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Paper 31
Entered: March 9, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOSHIBA CORPORATION,
Petitioner,

v.

OPTICAL DEVICES, LLC,
Patent Owner.

Case IPR2014-01445
Patent 7,839,729 B2

Before ERICA A. FRANKLIN, GLENN J. PERRY, and JAMES B. ARPIN, *Administrative Patent Judges*.

FRANKLIN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

A. Background

Toshiba Corporation ("Petitioner") filed a Petition (Paper 1, "Pet.") to institute an *inter partes* review of claims 1–10 of Patent No. US 7,839,729 B2 (Ex. 1001, "the '729 patent"). Optical Devices, LLC ("Patent Owner") filed a Preliminary Response (Paper 6, "Prelim. Resp.").

On March 10, 2015, we instituted an *inter partes* review of claims 1–10 of the '729 patent. Paper 7 ("Dec. Inst."). Patent Owner filed a Patent Owner Response to the Petition. Paper 16 ("PO Resp."). Petitioner filed a Reply to the Patent Owner's Response. Paper 18 ("Pet. Reply"). In addition, Patent Owner filed a Motion to Exclude four of Petitioner's exhibits. Paper 24 ("Mot."). Petitioner filed an Opposition to the Motion to Exclude. Paper 27 ("Opp."). Patent Owner responded to that Opposition in a Reply in Support of the Motion to Exclude. Paper 28 ("PO Reply"). On January 13, 2016, the parties presented arguments at an oral hearing. Paper 30 ("Tr.").

The Board has jurisdiction under 35 U.S.C. § 6(c). In this Final Written Decision, issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73, we determine that Petitioner has not shown by a preponderance of the evidence that claims 1–10 are unpatentable.

B. The Cited References and Declarations

Petitioner relies upon the following references in support of its grounds challenging the identified claims of the '729 patent:

Exhibits	References
1003	Patent No. US 6,204,787 B1 to Baird, filed March 31, 1999 ("Baird")
1005	Product Preview for ST TDA7522, "Digital Servo and Decoder," May 1998[1] (the "ST Datasheet")

Petitioner relies also upon the Declaration of Richard Zech, Ph.D. (Ex. 1006). Patent Owner relies upon the Declaration of Raymond de Callafon, Ph.D. (Ex. 2008).

C. The Instituted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–10 of the '729 patent as set forth below:

Reference(s)	Basis	Claims
Baird	§102(e)(pre-AIA)	1–10
Baird and ST Datasheet	§103	1–10

D. Related Proceedings

The parties indicate that the '729 patent is the subject of *Optical Devices, LLC v. Toshiba Corp*., Case No. 1:13-cv-10530 (D. Del. 2013). Pet. 1; Paper 5, 2 (also identifying other related cases). In addition, the '729 patent is the subject of an investigation before the U.S. International Trade Commission: *In the Matter of Certain Optical Disc Drives, Components Thereof, and Products Containing the Same*, Inv. No. 337-TA-897. Pet. 1;

[1] "May 1998" is the date that appears on the reference. As discussed in this Final Written Decision, that date has not been established as a "printed publication" date so as to qualify the reference as prior art under 35 U.S.C. § 102.

Paper 5, 1. Further, we instituted *inter partes* reviews for claims of the following patents covering related subject matter: Patent Nos. US 7,196,979 B2 (IPR2014-01446, Paper 7) and US 8,416,651 B2 (IPR2014-01447, Paper 9).

E. The '729 Patent

The '729 patent describes a digital servo system in an optical disk drive. Ex. 1001, 1:16–17. The servo system includes photodetectors for receiving reflected light from an optical disk and providing an output signal which is converted into a digital signal by an analog-to-digital converter. *Id* at 2:30–35. The servo system includes also a digital signal processor configured to (a) receive the digital signals, (b) determine a focus error signal ("FES") and a tracking error signal ("TES") from the digital signals, and (c) process TES and FES through servo algorithms to produce tracking and focus control signals. *Id*. at 2:35–41.

The claims at issue are directed to an optical disk drive having such a digital servo system, a method of driving an optical pick-up unit, and a servo system comprising an optical pick-up unit. *See, e.g.*, Ex. 1001, Claims 1, 5, and 8.

