz”;
- **“Format”**—“analog and digital signals are examples of distinct formats”;
- **“Said input RF signals encoding information in one of a plurality of formats”**—“requiring that each received input RF signal encode information in exactly one format”;
- **“processing said digital representation of said intermediate signals in accordance with said format”** and **“processing said digitized signals in accordance with said format”**—“the phrases exclude processing a plurality of formats in parallel;” “required processing in accordance with the exactly one format in which each received input RF signal is encoded.”

- **“Baseband signal”**—“a signal without transmission modulation”;
“each ‘video and audio baseband signal’ may correspond to a signal that encodes both video and audio information without transmission modulation”;
- **“Signal Processor”**—“a digital module that processes signals in the digital domain”; and
- **“Receiver”**—“is not a claim limitation.”

FWD at 6–12. I have used these constructions in formulating the opinions expressed herein.

10. In its Institution Decision in this case, the Board provided the following construction for one additional term:

11. **“Indexes”**—“points to a block of memory when retrieving a set of coefficients [of filter functions].” Paper No. 9 at 15.

12. I have used this construction in formulating the opinions expressed herein.

Patent Owner’s Proposed Constructions

13. In its Patent Owner response, Patent Owner raises two claim construction issues, one explicitly and one implicitly. As discussed below in detail, I do not agree with either of Patent Owner’s proposed constructions because

they do not reflect the plain and ordinary meaning of those terms as would be understood by a POSITA in light of the specification.

14. “**select signal**”—Patent Owner suggests that this phrase means “a signal that performs a selection and that comprises information about the format of said input RF signal.” POR at 7. I disagree. In my opinion, this construction does not represent the broadest reasonable construction of this term to a POSITA. Instead, it appears to be an attempt to avoid the invalidating prior art (i.e., Zenith) that teaches a binary signal that serves as a sign, or indication, or suggestion of the format of the input RF signal (e.g., 0=analog TV; 1=digital TV). In my opinion, the broadest reasonable construction of “select signal” in light of the specification to a POSITA is “a select signal that serves as a sign or indication of or is suggestive of a format of said input RF signal.”

15. I first examine the claim language. It turns out that the term “select signal” appears solely in the claims of the ’585 patent, specifically claims 13-15 and 19-20. Those claims recite the following;

13. The receiver of claim **10**, wherein said channel filter further comprises a standard selection circuit coupled to said signal processor, said standard selection circuit generating a select signal indicative of a format of said input RF signal and said signal processor selecting a finite impulse response filter in response to said select signal.

14. The receiver of claim **13**, wherein said standard selection circuit generates said select signal in response to an input signal from a user.

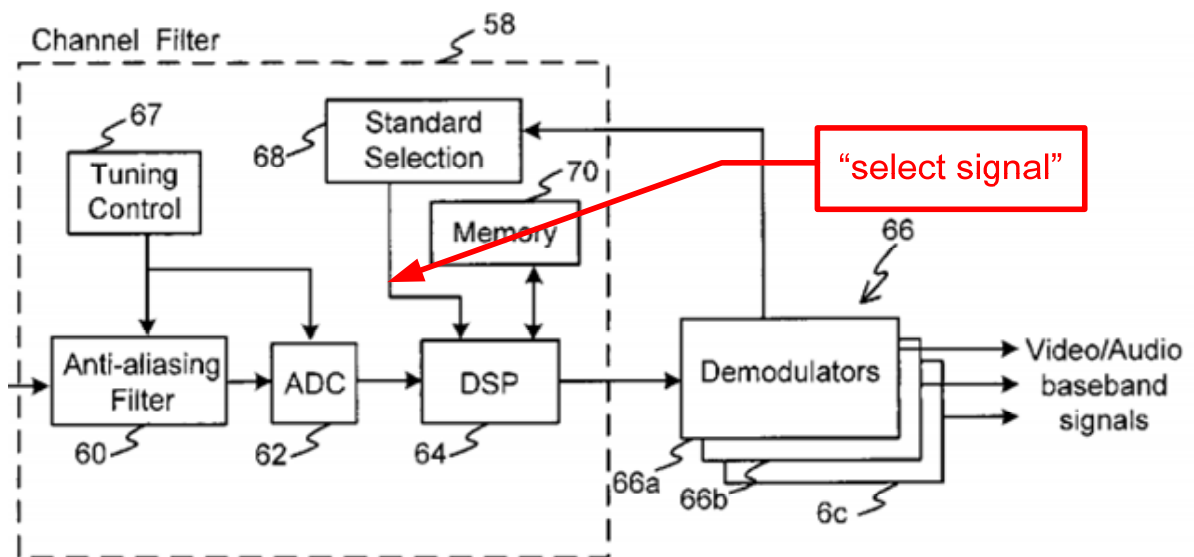
15. The receiver of claim **13**, wherein said standard selection circuit generates said select signal by detecting carrier signals identifying one of said formats of said input RF signals.

19. The method of claim **17**, wherein said processing said digital signals is performed in response to a select signal indicative of said format of said input RF signal.

20. The method of claim **19**, further comprising:
generating said select signal by detecting carrier signals in said input RF signal identifying said format of said input RF signal.

16. The claim language reveals three things about the “select signal.” First, this signal must “indicative of a format of said input RF signal.” Second, the signal is “generate[d]” by the “standard selection circuit,” which is discussed further below. Third, the select signal is used by the “signal processor” to “select[.]” a filter “in response to said select signal.” I note that Dr. Opris agrees with each of these propositions. Ex. 1060 at 13:24-14:8. With this context in mind, I turn now to the written description portion of the specification.

17. Unfortunately, the term “select signal” does not appear in the written description portion of the ’585 patent specification. From its use in the claims, however, a POSITA would understand the select signal to be the signal appearing on the output of the “standard selection” circuit 68, shown in Figure 2 (and reproduced below with annotations added in red):



Once again, Dr. Opris agrees. Ex. 1060 at 14:19-23.

18. As discussed above, this is confirmed by the language of the claims. Claim 13, for example, requires “said standard selection circuit generating a select signal.” That claim further clarifies that the “signal processor” is responsive to this signal--“said signal processor selecting a finite impulse response filter in response to said select signal.” This further supports the conclusion that the signal on the output of the standard selection circuit 68 is the “select signal” because that output

is connected to an input of the DSP 64, thereby allowing the DSP to respond to changes in that signal. Claim 19 further reinforces this understanding.

19. The standard selection circuit is described briefly in two passages of the written description—column 4, lines 55-54 and column 5, lines 7-22. The former provides the following description:

In the present embodiment, channel filter 58 includes a standard selection circuit 68 for selecting between the several analog television standards and the several digital television standards. DSP 64 applies the appropriate filter function, such as an impulse response, to the digital signals depending on the state of standard selection circuit 68. In one embodiment, the coefficients of the filter functions are stored in a look-up table in a memory 70. DSP 64 retrieves the coefficients from memory 70 to be applied to the incoming digital signals.

20. The first sentence of this passage suggests that the function of the standard selection circuit 68 is “for selecting between the several analog television standards and the several digital television standards.” The following sentence makes clear, however, that it is the DSP that selects the appropriate filter function from memory 70 in response to “the state of standard selection circuit 68.” When Dr. Opris was asked, “[i]n response to that signal, the DSP retrieves a set of filter coefficients from memory 70, correct,” he responded, “Yes.” Ex. 1060 at 14:25-15:3. A POSITA would interpret this passage to mean that the DSP 64 selects a set

of filter coefficients from memory that corresponds to the state of the select signal generated on the output of the standard selection circuit 68. This is confirmed by the claim language which requires the selection circuit to “generat[e] a select signal” and the signal processor to “select[] a finite impulse response filter in response to said select signal.”

21. The second passage in the specification relating to the standard selection circuit (column 5, lines 7-22) describes two different modes of operation—manual and auto-detect:

Standard selection circuit 68 can be implemented in one of many ways. The selection of the correct standard can be made manually by the user of the television system, such as by activating a switch, or the selection can be made automatically by providing an auto-detection capability in TV receiver 50. In the present embodiment, auto-detection is implemented by detecting in the baseband signals the presence or absence of carrier signals which uniquely identify the television standards. For example, analog television signals can be identified by the analog visual carrier signal while digital television signals can be identified by the pilot carrier. Each demodulator in bank 66 generates a signal which is fed back to standard selection circuit 68 indicating which television standard the input signal is encoded. In other embodiments, other means for selecting between the different standards can be used.

While the specification describes these two modes of operation, it fails to provide any description of the circuits used to implement either of these modes. Instead,

the standard selection circuit 68 is shown as a “black box.” See Ex. 1060 at 24:24-25:10. This passage does note, however, that “other means for selecting between the different standards can be used.” That would indicate to a POSITA that, for example, the modes are not mutually exclusive, but can be used in combination. Dr. Opris agrees that these two embodiments are not meant to be exclusive. Ex. 1060 at 17:7-17. With this background in mind, I now turn to the proper construction of the “select signal” phrase.

22. Dr. Opris opines that this term means “a signal that performs a selection and that comprises information about the format of said input RF signal.” Opris Dec., ¶73. Dr. Opris relies exclusively on the passage quoted above from column 5 and the language of the claim. *Id.* at ¶74-75. Neither, in my opinion, supports his opinion.

23. Dr. Opris contends that the passage at column 5 describing the two modes of operation (manual and auto-detection) supports his opinion that “indicative of” means “comprises information about.” It is not exactly clear from his declaration what he means by “comprises information about,” but neither the plain language nor the specification requires the level of specificity or certainty that he implies.

24. All that the specification says about the manual selection mode of operation is that “selection of the correct standard can be made manually by the

user of the television system, such as by activating a switch.” Ex. 1001 at 5:8-10. Dr. Opris reads this single statement to mean that the select signal generated by the standard selection circuit comprises information about the standard.” Ex. 2032, ¶74. Not necessarily. The user may actuate a switch selecting a particular standard, but that signal may or may not be processed by the DSP or even received by the tuner. Dr. Opris agrees that setting the switch to a particular television signal format “doesn’t guarantee that that signal is actually received by the television receiver.” Ex. 1060 at 23:16-22. For example, the signal source may be down or the source not properly connected to the receiver. To the extent that Dr. Opris implies that the “select signal” must actually correspond to the signal received by the channel filter, he is incorrect. *Id.* Instead, the selection circuit may infer the standard of the incoming television signal from the switch selection. That inference may or may not be correct, based on other settings in the television system, e.g., the input source to the television receiver.

25. The description of the auto-detect mode of operation likewise does not support Dr. Opris’s opinion. That description notes that “auto-detection is implemented by detecting in the baseband signals the presence *or absence* of carrier signals which uniquely identify the television standards.” Ex. 1001 at 5:12-15 (emphasis added). While detecting the presence of a particular carrier signal that uniquely identifies a particular television standard (e.g., analog visual carrier

signal) would be conclusive evidence that that particular television standard was received, detecting the “absence” of a particular carrier signal would not. In that case, the standard selection circuit would *infer* the presence of another television standard from the absence of that particular carrier signal. Such an inference might be reasonable if, for example, the circuit only anticipated receiving two different formats such as analog and digital, as in Zenith.

26. Dr. Opris also purports to rely on the language of the claim to support his opinion. Opris Dec., ¶75. In particular, he places great weight on the juxtaposition of the terms “indicative of” and “in response to” in claim 13. He says, “A bit toggling when the TV format changes is an example of a signal that changes ‘in response to’ a format change.” He is not reading the claim correctly. The claim says, “signal processor selecting a finite impulse response filter in response to said select signal.” Clearly, it is the signal processor responding to the select signal, and not the select signal responding to the TV format. These terms will not support the weight that Dr. Opris places upon them.

27. I agree with Patent Owner that the plain and ordinary meaning of “indicative” to a POSITA is “serving as a sign or indication (of); suggestive (of).” Ex. 2034. That sign or indication may take many different forms. Patent Owner’s own dictionary defines “indication” as “clue, evidence, ..., hint, inkling, intimation, manifestation, ..., suggestion, symbol, token....” Ex. 2034 at 2. A

POSITA would agree that these are examples of an indication. Contrary to Dr. Opris's opinion, however, a "bit toggling when the TV format changes" is a classic example of "a sign or indication of" the TV format when the TV format is either one format or another, e.g., analog or digital.

28. The claim's later use of the term "in response to" does not change the plain and ordinary meaning of "indicative of." As I noted earlier, the claim language "indicative of" and "in response to" refer to two different things. The former refers to a characteristic of the select signal itself. The latter refers to how the select signal is acted upon by the signal processor. Dr. Opris, once again, agrees. Ex. 1060 at 48:2-20. Thus, contrary to Patent Owner's argument, giving the language "indicative of" the full breadth of its plain and ordinary meaning does not render the language "in response to" superfluous.

29. The specification supports a plain and ordinary meaning of the language "indicative of." As mentioned above, the select circuit is shown as a black box 68 in Fig. 2. Circuit 68 has an input connected to the demodulators 66 and an output that is connected to the DSP 64. While the term "select signal" is not mentioned in the written description of the specification, as described above, a POSITA would infer that this signal is on the output of the select circuit 68 given its function within the claim, i.e., "said signal processor [DSP 64] selecting a finite impulse response filter in response to said select signal." Ex. 1001, cl. 13.

30. The specification does not suggest, let alone require, that the signal on the output of the select circuit “contain information about the underlying signal,” other than merely indicating the format. The select signal is generated by the “standard selection circuit 68.” *Id.* at 5:18-20. The specification refers to “a signal which is fed back to standard selection circuit 68 indicating which television standard the input signal is encoded.” *Id.* at 5:18-20. This feedback signal from the demodulators is not the claimed select signal, however, because claim 13 requires the signal processor to be responsive to the select signal. The specification goes on to state that “DSP 64 applies the appropriate filter function, such as an impulse response, to the digital signals ***depending on the state of standard selection circuit 68.***” *Id.* at 4:58-60 (emphasis added). A POSITA would interpret this statement to mean that the select signal encodes a state that is indicative of the format of the input RF signal. For example, a zero (“0”) could be indicative of an analog TV format and a one (“1”) could be indicative of a digital TV format. *Id.* Dr. Opris agrees that “a single bit can represent two states.” Ex. 1060 at 31:4-13. While this encoding could certainly be considered “information about” the television format, it does not have to be definitive. Instead, the encoding only need “be indication of” the format, i.e., a “clue, evidence, ..., hint, inkling, intimation, manifestation, ..., suggestion, symbol, token....,” Ex. 2034 at 2, from which the DSP can infer the format. For example, the select circuit 68

could infer that the input TV signal is in a particular format based on the “absence” of a certain signal or a manual input by the user and that inference could turn out to be incorrect. The select signal would nonetheless provide an “indication of” the format, i.e., a “clue, evidence, [or] hint,” which may or may not be indicative of the actual format.

31. During his deposition, Dr. Opris seemed to imply that the select signal had to be more than a single bit because “[t]here are many analog formats and there are many digital formats.” Ex. 1060 at 31:18-32:2. There are several problems with this position. First, claim 1 simply recites “one of a plurality of formats.” Two is a plurality, so a single bit could be used to represent these two formats, by Dr. Opris’s own admission. Second, the ’585 patent itself is completely silent about the number of bits that must be required in the select signal. Ex. 1060 at 33:13-15. This would lead a POSITA to conclude that the select signal could be used to indicate whether the television signal was in one of two formats.

32. The other problem with Dr. Opris’s construction is that it reads too much into the word “select.” Dr. Opris appears to equate that the word “select” with “performs a selection.” That mischaracterizes the function of the signal in the claim. The signal does not “perform a selection,” the signal processor does. Ex. 1001, cl. 13 (“said signal processor **selecting** a finite impulse response filter in

response to said select signal”). During his deposition, Dr. Opris agreed that the “DSP retrieves a set of filter coefficients from memory 70,” not the select circuit. Ex. 1060 at 14:25-15:3. While the specification states that “channel filter 58 includes a standard selection circuit 68 for selecting between several [different standards],” (4:55-58) the select signal itself merely indicates the format of the incoming input RF signal. The signal processor then selects appropriate filter coefficients from memory “in response to” the “state” of the select signal. Accordingly, in my opinion, a POSITA would interpret the phrase to mean “a select signal that serves as a sign or indication of or is suggestive of a format of said input RF signal.”

33. **“carrier signals”**— The second claim construction issued raised in Patent Owner’s response, albeit implicitly, is the meaning of “carrier signals” in claims 15 and 20. While Dr. Opris does not offer a construction of this term, he contends that Zenith does not satisfy this limitation. In my opinion, the broadest reasonable construction to a POSITA in light of the specification of the term “carrier signals” is “[a] wave having at least one characteristic that may be varied from a known reference value by modulation.” Ex. 1054 at 134 (IEEE Dictionary).

34. The term “carrier signals” appears in challenged claims 15 and 20:

20. The method of claim **19**, further comprising:
generating said select signal by detecting carrier signals in
said input RF signal identifying said format of said
input RF signal.

15. The receiver of claim **13**, wherein said standard
selection circuit generates said select signal by detecting
carrier signals identifying one of said formats of said input
RF signals.

35. Claim 20 reveals that these “carriers signals” are “in said input RF signal.” Dr. Opris seems to infer from this that the “carrier signals” must be the “transmission” carrier signal, presumably because that is “in said input RF signal.” See Opris Dec., ¶93. Such an inference would be incorrect, however, because the baseband signals are also “in said input RF signal.” Thus, the language of the claim does not resolve this issue.