F. Illustrative Claim

Independent claim 1 is illustrative and is reproduced below:

1. An optical disk drive, comprising:
a plurality of photodetectors for receiving reflected light from an optical disk, each photodetector providing a photodetector output signal;
an analog-to-digital converter for converting low-pass filtered and gain-adjusted versions of the photodetector output signals into digital signals; and

> *a digital signal processor configured to receive the digital signals, the digital signal processor being further configured to determine a focus error signal (FES) and a tracking error signal (TES) from the digital signals, the digital signal processor being further configured to process TES and FES through servo algorithms to produce tracking and focus control signals*.

Ex. 1001, 45:58–46:10 (emphasis added to identify disputed limitations). Claims 1, 5, and 8 are independent. Claims 2–4 depend directly from claim 1; claims 6 and 7 depend directly from claim 5; and claims 9 and 10 depend directly from claim 8.

G. Claim Construction

In an *inter partes* review, the Board interprets claim terms in an unexpired patent according to the broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278–79 (Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 84 U.S.L.W. 3218 (U.S. Jan. 15, 2016) (No. 15-446). Under that standard, and absent any special definitions, we give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc*., 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). "In such cases, the inventor's lexicography governs." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc). In the absence of such definitions, limitations are not to be read from

the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

Only terms which are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). For this reason, we provide express constructions only for the following terms.

1. "digital signal processor"

In the Institution Decision, we construed the claim term "'digital signal processor'" ("DSP") as meaning "'an integrated circuit structured and arranged for processing digital signals in accordance with programmed commands.'" Dec. Inst. 7.

In the Patent Owner Response, Patent Owner asserts that our initial construction is "overly broad" because it "encompasses virtually any general purpose microprocessor or microcontroller unit." PO Resp. 7. According to Patent Owner, "[o]ne of ordinary skill in the art would understand that a digital signal processor or DSP is a *specialized* microprocessor—one that is structured and arranged for high speed processing of digital signals—particularly real-time digital data streams." *Id*. In particular, Patent Owner asserts that the Specification "frequently relies on the difference between a general purpose microprocessor and a DSP in describing embodiments of the invention." *Id*. at 7–8 (citing Ex. 1001, 19:1–18) (describing, for example, that ***"[i]n some embodiments, DSP 416 operates under instructions from microprocessor 432.***").

In further support of its proposed claim construction, Patent Owner provides two dictionary definitions for a DSP, with one defining the term as "[a]n integrated circuit designed for high speed data manipulation and used

in audio communications, image manipulation, and other data acquisition and data control applications" (Ex. 2002, 145) and the other defining the term as "[a] high-speed coprocessor designed to do real-time manipulation of signals" (Ex. 2003, 198). *Id*. at 9–10. In addition, Patent Owner relies upon the declaration testimony of Dr. de Callafon, as well as the deposition testimony of Petitioner's declarant, Dr. Zech, that a DSP is a *specialized* microprocessor architected and designed to perform *high speed processing* of digital signals, particularly real-time data processing. *Id*. at 7 (citing Ex. 2008 ¶ 21(a)) and 9 (citing Ex. 2001, 28:14–29:4, 31:17–32:10, 34:15–35:3, 35:9–14, 48:11–22, 55:4–21, 62:17–63:22, 90:9–92:6, 96:7–97:22, 108:10–109:10).

In the Reply, Petitioner and its declarant, Dr. Zech, observe that the Board's initial construction of DSP is "very general but accurate." Pet. Reply 3. Petitioner asserts that Patent Owner's proposed construction "finds no support in the specification" and attempts "improperly to import two amorphous limitations into that construction – 'specialized' and 'high speed.'" *Id*. at 4. In particular, Petitioner asserts that "[n]owhere in the '729 patent specification or claims is a DSP described as a 'high speed' processor." *Id*. at 7.

As in our Institution Decision, here again we agree with Patent Owner that the Specification of the '729 patent recognizes that a DSP is different from a general purpose microprocessor. *Id*. at 6–7. For example, the Specification states:

> FIG. 4 shows an embodiment of control chip 350 of control system 300. The embodiment of control chip 350 shown in FIG. 4 includes a microprocessor 432 and a digital signal processor (DSP) 416. Since DSP 416 operates much

> faster, but has lower overall capabilities (e.g., code and data storage space), than microprocessor 432, in some embodiments real time digital servo system algorithms can be executed on DSP 416 while other control functions and calibration algorithms can be executed on microprocessor 432. A control structure for embodiments of control chip 350, and interactions between DSP 416 and microprocessor 432, are further discussed in the System Architecture disclosures.