36. According to Dr. Opris, “Zenith’ SYNC DET 20 does not detect any carrier signal.” Opris Dec., ¶93. The purported reason is that the “SYNC DET is coupled to the output of the analog demodulator, which outputs baseband signals (i.e., CVBS, shown in Thomson’s Fig. 1)” and “[a] CVBS signal does not contain the carrier; in fact, removing the carrier is the entire purpose of the demodulator.” *Id.* The implication is that baseband signals may not contain carrier signals.

37. Dr. Opris's argument is contradicted by the '585 patent's own specification. The sole description of this operation makes clear that the "preferred embodiment" also detects the carrier signals "in the baseband signals":

receiver 50. In the present embodiment, auto-detection is implemented by detecting in the baseband signals the presence or absence of carrier signals which uniquely identify the television standards. For example, analog television signals can be identified by the analog visual carrier signal while digital television signals can be identified by the pilot carrier. Each demodulator in bank 66 generates a signal

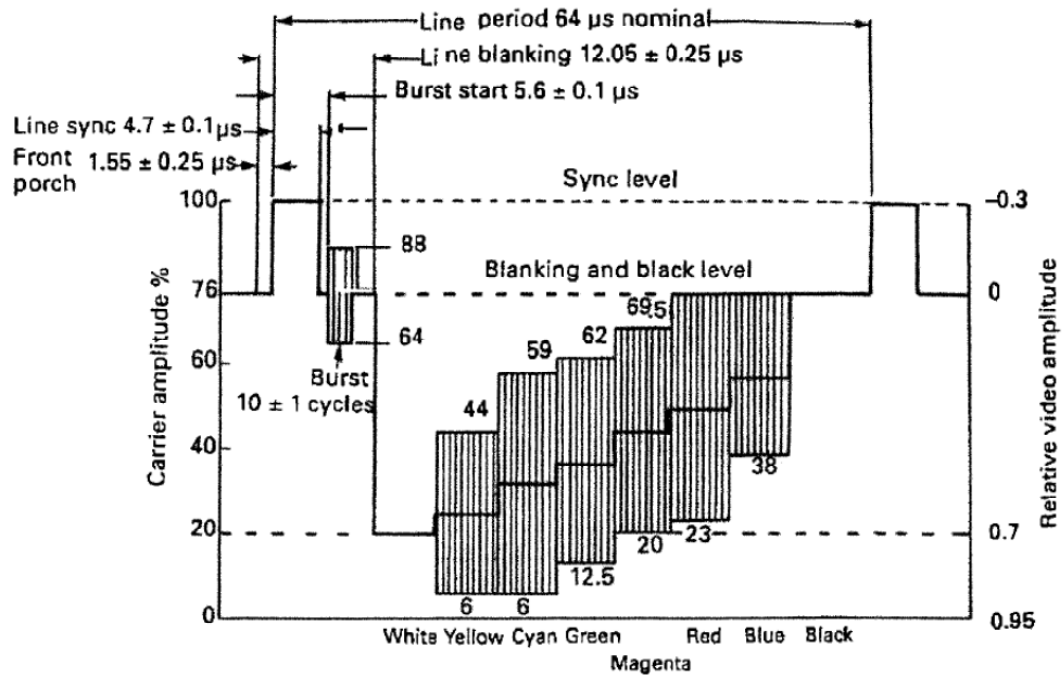
Ex. 1001 at 5:12-18 (emphasis added). Dr. Opris's suggestion that carrier signals cannot be present in "baseband signals" is inconsistent with the '585 patent itself. Moreover, the '585 shows the input to the "Standard Selection" circuit coming from demodulators, 66, and not from the RF input signal, 52—the only location in the signal path where Dr. Opris would find a "carrier." Therefore, Dr. Opris cannot distinguish Zenith without likewise distinguishing the preferred embodiment. As a result, it is my opinion that Dr. Opris's implicit construction is unreasonable and, therefore, does not represent the broadest reasonable interpretation.

38. During his deposition, Dr. Opris tried to distance himself from the '585 patent's own description of the standard selection circuit. According to Dr. Opris's testimony, he claims that the standard selection circuit doesn't actually

detect the carrier signals “in the baseband signals,” but instead detects some “internal signal to the demodulators.” Ex. 1060 at 154:5-16. Dr. Opris’s testimony not only finds no support in the ’585 patent specification, it flatly contradicts it. The ’585 patent specification makes no mention of any “internal signals;” Dr. Opris simply imagines it. Instead, the patent states that “[i]n the present embodiment, auto-detection is implemented by detecting ***in the baseband signals*** the presence or absence of carrier signals which uniquely identify the television standards.” Ex. 1001 at 5:12-15 (emphasis added). The ’585 patent could not be more clear on this point.

39. In my opinion, the broadest reasonable interpretation of “carrier signals” in light of the specification to a POSITA is “[a] wave having at least one characteristic that may be varied from a known reference value by modulation.” Ex. 1054 at 134.” The IEEE Dictionary notes that “a recurring series of pulses” is a classic example of a carrier signal. Ex. 1054.

40. As shown below, the sync signal is such a “carrier signal” because it is “a recurring series of pulses” that “may be varied about a known reference value” (e.g., “Blanking and black level”) “by modulation.”



Ex. 1059 at 1/6 (Figure 1.8).

41. This construction is supported by the intrinsic evidence. The specification, as quoted above, identifies two carrier signals—“visual carrier signal” and “pilot carrier”—both of which are part of the baseband signals. The “visual carrier signal” is a wave that may be varied about a known reference value by modulation. The prior art of record also expressly teaches that “detecting a carrier signal includes detecting at least one of a picture carrier, a sound carrier, **and a synchronization signal.**” Ex. 1053 (U.S. Pat. No. 6,369,857 to Balaban (cited on the face of the ’585 patent)) at 19:19-21. Apparently Dr. Opris did not even consider the Balaban patent in forming his opinion, even though it is part of the file history of the ’585 patent. Ex. 1060 at 60:5-21.

42. My testimony elicited during cross examination is entirely consistent with the plain and ordinary meaning of this term. During that cross examination, the following Q and A occurred:

Q. What is a carrier signal?

A. It would be, by way of example, a local radio station is KLBJ, 590 AM band, and it's transmitted on a carrier signal of 590 kilohertz, I believe. So that is a – the carrier is the signal that is used to carry the modulation.

Q. So the carrier signal is part of the transmission modulation?

...

A. Yes.

Q. . . . The output of the digital demodulator, is that also a baseband signal?

...

A. Yes.

Q. . . . And so the output of the analog demodulator and the digital demodulator, they do not include transmission modulation. Right?

A. Correct.

Ex. 2033 at 50:9-51:1. From this, Patent Owner tries to imply that I conceded that carrier signal is synonymous with transmission modulation. POR at 42. Nothing could be further from the truth. Instead, I merely indicated that, “by way of

example,” a transmission carrier could be carrier signal and that a demodulator produces a “baseband signal.”

43. I was not asked by Patent Owner’s counsel my opinion on the meaning of “carrier signals” as used in the ’585 patent. Had I been asked, I would have given my opinion that the broadest reasonable interpretation of “carrier signal” in light of the specification is “[a] wave having at least one characteristic that may be varied from a known reference value by modulation.” My opinion is supported by both the intrinsic as well as the objective extrinsic evidence described above.

44. In addition, on redirect, I explained that carrier signals were not limited to transmission modulation. Ex. 2033 at 126:18-25. Moreover, I explained that in the ’585 patent, like in Zenith, the standard select circuit detects the carrier signals “in the baseband signals.” *Id.* at 127:1-20. As a result, my testimony is entirely consistent with my opinion on the broadest reasonable construction of the term “carrier signals.”

V. OPINIONS RELATING TO EACH OF THE GROUNDS

45. I will now address each of the arguments raised in the Patent Owner’s response and, in particular, Dr. Opris’s opinions expressed in support of those arguments.

A. Ground 1: Claims 11 and 12 are Obvious

46. Claims 11 and 12 depend from claim 10. Claim 10 recites the following:

10. The receiver of claim 1, wherein said signal processor applies one of a plurality of finite impulse response filters to said digital representation of said intermediate signal, each of said plurality of finite impulse response corresponding to a format of said input RF signal.

In its Final Written Decision, the Board concluded that claim 10, which depends from claim 1, was unpatentable in light of the obvious combination of Thomson and Harris. FWD at 29.

Grumman Renders Claim 11 Obvious

47. As shown above, claim 10 covers a signal processor that applies one of a plurality of different sets of filter coefficients, with each set corresponding to a different television format (e.g., digital and analog). Claims 11 adds the details of storing those filter coefficients “in memory” in a such a way that the signal processor can access them logically by “indexing” into that memory:

11. The receiver of claim 10, wherein said plurality of finite impulse response filters are stored in a memory, and said signal processor indexes said memory to retrieve one of said plurality of finite impulse response filters.

As I explained in my original declaration, this is an obvious way to implement the claimed plurality of FIR filters.

48. As a starting point, it is undisputed that the digital filter coefficients are stored in memory. In his deposition, Dr. Opris agreed that “it was well-known at the time to store digital filter coefficients in memory.” Ex. 1060 at 62:25-63:4. In a typical application, such as Harris, the filter coefficients are initially stored in non-volatile memory such as ROM, so that they are retained when the power is off. As part of the initialization procedure, these filter coefficients are copied by the system controller or microprocessor from non-volatile memory into volatile memory, such as RAM or on-chip registers, where they can be more quickly accessed by the filter. *See* Ex. 1005 (Harris) at FIG. 7.

49. Grumman (Ex. 1008) takes this typical approach one step further by having two sets of filter coefficients in volatile memory simultaneously. Grumman uses two different memory banks for two different sets of coefficients that are indexed by the processor. This allows one set of filter coefficients to be loaded by the host processor while the other is being accessed by the filter. *Id.* at Abstract; FIG. 1b (“BANK 0” and “BANK 1”).

50. In my opinion, Grumman renders claim 11 obvious in light of Thomson and Harris. A POSITA would have naturally looked to the FIR filter implementation of Grumman to implement Thomson’s two filter functions because of its efficiency. In particular, Grumman’s use of two mutually exclusive memory banks allows the processor to quickly switch from one set of filter coefficients to

another set. This would be useful in the Thomson/Harris combination because it would allow the processor to quickly switch to another filter if, for example, the user switched the input source (or channel) from one format to another. Patent Owner's arguments to the contrary are premised on its faulty reading of Thomson, Harris and Grumman, as discussed below.

Thomson Describes a Single Adaptive Filter, Not Two Parallel Filters

51. Patent Owner argues that Thomson “teaches parallel, simultaneous path processing.” POR at 13. Dr. Opris expresses a similar opinion. Opris Dec., ¶97. Both are mistaken. Thomson describes a single “adaptive[]” bandpass filter that is responsive to the “TV standard” input, which indicates the format of the incoming TV signal. Patent Owner and Dr. Opris's interpretation of Thomson, once again, ignores the “TV standard” input and Thomson's explicit characterization of the bandpass filter as “adaptive[.]” Dr. Opris also ignores the explicit language of the Thomson patent where it refers to “bandpass filter 8” in the singular, while referring to “low-pass filters 14 and 15” in the plural. Ex. 1060 at 71:15-25. There would be no need for the “TV standard” input if Thomson had “two circuits in parallel (one for analog TV and one for digital TT),” each driving “its respective demodulator,” as characterized by Patent Owner. POR at 14. Moreover, such a circuit could hardly be considered as having “an adaptively controlled bandwidth,” and yet that is precisely how the bandpass filter in

Thomson is characterized. Ex. 1004 at 3:16-18. Thus, Patent Owner characterization of Thomson is contradicted by Thomson itself.

52. Patent Owner also appears to mischaracterize the Board's interpretation of Thomson. POR at 13 (citing FWD at 20-21). As I read the Board's decision, the Board did not endorse Patent Owner's reading of Thomson. One thing the Board did make clear, however, is that it credited my reading of Thomson over Dr. Opris's "because Dr. Opris's characterization of this aspect of Thomson provides insufficient explanation for the 'TV standard designation' and would render that designation superfluous." FWD at 21. In my opinion, Thomson describes to a POSITA a single, adaptive, digital filter having at least two sets of filter coefficients—one for analog TV and one for digital TV—that are selected based on the state of the "TV Standard" signal.

Harris Describes a Reprogrammable Digital Filter

53. Dr. Opris further characterizes Harris as "disclos[ing] a set of parallel finite impulse response filters that are implemented in hardware." Opris Dec., ¶97. I agree. He then goes too far by stating that "Harris does not teach or suggest a single path process using a signal processor to operate on a plurality of different input RF signals." *Id.* As the Board itself recognized:

Harris discloses a digital tuner that uses “standard off the shelf DSP [integrated circuits] as digital replacements for the analog intermediate frequency (IF) processing stage in wideband receivers.” Ex. 1005, 1. As illustrated in Figure 6 of Harris, such wideband channelized receivers use an analog-to-digital converter to convert an incoming RF signal to an IF signal, which subsequently is processed by a set of finite impulse response filters. *Id.* at 5–6. Harris further teaches that “[i]n systems where the second IF filter stage consists of a bank of filters to support various operational modes, cost and board space can be saved [by] reconfiguring a single DDF [digital decimation filter] to implement the filter required by each operational mode.” *Id.* at 5.

FWD at 27 (citing Harris). Thus, Harris also discloses a single, reconfigurable digital filter that can be reprogrammed by the system processor/microprocessor depending on the current “operational mode.” Harris teaches a POSITA that a single, reconfigurable digital filter could be used in place of multiple, dedicated, digital filters to save “cost and board space” in an application in which there are multiple, mutually exclusive, operational modes. Thomson is just such an application because the incoming television signal will be in only one TV format at a time. Moreover, television manufacturers are especially space and cost conscious given the intense price competition in the consumer television market, so a POSITA would be particularly motivated to adopt the single, reconfigurable FIR filter approach, as suggested by Harris. Dr. Opris’s opinions to the contrary appear to be based on his willful ignorance about the Harris implementation

because he did not even consider the datasheet for the actual filter described in Harris and filed by Patent Owner in this case. Ex. 1060 at 69:3-70:14.

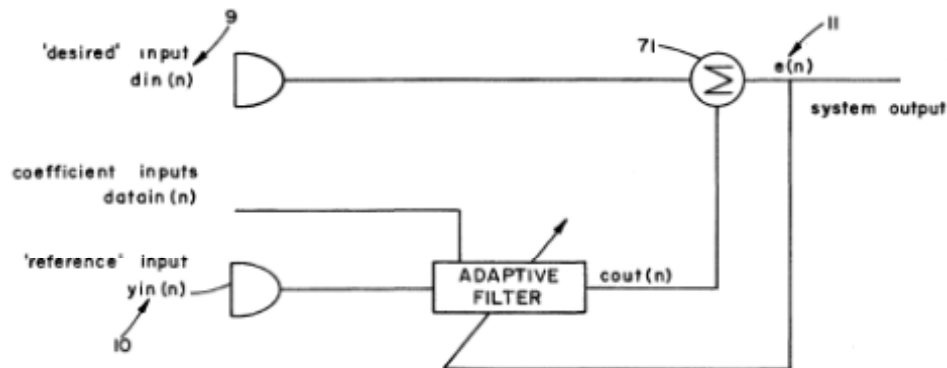
Grumman Describes Two Complete Sets of Filter Coefficients

54. Patent Owner also argues that Grumman only describes a single FIR filter and its “two-bank architecture is only a subcomponent of the single Grumman filter.” POR at 19-20. That is incorrect. Grumman describes two, complete sets of filter coefficients, with each defining a different filter impulse response, and a processing circuit that switches between these two different sets depending on whether the set is currently active or being updated. Grumman’s architecture fits comfortably within claim 11.

55. Patent Owner attempts to draw a purported distinction between “the single Grumman filter” and the claimed “two separate [FIR] filters,” POR at 20. Dr. Opris tries to make the same point. Opris Dec., ¶98. In the ’585 patent itself, however, a set of filter coefficients is synonymous with a “filter.” Claim 11 requires that the “plurality of [FIR] filters are stored in memory.” The ’585 patent specification makes clear that it is “the coefficients of the filter functions” that are “stored in a look-up table in memory 70.” Ex. 1001 at 4:58-64. The DSP then indexes into that memory to retrieve the appropriate set of filter coefficients depending on the state of the format select signal. *Id.* at 4:62-64.

56. By disclosing separate sets of filter coefficients in memory, Grumman satisfies claim 11, in the same way as the preferred embodiment of the FIR filters. Grumman explicitly refers to the data stored in the memory banks as “coefficient data values.” Ex. 1008 at 4:7-9. These coefficients define two separate filter impulse responses. While the selection of filter coefficients in Grumman is based on a different condition (i.e., active v. loading) than in the '585 patent (i.e., analog v. digital), a POSITA would understand that Grumman’s architecture is well suited for Thomson’s adaptive filter because of its transparent switching.