Ex. 1001, 13:50–61. From this disclosure, we recognize that the Specification suggests that a DSP operates faster than a microprocessor and, in some embodiments, real time digital servo algorithms can be executed on a DSP. *Id*. at 53–55. The Specification, however, does not expressly define the term "digital signal processor."

We note the competing views of Dr. de Callafon, on behalf of Patent Owner, and Dr. Zech, on behalf of Petitioner. We also note issues regarding the testimony of each declarant. For example, in some respects, Dr. de Callafon bases his proposed construction of a DSP on features that he asserts one of ordinary skill in the art would have understood that "most DSP processors have," as opposed to features that all DSP processors require. Ex. 2008 ¶ 21(a). Dr. Zech's deposition testimony describing the design of a DSP, also relied upon by Patent Owner, is unreliable because Dr. Zech testified that he had "no expertise" as to design elements distinguishing a DSP from a general processor. *See*, *e.g.*, Ex. 2001, 35:12–13, 44:12–14.

As we seek to give the term "DSP" its ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention, we take into account the Microsoft and IBM dictionary definitions submitted by Patent Owner. We note that each of those dictionaries define a DSP as being designed for "high speed"

manipulation of data/digital signals. Ex. 2002; Ex. 2003. Patent Owner, however, has not directed our attention to evidence establishing what "high speed" encompasses.

We note also that only one of the submitted dictionary definitions additionally characterizes such digital signal manipulation as "real-time." *Id*. at 2003. The Specification, however, discloses that only some embodiments can execute real time digital servo algorithms on a DSP. We determine that Patent Owner has not established persuasively that the broadest reasonable interpretation of a DSP requires "high speed" processing achieving this "real time" feature. Indeed, Patent Owner's "basic" construction for a DSP does not include a requirement for "real time" processing. *See* PO Resp. 20 (providing a minimal definition for a DSP).

Thus, we are persuaded that that the broadest reasonable intepretation of the term "digital signal processor," consistent with the Specification, is "an integrated circuit structured and arranged for manipulation of digital signals in accordance with programmed commands, and in a manner that operates faster than a microprocessor." Patent Owner's proposal to characterize further an integrated circuit as "specialized" is not well taken. Indeed, we find that proposed modification to be superfluous in that our construction describes that the integrated circuit is structured and arranged to achieve a specific function, i.e., manipulation of digital signals and operating faster than a microprocessor.

2. Unchallenged Constructions

We provided the following constructions in the Institution Decision:

(a) "versions of signals from photodetectors" and "versions of photodetector output signals" as meaning "individual analog signals derived

from photodetector output signals." Dec. Inst. 5–6.

(b) "digital signals" as "signals using two or more states, e.g., '0' or '1,' to represent signal values." *Id*. at 7–8.

(c) "focus error signal" as "a digital signal representing an out-of-focus condition." *Id*. at 8.

(d) "tracking error signal" as "a digital signal representing an off-track condition." *Id*. at 9

The parties do not challenge those constructions in the Patent Owner Response or in the Petitioner's Reply. Nor do we find any reason to depart from those constructions in this Final Written Decision. Accordingly, we maintain each of those unchallenged constructions as the broadest reasonable interpretation, consistent with the Specification, in this Final Written Decision.

Patent Owner proposes constructions for additional claim phrases without providing any discussion or reference to the Specification in support of those proposed constructions. PO Resp. 12–13. Based on our analysis, we determine that no express claim construction is necessary for any remaining claim term. Thus, we are not persuaded to adopt those proposed constructions.

H. Level of Ordinary Skill in the Art

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999)(citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966) and *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)).