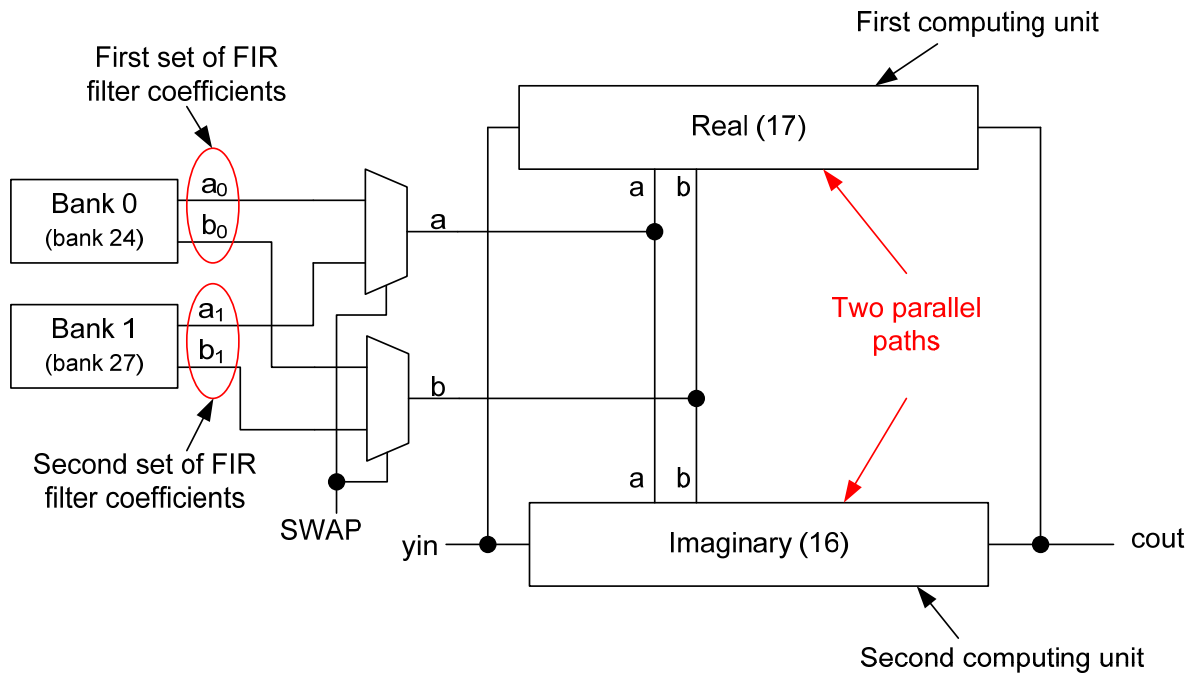
57. A “typical application” for Grumman’s adaptive filter is shown in Fig. 3, reproduced below:



Ex. 1008 at 4:39-41. As this shows, Grumman’s filter receives an input “reference” signal $y_{in}(n)$, which is filtered by the “Adaptive Filter” using a set of “coefficient inputs $data_{in}(n)$,” which specify the frequency response of the FIR filter. The filter produced output, $cout(n)$, is then compared to a “desired input $d_{in}(n)$.” The difference is an error signal “ $e(n)$ ” that is fed back to the filter in a

control loop. Based on the error signal $e(n)$, the filter will select a new set of filter coefficients in order to reduce the error signal. This process will continue until the system reaches a steady state, *e.g.*, $e(n)=0$. At that point, the filter coefficients used by the filter will remain constant. Ex. 1060 at 90:2-7. What is important to understand is that each set of filter coefficients used by the adaptive filter represents a different filter response. In fact, Grumman gives an example of a 3 Complex Weight Filter (Ex 1008 12:28 – 16:33) using all of the ‘a’ and ‘b’ coefficients (a_0 - a_5 , b_0 - b_5).

58. Grumman is complex, but not difficult for a POSITA to understand. Grumman’s filter circuit may be more easily understood by considering the block diagram abstraction shown below, which accurately represents the functionality of the circuit:



Grumman illustrates an adaptive filter having two sets of parallel paths; one set for processing the real data portion of the complex input and the other set for processing the imaginary data portion. Ex. 1008 at 4:34-38. Grumman provides two banks of memory, Bank 0 and Bank 1. Each bank contains a set of ‘a’ and ‘b’ coefficients. *Id.* at 11:47-55. The set of a_0 and b_0 from Bank 0 constitute a complete set of filter coefficients for a FIR filter. Likewise, a_1 and b_1 constitute a second complete set of FIR filter coefficients. Grumman itself refers to Bank 0 as “the first coefficient memory bank” and Bank 1 as “the alternative bank”:

With applicant's two Bank architecture, while the filter is operating with data present in the first coefficient memory bank, the alternative memory bank, i.e., the one not being used by the filter, is being updated with the new set of coefficients. This ensures that under the control of the weight swap circuitry, after the accumulation has taken place, multiplication with new coefficients loaded into the alternative bank can immediately take place with no time lapse. Hence, with no filter processing time delay, the complex data output rate of the filter is equal to the complex data input rate. As

Id. at 11:25-35; *see also* 4:7-14. The “two Bank architecture” allows the processor to update the set of filter coefficients in one of the memory banks that are “not being used by the filter” while the set in other bank is being used. *Id.* at 11:43-12:25.

59. Memory banks 0 and 1 are coupled to “swap circuitry” that operates like dual 2-to-1 multiplexer that are controlled by a “SWAP” signal, as shown above. *Id.* at 9:63-67. Grumman states that changing access of data from one set of ‘a’ and ‘b’ coefficient registers from Bank 0 to the other set of ‘a’ and ‘b’ coefficient memory registers from Bank 1 is referred to as “weight swapping.” *Id.* at 9:10-15. The benefit of this approach, according to Grumman, is that one set can be utilized while the other is being updated. *Id.* at 9:4-10 (“Once the accumulating has begun on the ‘a’ side, it is possible to switch to the alternate ‘a’ coefficient registers since the old coefficients are no longer needed and are not

being utilized by the multipliers.”); 11:7-10. The indexing is initiated by the SWAP signal generated by the system controller/microprocessor. *Id.* at 6:51-60.

60. This process is illustrated in Fig. 7a, which illustrates “a timing diagram of the signals utilized during the weight coefficient updating (i.e., weight swapping) process when implemented in the adaptive filter of the present invention.” *Id.* at 4:55-58. Fig. 7a illustrates the “swapping of the ‘a’ side coefficients between Bank 0 and Bank 1.” *Id.* at 10:9-10. Grumman makes clear that “the same timing diagram shown in FIG. 7a applies to the swapping of ‘b’ side coefficients.” *Id.* at 10:11-14. This confirms my opinion that each memory bank stores a complete set of filter coefficients consisting of “a” and “b” coefficients, as shown in my conceptual block diagram above.

61. Grumman describes two different filter functions stored in separate memories that can be accessed quickly and individually by the host processor simply by accessing a different part of memory. *Id.* at 6:28-38 (“make the filter 10 look like a memory-mapped peripheral to the host processor”). Dr. Opris implicitly concedes as much when he agreed that once the error signal goes to zero that the filter coefficients would remain constant. Ex. 1060 at 90:2-7. When the coefficients remain constant there is no need to “swap” the coefficients, so the filter coefficients will be pulled from a single memory bank. Whether those different filter functions are modified in real time in response to an error signal, as

in Grumman, or calculated *a priori* based on the signal characteristics of different television formats, as described in Thomson and Harris, is irrelevant. The point is that Grumman describes a method to multiplex between (or index) two different sets of coefficients without interrupting filter processing. Ex. 1008 at 3:3-6. A POSITA would have been motivated to use this two-bank architecture in Thomson because it would have allowed the television receiver to switch sources quickly, resulting in minimal disruption to the viewing experience.

62. Patent Owner’s reliance on the real and imaginary “parts;” of the filter described in the ’585 patent likewise misses its mark. POR at 21; *see also* Opris Dec., ¶¶98-99. Contrary to Patent Owner’s argument, claim 12 does not create “a clear division of a single finite impulse response filter into two components, real and imaginary.” *Id.* (emphasis added). Instead, claim 12 refers to two different filter operations—“a real part of said finite impulse response filter **operation**” and “an imaginary part of said finite impulse response filter **operation.**” Ex. 1001 at cl. 12 (emphasis added). These “operation[s]” are performed by the same hardware in the ’585 patent—DSP 64. Moreover, I am not contending that the real and imaginary components (16, 17) in Grumman satisfy the plurality of finite impulse response filters of claim 11. Instead, I rely on the two memory banks (24-Bank 0, 27-Bank 1) as providing those filter functions. Each of those memory banks

provides filter coefficients to both the real and imaginary processing components, as shown in FIG. 1b. *See* Ex. 1008 at FIG. 1b (lines 26 and 29); 9:26-39.

63. Even if a POSITA were to indulge Patent Owner's argument that Grumman only describes a single FIR filter, a POSITA would recognize that this architecture could (and would) still be used to implement the adaptive filter in Thomson. Grumman describes two sets of filter coefficients, with only one being active at a time. That is precisely the scenario contemplated by Thomson. Whether each set in Grumman is only a partial set or a complete set is beside the point. The point is that two sets may be maintained in memory simultaneously and switched (indexed) based on the setting of a selection signal (i.e., "swap" in Grumman and "TV Standard" in Thomson). A POSITA would understand that the number and value of the specific filter coefficients used in a FIR filter is always a design parameter in virtually every filter design. The coefficients could and most likely would change between the two applications depending on the design parameters such as impulse response, sample rate, etc. Patent Owner (and Dr. Opris) seems to assume that a POSITA would attempt to bodily incorporate Grumman into Thomson without exercising routine engineering steps to vary the filter coefficients based on the application parameters. That assumption is unfounded and unreasonable. As a result, the combination of Thomson, Harris, and Grumman to produce the result in claim 11 would be obvious to a POSITA

even assuming, for sake of argument, that Grumman only described a single FIR filter.

64. Patent Owner also argues that “Grumman does not disclose format-specific finite impulse response filters.” POR at 22; *see also* Opris Dec., ¶¶99-101. Once again, this argument misapprehends the issue. The issue is not whether Grumman discloses filters for two different formats. The issue is whether the Grumman’s dual memory bank architecture, with each memory bank storing a different set of FIR filter coefficients, satisfies claim 11 when deployed in the adaptive bandpass filter of Thomson in light of Harris’s reprogrammable channelized filter. The answer to that question is unequivocally yes because the adaptive filter in Thomson receives “said digital representation of said intermediate signal,” which may be in one of two different television formats (i.e., analog or digital). The appropriate filter bank in Grumman would then be selected to correspond to the television format based on the state of the “TV standard” input signal.

65. Patent Owner next argues that Grumman does not disclose a signal processor indexing a memory to retrieve one or a plurality of FIR filters. POR at 23-27. While Patent Owner’s argument is not exactly clear, it appears to argue that Grumman discloses two signal processors (one real, one imaginary) rather than a single signal processor. *Id.* According to Patent Owner’s expert, rather than

disclose a single signal processor, Grumman “relies on parallel processors, operating to simultaneously process the workflow within the single finite impulse response filter.” *Id.* at 25-26. The short answer to that argument is that broadest reasonable interpretation of “signal processor” encompasses Grumman’s real and imaginary processing circuitry. *See id.* at 14 (defining “signal processor” as “a digital module that processes signals in the digital domain”). This argument does not “read[] ‘signal processor’ out of the claim.” POR at 25. Instead, it gives the term its broadest reasonable construction.

66. The longer answer is that Grumman does not require the real and imaginary paths to be separate signal processors. Instead, Fig. 2 “shows a general block diagram conceptually illustrating the adaptive filter having two sets of parallel paths; one for processing the real data portion of the input signal and the other set for processing the imaginary portion of the input signal.” Ex. 1008 at 4:34-38 (emphasis added). A POSITA would understand that these parallel paths could be implemented using separate signal processors or as part of a single signal processor. In other words, nothing in Grumman requires the real and imaginary processing circuits to be implemented as separate signal processors.

67. Continuing with its “single signal processor” theory, Patent Owner further argues that “there is no one ‘signal processor’ that will index any of the memory locations disclosed in Grumman.” POR at 26. Once again, however,

Patent Owner ignores the Board's definition of "signal processor." That broad construction embraces the "swap circuitry" that performs the switching between the active set of filter coefficients and the updated set of filter coefficients included in Grumman's adaptive filter, as well as the system processor/host processor disclosed in Thomson/Harris.

68. Patent Owner also crops my testimony to give the mistaken impression that I conceded that Grumman does not disclose a signal processor. POR at 26 ("A. I didn't"). The full text of my response reveals that I said no such thing:

Q. So the said signal processor here in claim
you don't find that claim element in Grumman. Is
that right?

A. I didn't --

MR. AYERS: Objection. Form.

A. I didn't need it in Grumman, because it was
in ten and that -- ten has been ruled by the PTAB. So
I believe -- and I believe that that's based on
Thomson and Harris.

69. As this shows, I testified that I didn't need to rely *exclusively* on Grumman for that because the Board had already found it present in Thomson and Harris. Patent Owner's arguments notwithstanding, claim 11 is obvious in light of Thomson, Harris, and Grumman.

70. Patent Owner also suggest that a “person of ordinary skill would not be motivated to change a fundamental aspect of Harris to add additional memory indexing of filter coefficients that would not be required or beneficial in the system of Harris.” Patent Owner relies in part on my testimony relating to the “signal processors in Harris.” POR at 27 (citing Ex. 2033 at 63:18-24). First, I would note that Patent Owner does not provide any support for its argument about what a POSITA would or would not be motivated to do. Second, Patent Owner’s argument gives the mistaken impression that I testified that storing a single set of filter coefficients was “a fundamental aspect of Harris.” *Id.* Instead, I merely answered that this was “one way” in which it was done in Harris. Moreover, I did not testify that Harris only “teaches a parallel bank of signal processors that are used when multiple signals need to be processed concurrently, as implied by Patent Owner. *Id.* (citing Ex. 2033 at 64:9-65:6). In fact, earlier in my testimony I testified that Harris “says it could reconfigure, so there must be at least another set” of filter coefficients. Ex. 2033 at 63:5-9.

I Provided a Clear Reason to Combine

71. Patent Owner unduly complicates the proposed combination in an attempt to create unnecessary confusion. POR at 28-32. Petitioner’s combination is simple. I rely on Grumman for its two, programmable memory banks, each storing filter coefficients for a separate FIR filter function. In my opinion, a

POSITA would have been motivated to use this programmable memory architecture to implement the adaptive filter in Thomson because it would have resulted in minimal interruption of the television signal during a context switch from one television format to another (e.g. analog to digital). Harris is relied upon simply for its general teaching of microprocessor programmable FIR filters for a channelized receiver. This is an obvious combination.

Grumman Renders Claim 12 Obvious

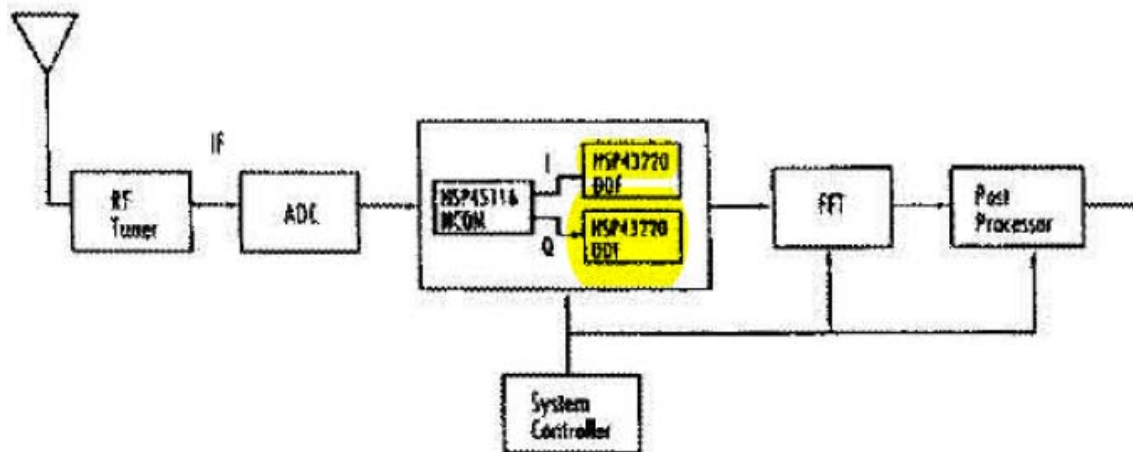
72. Patent Owner does not dispute that Grumman teaches each and every one of the limitations of claim 12. That is not surprising because Grumman clearly describes two computing units—one “processing a real part of said finite impulse response filter operation” and another “processing an imaginary part.” *Compare* Ex. 1001 at cl. 12 *with* Ex. 1008 at FIG. 1b (“REAL PROCESSING 17” and “IMAGINARY PROCESSING” 16). Dr. Opris agreed at his deposition that processing circuits 16 and 17 “could be considered a computing unit.” Ex. 1060 at 94:18-21. Patent Owner’s only argument is that Silicon Labs has not provided a sufficient reason to combine Grumman with Thomson and Harris. POR at 32-35. That is incorrect.

73. In my original declaration, I articulated a clear reason why a POSITA would combine Grumman with Thomson and Harris. The reason is simple—speed and efficiency. Thomson necessitates an adaptive filter that can accommodate two

different television formats—analog and digital. Grumman describes an adaptive filter that is capable of quickly switching between two different contexts, with little to no interruption of service. Such an attribute makes Grumman’s architecture ideally suited for Thomson’s application. Harris also teaches a FIR filter having separate computing units for the real and imaginary components of the signal. Grumman likewise discloses two separate computing units—one for the real component and one for the imaginary—making it particularly well suited for the adaptive FIR filter in Thomson.

74. Dr. Opris makes the further argument that “both Thomson and Harris possess real filters only and have no disclosure of processing an imaginary portion of a finite impulse response filter....” Opris. Dec., ¶107. I disagree. Harris clearly describes processing both real and imaginary components, as shown by Patent Owner’s own exhibits.