Petitioner asserts that one of ordinary skill in the art at the time of the filing of the '729 patent as having:

> (1) a Bachelor's of Science Degree in Electrical Engineering, Mechanical Engineering, Physics *or* a related field and at least two years of additional experience in control system technology, optical disk servo technology, magnetic disk servo technology, or related technologies, either in industry or research[,] *or* (2) at least a Master's of Science Degree in Electrical Engineering, Mechanical Engineering, Physics *or* a related field with coursework in control system technology, optical disk servo technology, magnetic disk servo technology, or related technologies.

Pet. 36–37 (citing Ex. 1006 ¶¶ 65–66) (emphases added).

Patent Owner asserts that one of ordinary skill in the art would have "a Bachelor of Science in Mechanical or Electrical Engineering *and* at least two years of experience in control systems technology." PO Resp. 5 (citing Ex. 2008 ¶¶ 9–11) (emphasis added).

Based on our consideration of the record, we find that the evidence as a whole supports Petitioner's broader description of the level of ordinary skill in the art. Accordingly, we adopt Petitioner's statement of the ordinary skill in the art.

II. ANALYSIS

A. Anticipation by Baird

Petitioner contends that claims 1–10 of the '729 patent are anticipated by Baird. Pet. 39–53; Pet. Reply 8–17. Patent Owner disagrees. PO Resp. 15–33.

1. Baird

Baird is directed to circuits and methods for gain ranging in an analog modulator and systems using the same. Ex. 1003, 1:33–35. Baird's Figure 1 is reproduced below.

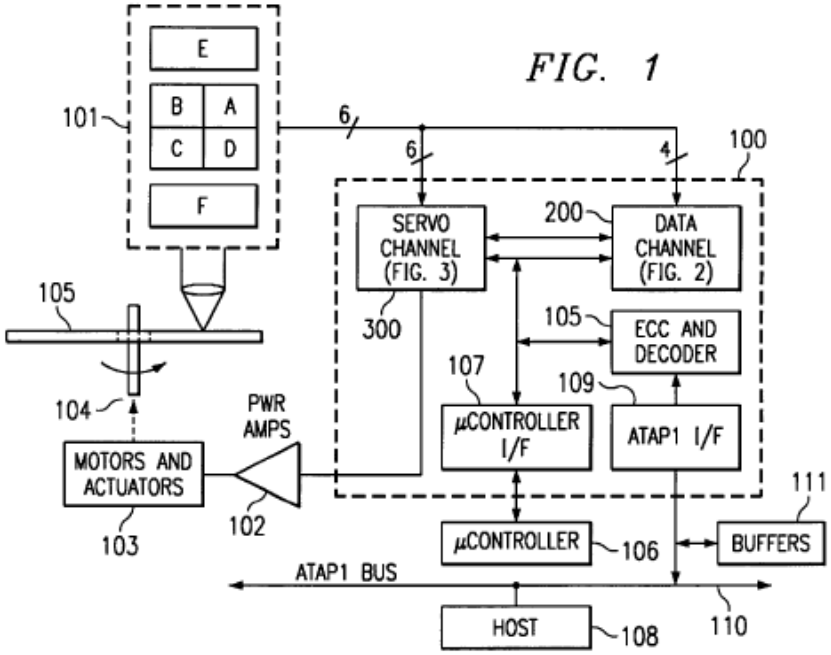

Figure 1 is a conceptual diagram of an exemplary personal computer based optical disk playback system. *Id*. at 2:59–60. Optical pick-up unit 101 includes a photodiode array, i.e., photodetectors A–F, which provide six respective signals to a "drive manager integrated circuit" ("IC") 100. *Id*. at 3:24–32, 5:57–63. IC 100 includes "servo channel" 300 which provides servo control for motors and actuators 103 associated with mechanical manipulation of the optical playback system. *See id*. Fig. 1. Integrated circuit 100 also includes "data channel" 200 for processing data signals read from disk 105. *Id.* at 3:24–61. The "servo channel" is shown in more detail in Baird's Figure 3, reproduced below.

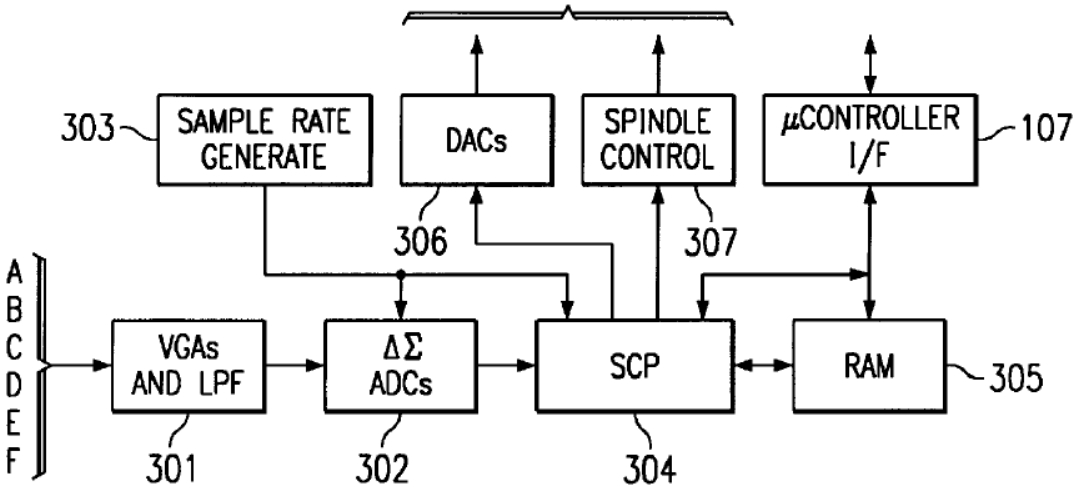

FIG. 3

Baird's Figure 3 is a diagram showing further detail of the servo control path shown in Baird Figure 1. Ex. 1003, 2:64–65. Servo data is received from six photodiodes 101 (i.e., photodetectors A–F) and converted into digital signals by analog to digital converters ("ADCs") 302. *Id.* at 5:63–65. Baird explains, "Servo data processing is performed by on-board servo control processor (SCP) 304, which receives its instruction set from the user selected local microcontroller 106 through interface 107 and RAM 305. *Id.* at 6:13–16.

2. Analysis

"To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently." *In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997). "Inherency . . . may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *MEHL/Biophile Int'l. Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999) (*quoting In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)).

Petitioner asserts that Baird discloses each limitation of claims 1–10 and provides a detailed reading of the challenged claims on Baird. Pet. 39–53. In particular, Petitioner asserts that the Baird's on-board SCP 304 is a DSP configured to receive digitals and further configured to determine and process a focus error signal (FES) and a tracking error signal (TES) as required by the challenged claims. Pet. 41.

a. A digital signal processor configured to receive digital signals

According to Petitioner, Baird discloses an "'on-board servo control processor (SCP) 304' which receives the claimed digital signals from the analog-to-digital converters." Pet. 41 (quoting Ex. 1003; citing Fig. 3, 6:12–15 and Ex. 1006 ¶ 77). Specifically, Petitioner asserts that the SCP receives six separate digitized photodetector signals, each of which has been amplified using six separate VGAs and amplified using separate ADCs 302. *Id*. (citing Ex. 1003, 5:63–6:11). In addition, Petitioner asserts that Baird discloses the SCP as part of an "'integrated servo system that operates four control loops: focus, tracking sled and spindle, using an intermal servo control processor requiring little external microcontroller intervention.'" *Id*. at 42 (quoting Ex. 1003, 5:56–62; citing Ex. 1006 ¶ 78). Petitioner asserts that Baird also discloses that the servo data processing "'is performed by on-board servo control processor (SCP) 304, which receives its instruction set from the user selected local microcontroller 106 through interface 107 and RAM 305.'" *Id*. (quoting Ex. 1003, 6:12–15). Based on those disclosures, Petitioner asserts that one of ordinary skill in the art would understand that Baird's SCP is a (1) DSP used for performing servo functions; and (2) a non-dedicated programmable device that is optimized for processing received digital signals using programmed commands. *Id.*

In further supports of its contention that one skilled in the art would understand Baird's servo processor is a DSP, Petitioner refers to the '729 patent's file history wherein Applicant stated the following:

> Applicant appreciates the suggested replacement titleprovided by the examiner. However, it is respectfullynoted that prior art optical disk drive servos also usedigital signal processors —that use is old. What is notold, however, is ***the provision of a servo processor (e.g.,a DSP)*** that receives versions of the photodetectorsignals such that the servo processor is the component that calculates the resulting servo algorithm error signals (FES for focus and TES for tracking).