75. Harris explicitly discloses a plurality of FIR filter coefficients stored in memory. In the single channel embodiment shown in Figure 7 (below), Harris uses two DDFs—one for the imaginary component of the signal and one for the real component—each with its own set of filter coefficients stored in “Coefficient RAM”:



Ex. 1005 at Figures 4 and 7 (emphasis added). This is further confirmed by the Harris Datasheet filed by Patent Owner:

The HSP45118 down converts the signal of interest to base-band, generating a real component and an imaginary component. A HSP43220 then performs low pass filtering and reduces the sampling rate of each of the signals.

Ex. 2015 at 13 (emphasis added). Moreover, in the “[w]ideband channelized receiver” embodiment of Figure 6 in Harris, there are two sets of filter coefficients for each channel. *Id.* Both embodiments also include a “System Controller” or “standard microprocessor” that indexes into memory to retrieve the corresponding set of coefficients. *Id.* at 5 (“the DFF can be rapidly reconfigured via a standard microprocessor interface”). Because Harris already contemplated the use of both real and imaginary processing, the proposed combination with Grumman does not materially impact the cost or complexity of the overall circuit. Once again, Dr. Opris appears to have kept himself willfully ignorant of this fact by restricting his

universe to a subset of the evidence in this case. Ex. 1060 at 96:2-9. He did admit, however, that “it was well known to process imaginary and real components separately at the time of the ’585 patent.” *Id.* at 93:22-94:1.

B. Ground 2: Claims 13, 15, and 20 are Obvious

76. Claims 13, 15, and 20 relate to the so-called “standard selection circuit 68” shown in Fig. 2. The purpose of this circuit is to produce a “select signal” that is “indicative of” the incoming television signal format (e.g., analog or digital). The signal processor then selects the FIR filter coefficients from memory that correspond to the format indicated by the select signal. In its institution decision, the Board found that “Petitioner has established a reasonable likelihood of prevailing on its challenge” that Zenith discloses such a circuit. *Id.* at 21-22. That conclusion is not surprising given Zenith’s explicit objective of “provide an improved low cost method of processing digital and analog television signals using a single tuner.” Ex. 1011 at 1:62-64. Patent Owner raises several arguments as to why the Board was mistaken. None of Patent Owner’s arguments undermine my opinion that the challenged claims are obvious in light of Zenith.

Zenith Describes a Select Signal Indicative of the TV Format

77. Patent Owner’s primary argument is that the output of the Zenith μ PC “is a *control* signal, and not an information signal.” POR at 36. Dr. Opris makes the same argument. Opris. Dec., ¶83 (“In Zenith, the uP 22 output is a one-bit

signal that controls a single-pole double throw switch. Ex. 1011 Fig. 2. The one-bit signal is not indicative of a format.). This argument fails because it is premised on a faulty claim construction of “select signal.”

78. As described above, all that “indicative” requires is that the select signal “serv[e] as a sign or indication (of); suggestive (of)” the format. Ex. 2034. That “indication” may take many different forms including a “clue, evidence, ..., hint, inkling, intimation, manifestation, ..., suggestion, symbol, token....” *Id.* at 2. The output of the Zenith μ P does just that. When the signal is in one state (e.g., “1”), it indicates or suggests one format (e.g., digital TV) and when the signal is in another state (e.g., “0”), it indicates or suggests another format (e.g., analog TV). See Ex. 1011 at 2:35-45. In this way, the output signal is “indicative of” the format of the input RF signal.

79. Patent Owner and Dr. Opris all but concede this point. Dr. Opris admits that “the μ P 22 output may change in response to a change in format.” Opris Dec., ¶83. Likewise, in its POR, Patent Owner reluctantly acknowledges that “Zenith’s μ P 22 generates select signal indicative of the SYNC DET 20,” but tries to argue that this signal is not “indicative of format of the input RF signal.” POR at 36-37. Patent Owner is mistaken because, as Zenith explains, there is a one-to-one correlation between the sync signal and the format.

80. As shown in FIG. 1 of Zenith, the switch 14 is set by default to route the IF television signal to the analog demodulator 16. If that signal is carrying a television signal in the analog TV format, the SYNC DET 20 will detect it and provide a signal to the μ P 22. Ex. 1011 at 2:34-42. If the microprocessor 22 detects a valid sync signal from SYNC DET 20, it concludes that the input RF signal contains a television signal in the analog TV format and, therefore, sets (or, in this case, maintains) the output signal in a state that will continue to route the incoming IF signal to the analog modulator. *Id.* If the input RF signal switches to a digital format, however, the SYNC DET 20 will no longer detect a valid sync signal and will so inform the microprocessor 22. When the microprocessor receives a signal from the SYNC DET 20 that indicates that the input RF signal is not in an analog format, “microprocessor causes switch 14 to connect its pole 14a to terminal D to couple the IF signal to digital demodulator 18” under the assumption that the input RF signal is in the digital television format. *Id.* at 2:42-25. With respect to the embodiment shown in FIG. 2, Zenith makes clear that “microprocessor 22 controls the operation of switch 42 ***in accordance with the type of signal (analog or digital)*** that is received.” *Id.* at 3:13-15 (emphasis added); *see also* 5:22-23 (“means for developing a control signal indicative of the type of said tuner signal”). Therefore, the Zenith μ P 22 output signal is “indicative

of” whether the input RF signal is in either an analog TV format or a digital TV format, in the same way as the “select signal” in the ’585 Patent.

81. The fact that the Zenith μ P output signal is a “control” signal supports rather than detracts from its function as a “select signal.” The claimed function of the select signal in claim 13 is to control the signal processor. As recited in claim 13, the signal processor “selects” the appropriate filter coefficients in memory “in response to” the state of the “select signal.” Ex. 1001 at cl. 13. This is further confirmed by the specification: “DSP 64 applies the appropriate filter function, such as an impulse response, to the digital signal ***depending on the state of standard selection circuit 68.***” *Id.* at 4:58-60 (emphasis added); *see also* 4:60-64 (DSP “retrieves the coefficients from memory”). The select signal thus controls the signal processor in the same way that the Zenith μ P output signal controls the switch 42 to select the correct signal path. Ex. 1011 at Fig. 2, 2:35-45.

82. Dr. Opris postulates a hypothetical in which the incoming TV signal is initially in the digital format and by implication the switch is set to route the TV signal to the digital demodulator. Opris Dec., ¶85. Dr. Opris then proposes changing the channel to an analog TV station. *Id.* at ¶86. In that hypothetical, according to Dr. Opris, “the filter inside the signal processor is still configured to for [sic] a digital format” so the TV signal will not be routed to the analog demodulator. *Id.* If the TV signal is not routed to the analog demodulator, so goes

the argument, the SYNC DET will never be able to detect the sync signal and thus “[t]he loop is stuck is a state corresponding to the digital format.” *Id.*

83. I find this argument disingenuous at best because it ignores the actual scenario described in Zenith and relies on an unrealistic hypothetical. As shown in FIG. 2 of Zenith (below), the default position of the switch (“A”) routes the incoming TV signal to the analog demodulator 16.

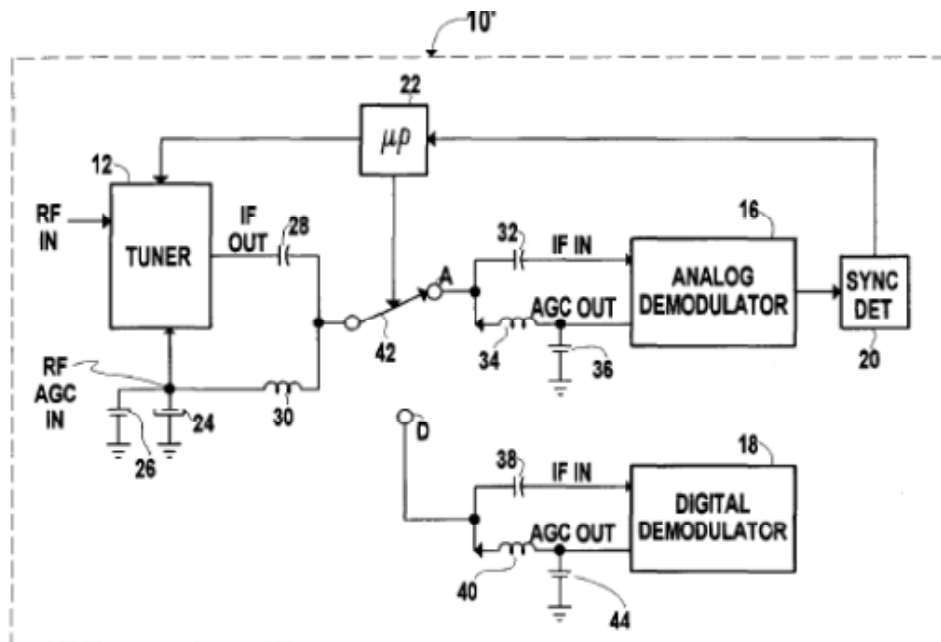


FIG. 2

Ex. 1011 at FIG. 2. If an analog TV signal is received, the SYNC DET 20 will detect the sync signal and so indicate to the uP 22. Zenith explicitly teaches that “microprocessor 22 controls the operation of switch 42 in accordance with the type of signal (analog or digital) that is received. Specifically, the presence of syncs associated with the demodulated analog signal is communicated to the

microprocessor.” *Id.* at 3:13-17. With respect to the embodiment shown in FIG. 1, Zenith further explains that:

demodulated analog signal. Sync separator **20** is connected to a microprocessor **22** that controls tuner **12** and the operation of switch **14**. Specifically, in the presence of syncs corresponding to a demodulated analog type signal, microprocessor **22** causes switch **14** to connect its pole **14a** to terminal A which routes the IF signal from tuner **12** to analog demodulator **16**. In the absence of syncs corresponding to a demodulated analog type signal, microprocessor causes switch **14** to connect its pole **14a** to terminal D to couple the IF signal to digital demodulator **18**.