Pet. 43 (quoting Ex. 1002, 139) (emphasis added in Petition). Petitioner draws support also from a second statement made by that Applicant:

> Thus, just as the Examiner would hear a version of a caller's voice on the telephone (as opposed to the actual sound of the caller's voice that would be heard by the Examiner in a face-to-face conversation) so does ***the claimed servo processor*** receive processed versions of the photodetector signals.

Id. (quoting Ex. 1002, 140–141). According to Petitioner, Applicant's use of the terms "digital signal processor" and "servo processor" interchangeably establishes persuasively that Baird's SCP also must be considered a DSP. *Id*.

Patent Owner asserts that Baird's SCP does not constitute "a digital signal processor (DSP)," as required by independent claims 1, 5, and 8. PO Resp. 16. According to Patent Owner, a "DSP typically comes with additional flash memory and/or RAM," and is distinguished from a general purpose microprocessor and/or microcontroller "due to the specialized architecture for the computational needs in digital signal processing." *Id*. at 18–19 (citing Ex. 2008 ¶ 31). Patent Owner asserts that the "specialization

ensures that calculations can be done as fast as possible with as little latency as possible." *Id*. at 20 (citing Ex. 2008 ¶ 33).

Patent Owner asserts that Baird's Figure 3 shows that "the RAM (memory) is separate from the SCP and data flow would go through the SCP to the RAM." *Id*. at 23. According to Patent Owner, because the memory to process data is not part of the processor architecture, "the SCP is inconsistent with a typical DSP architecture." *Id*. In other words, Patent Owner asserts that Baird's SCP "does not consitute a DSP, since hardware assisted computations would have to have direct memory access to qualify as a DSP programmed command." *Id*. (citing 2008 ¶ 41).

Based on our review of Baird, we disagree with Patent Owner's characterization of the SCP depicted in Figure 3 as not having direct access to RAM. Although the RAM is separated from the SCP, Figure 3 depicts a two-way arrow positioned directly between the two elements. Patent Owner has not explained persuasivley why a skilled artisan would not understand that two-way arrow as indicating direct access to RAM by the SCP. *See* Tr. 46:16–50:8. Moreover, we note that Dr. de Callafon characterizes a DSP as "typically" having RAM, and because Baird's RAM is separate from the SCP, it is inconsistent with "typical" DSP architecture. Ex. 2008 ¶¶ 31, 40. Thus, neither Dr. de Callafon's declaration nor our construction of DSP prohibits RAM from being separate from the DSP.

Further, based upon our review of the record, Patent Owner has not addressed either of Applicant's statements referenced by Petitioner wherein the terms "digital signal processor" and "servo processor" were used interchangeably, suggesting that Baird's SCP may be considered a DSP.

Based on our review of the record as a whole, and in view of our claim construction for the claim term "digital signal processor," we find that the preponderance of the evidence establishes that one of ordinary skill in the art would understand Baird's SCP to be a DSP used to perform servo functions.

b. Determining/Calculating FES and TES from the digital signals

Petitioner asserts that "[i]t is inherent that the servo control processor of Baird determines focus error signal and tracking error signal." Pet. 44. Petitioner reasons that, because Baird discloses that the SCP performs focus and tracking control loops, "it is necessarily the case that a focus error and tracking error signal are generated" in order to perform that function. *Id*.; Ex. 1006 ¶ 82; *see* Tr. 20:21–23:5. According to Petitioner and Dr. Zech, one of ordinary skill in the art would understand that those error signal calculations must occur within the SCP because Baird does not disclose any other circuitry or block in its design that could perform that function. *Id*. Additionally, Petitioner asserts that Baird's SCP necessarily determines FES and TES because Baird discloses that the SCP receives digitized photodetector signals and generates servo control signals requires a determination of the error signals. *Id*. (citing Ex. 1006 ¶ 82).

Patent Owner contends that "[i]t is not inherent that the servo control processor of Baird is 'further configured to determine a focus error signal (FES) and a tracking error signal (TES) from the digital signals [it receives],' as required by independent claim 1 and similarly claimed in independent claims 5 and 8." PO Resp. 24–25. Patent Owner asserts that "Baird is silent with respect to the operations and locations of the four control loops, as well as any generation of focus or tracking error signals."

Id. at 25.

Regarding Baird's disclosure that the SCP processes the servo loops to create control signals, Patent Owner asserts that "Baird fails to provide any description of how its control loops operate" or even if the loops are "open" or closed." *Id*. at 28. According to Patent Owner, "[a] person of ordinary skill in the art would understand that there are different types of servo control loops, including, but not limited to, 'open' and 'closed' servo control loops." *Id*. at 27; Ex. 2008 ¶ 49. Patent Owner asserts that one of ordinary skill in the art also understands that open loops operate without any feedback and, thus, do not require the determination of error signals. *Id*. at 28: Ex. 2008 ¶ 50.

For example, Patent Owner asserts that "[o]ne example of 'open loop' control system is one which reacts before an error actually occurs, which is called feedforward control or predictive control." *Id*. (citing Ex. 2008 ¶ 51). Patent Owner and Dr. de Callafon explain that "[f]eedforward control is not error-based, but instead is based on knowledge about the process in the form of a mathematical model of the process or knowledge about measurements of the process disturbances." *Id*.; Ex. 2008 ¶ 51. According to Patent Owner and Dr. de Callafon, such knowledge is useful for a servo system wherein the process and process disturbances have a repetitive nature, making it easier to predict and react before any error occurs. *Id*. Patent Owner and Dr. de Callafon explain further that "[r]epetitive movements and repetitive control signals are found in an optical disk drive where the disk is constantly rotating creating repetitive and predictable error signals." PO Resp. 29; Ex. 2008 ¶ 52. Patent Owner asserts that it was known in the art that repetitive control signals needed for such a repetitive system could be

designed via iterative learning or a repetitive control algorithm and that one of skill in the art would understand that the repetitive control signals are applied in an open loop fashion to control the actuator in the optical disk drive. *Id*. Therefore, according to Patent Owner and Dr. de Callafon, Baird's disclosure of a servo system "does not imply unequivocally that the servo system is either 'open' or 'closed'." *Id*.

Further, Patent Owner asserts that one of ordinary skill in the art understands that, although closed loops operate based upon feedback, "that feedback need not result in the determination of error signals." *Id*. at 29; Ex. 2008 ¶ 53. In such cases, Patent Owner asserts that servo control can be done on the basis of feedback of the measurement of the actual reference signal as opposed to a measurement of the difference between the reference and the output. *Id*. (citing Ex. 2008 ¶ 53). Thus, Patent Owner contends that Baird's teaching that the servo system uses the SCP to operate focus and tracking control loops does not inherently disclose that the SCP determines any error signals, much less FES and TES. *Id*. at 32; *see* Tr. 64:16–65:14.

In the Reply, Petitioner asserts that Patent Owner has not explained "how or why open loop systems could be used in a servo control system in an optical disk drive system," or provided any examples of open servo control that can be used for an optical disk system, such as the system disclosed in Baird. Pet. Reply 13. According to Petitioner, Patent Owner's declarant, Dr. de Callafon, testified that photodetector signals are not used in open loop systems. *Id*. (citing Ex. 1017, 110:24–111:6). Because Baird discloses receiving servo data from photodetector signals, Petitioner asserts that "by Patent Owner's own admission, Baird teaches away from using an open loop system for servo control." *Id*. Further, Petitioner asserts that

optical disks contain imperfections, such that an open loop control system would lack the necessary feedback to adjust for those imperfections. *Id*. at 13–14 (citing Ex. 1006 ¶¶ 23, 32–35).