Id. at 2:35-45. Thus, if the sync detector detects a valid sync signal, the microprocessor will maintain the switch in the analog TV position; if it does not detect a valid sync signal, the microprocessor will infer that a digital TV signal is present and change the switch to the digital TV position. During his deposition, Dr. Opris admitted that, “yes, the system will work properly,” if one assumes that the switch is initially in the analog TV position. Ex. 1060 at 52:4-24.

84. This scenario satisfies the requirement that the claimed select signal be “indicative of a format of said input RF signal.” The output of the uP 22 positively identifies the presence of an analog TV signal and infers the presence of a digital TV format. The uP 22 output serves as a sign or indication of or is suggestive of the format. Ex. 2034. The output signal serves as a “clue, evidence, ..., hint, inkling, intimation, manifestation, ..., suggestion, symbol, token....” of

the format. Ex. 2034 at 2. The broadest reasonable construction of the term “select signal” requires nothing more.

85. The fact that Zenith infers the presence of the digital format in the absence of a valid sync signal, rather than affirmatively detects the digital signal, is irrelevant. The preferred embodiment of the standard selection circuit itself works “by detecting in the baseband signals the presence ***or absence*** of carrier signals which uniquely identify the television standards [sic: formats].” Ex. 1001 at 5:12-15 (emphasis added). The sync signal, like the examples given in the ’585 patent, “uniquely” identifies the analog television format from the digital television format. Thus, Dr. Opris cannot distinguish Zenith’s selection circuit on this basis without also excluding the ’585 patent’s own preferred embodiment.

86. The fact that the output of Zenith’s uP 22 is a single, binary signal also does not disqualify this signal from constituting the claimed “select signal.” As described above in the claim construction section, the select signal need only be able to resolve between two different formats, i.e., “one of a plurality.” A binary signal is able to represent two different states and therefore two different formats. In Zenith’s case, the output of uP 22 indicates that the RF signal is either in an analog television format or a digital television format. The claim language, when properly interpreted, does not require any more information than that.

The Proposed Combination with Zenith is Obvious

87. Patent Owner further argues that a POSITA would not have made the proposed combination. Once again, however, Patent Owner's argument is premised on its faulty assumption that Thomson describes "circuits in parallel." POR at 39-40. That is an unreasonable reading of Thomson because it ignores the "TV standard signal." As I have previously explained, there would be no need for the "TV standard" signal in Thomson if the adaptive bandpass filter comprised two static filters in parallel. The filter also would not be described as "adaptive." The Board agreed with me on this point. FWD at 21. Once that faulty premise is exposed, Patent Owner's argument collapses.

Zenith Detects Carrier Signals Just Like the '585 Patent

88. As described above, the broadest reasonable interpretation of "carrier signal" is "[a] wave having at least one characteristic that may be varied from a known reference value by modulation." Ex. 1054 at 134 (IEEE dictionary). When properly interpreted, Zenith satisfies the broadest reasonable construction of claim 15 and 20.

89. Dr. Opris argues that "Zenith' SYNC DET 20 does not detect any carrier signal." Opris Dec., ¶¶93-94. I disagree. As explained above, Dr. Opris's argument is premised on an implicit construction of "carrier signal" that is limited to transmission carrier. Such a construction does not represent the broadest

reasonable construction and is belied by the '585 patent itself, which describes “detecting in the baseband signals the presence or absence of carrier signals which uniquely identify the television standards.” Ex. 1001 at 5:12-18. A sync signal is a carrier signal under the broadest reasonable construction of that term, as the prior art of record recognizes. Ex. 1053 (U.S. Pat. No. 6,369,857 to Balaban) at 19:18-20 (“***detecting a carrier signal includes detecting*** at least one of a picture carrier, a sound carrier, and ***a synchronization signal***” (emphasis added)). Dr. Opris’s opinion ignores this intrinsic evidence and is inconsistent with the '585 patent’s own specification.

C. Ground 3: Claim 14 is Obvious

90. Patent Owner’s first argument is that claim 14 excludes any sort of automatic detection. That argument might have some force if the claim recited “manual” detection (as opposed to “automatic” detection), but it does not; the claim simply says that the “selection circuit generates said select signal in response to an input signal from a user.” The claim does not specify how the circuit generates the select signal as long as it is “in response to an input signal from a user.”

91. In my opinion, the '585 patent does not “explicitly distinguish[]” between “manual selection” and “automatic selection.” POR at 45. The patent specification describes two embodiments of the standard selection circuit, i.e.,

manual and auto-detect. The '585 patent is equally clear, however, that these two embodiments are not exhaustive. Instead, the specification states that “[s]tandard selection circuit 68 can be implemented in one of many ways.” Ex. 1001 at 5:7-8. After describing the two exemplary embodiments, the specification concludes by stating that, “[i]n other embodiments, other means for selecting between the different standards can be used.” *Id.* at 5:21-23. This suggests to a POSITA that, for example, a combination of the two embodiments could be used to implement the standard selection circuit. Describing two embodiments of the detection circuit does not exclude a combination of those circuits, especially where, as here, the circuit is shown as a black box with only a high level functional description of those embodiments, which suggests that these differences are not as critical.

92. It is hard to imagine a more obvious feature of a television receiver than a circuit that generates a select signal in response to a user input and yet that is what Patent Owner claims in claim 14. Televisions have long perform many functions “in response to an input signal from a user” given the prevalence of remote control units for controlling televisions. https://en.wikipedia.org/wiki/Remote_control (television remote control invented in 1950s). Birleson, for example, discloses a circuit that detects the television format and generates a select signal “every time a new channel is selected” by the user. In my opinion, Birleson renders claim 14 obvious.

93. It is my opinion that the broadest reasonable interpretation of claim 14 embraces a combination of manual and automatic detection. As long as the select circuit generates the select signal in response to a user input, it does not matter whether the circuit also performs some sort of “automatic” detection. There is no question that Birleson generates a select signal “*in response to an input signal* from a user.” Birleson explicitly describes generating a select signal in response to the user changing the channel. Ex. 1015 at 11:20. Claim 14 is obvious.

VI. SECONDARY CONSIDERATIONS

94. I have considered the so-called evidence of secondary considerations of non-obviousness relied upon by the Patent Owner. POR at 49-50. This evidence does not change my opinion that the challenged claims are obvious in view of the prior art. I disagree that there was a “long felt need” in the industry for the subject matter covered by the claims, as evidenced by Thomson, Harris, Zenith, and Birleson. Patent Owner also fails to link the “industry praise” to the subject matter of the claims. As a result, it is my opinion that there is no connection between the evidence and the challenged claims.

VII. CONCLUSION

95. In summary, it remains my opinion that claims 11–15 and 20 are obvious on the grounds instituted by the Board. Nothing contained in the Patent Owner’s Response (Paper 16) or Dr. Opris’s declaration (Ex. 2032) have caused

me to change my opinions. In contrast, my opinions were further reinforced by Dr. Opris's cross examination testimony (Ex. 1060), as explained above.

96. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will appear for cross examination within the United States during the time allotted for cross examination.

97. I reserve the right to supplement my opinions in the future to respond to any arguments that the Patent Owner raises and to take into account new information as it becomes available.

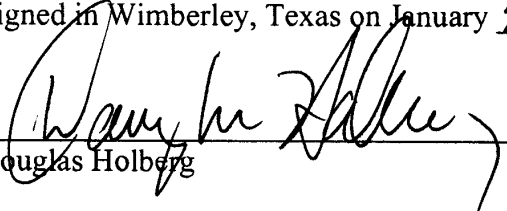
VIII. ACKNOWLEDGEMENT

98. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

IPR2015-00615
IPR2015-00626

U.S. Pat. No. 7,075,585
U.S. Pat. No. 7,265,792

Signed in Wimberley, Texas on January ~~27~~ 2016



Douglas Holberg