Having considered the arguments and evidence, we are not persuaded that Petitioner has established by a preponderance of the evidence that Baird inherently discloses a DSP configured to determine a FES and a TES from digital signals received by the SCP. In particular, Petitioner's primary contention with respect to inherency is that one of ordinary skill in the art would understand that Baird must determine a FES and TES in order for the SCP to operate focus and tracking control loops. Pet. Reply 14 (citing Ex. 1006 ¶ 82). However, neither Petitioner, nor Petitioner's declarant, Dr. Zech, provides any explanation why that is true. When asked for an explanation during his deposition, Dr. Zech responded in a manner that relied upon a *probability* that Baird's SCP determines FES and TES. For example, the following is an excerpt from Dr. Zech's deposition:

> Q Can you explain to me why it is your opinion that it is inherent that a servo control processor in Baird determines a focus error signal and a tracking error signal?
> A Well, because the way he designed it, it does. And I can't imagine why somebody, an engineer at Cirrus Logic, would swim against the current and come up with something entirely new. The chip surely would not sell. I know that from pretty broad experience in sales and marketing. Once you tell me optical disk drive -- *I've explained to you the statistics of it -- 99 percent plus are probably using continuous composite servoing*. When you use continuous composite servoing, you need to have a tracking error and a focus error signal. *So it's not much of*

> *a leap for me to conclude that that's what's going on here.*

Ex. 2001, 151:3–20 (emphases added). Dr. Zech's deposition testimony describes what functions and systems optical disk drives "are probably using" and that "it's not much of a leap" for him to conclude what is occuring in Baird with respect to whether error signals are determined *Id*.; *see MEHL/Biophile Int'l. Corp.*, 192 F.3d at 1365 (inherency is not established by probabilities or possibilities). Moreover, both in his declaration and at the deposition, Dr. Zech bases his opinion regarding that issue on assumptions unsupported by evidence. *See* Office Patent Trial Practice Guide 77 Fed. Reg. 48,756, 48,763 (Aug. 14, 2012) ("Affidavits expressing an opinion of an expert must disclose the underlying facts or data upon which the opinion is based. . . . Opinions expressed without disclosing the underlying facts or data may be given little to no weight.") (citations omitted). Thus, we do not afford Dr. Zech's opinions persuasive weight.

Further, based upon our review of the record, we find that Patent Owner has presented a credible challenge to Petitioner's assertion that Baird's SCP *necessarily* determines FES and TES. *See* PO Resp. 24–32 (discussed *supra*). In particular, Patent Owner and Dr. de Callafon have provided reasonable explanations and examples demonstrating that Baird's SCP may operate using (a) an open loop that is not dependent upon the determination of FES or TES, or (b) a closed loop that is based upon feedback not requiring the determination of those error signals. *Id*. We disagree with Petitioner's assertion that Patent Owner has not provided examples or explained how or why open loop systems could be used in a servo control system in an optical disk drive system. *See* Pet. Reply 13.

Patent Owner and Dr. de Callafon explained that, in an optical disk drive, where the disk is constantly rotating, repetitive control signals are found. PO Resp. 28; Ex. 2008 ¶ 52. Patent Owner and Dr. de Callafon explained also that it was known in the art that a repetitive system could be designed via iterative learning or a repetitive control algorithm to produce repetitive control signals needed for such a repetitive system. *Id*. Further Patent Owner and Dr. de Callafon explained that the repetitive control signals are applied in an open loop fashion to control the actuator in the optical disk drive. *Id*.

We also do not agree with Petitioner's assertion that Dr. de Callafon's testimony amounts to an admission by Patent Owner that Baird "teaches away" from using an open loop system for servo control. Pet. Reply 13. In support of that contention, Petitioner relies on Dr. de Callafon's deposition testimony relating to some "very simple open loop solutions for optical drives that didn't use any error measurement." Ex. 1017, 110:8–10. Petitioner asked whether "those systems utilize photodetector signals for the purposes of servo?" *Id*. at 110:24–111:1. Dr. de Callafon answered, "*If* they are purely open loop, *probably* not." *Id*. at 111:3–4 (emphases added). However, prior to that conditional statement, Dr. de Callafon explained that the photodetector signals received by the SCP in Baird would be useful in an open loop servo because those signals can provide information about the repetitive motion of the disk. Ex. 1017, 75:17–76:24. Dr. de Callafon explained further that the repetitive motion need not be a FES or TES, but, instead, a "reference signal," that is not based upon any error signal. *Id*. at 76:14–77:2.

In view of the evidence, arguments, and Baird's silence with respect to how focus and tracking control are accomplished by the SCP, and, in particular, whether such control relies upon determining any error signals, or, even if the servo operates in an open or closed loop, we are not persuaded that the preponderance of the evidence establishes that Baird's SCP determines, calculates, or otherwise provides FES and TES, as required by the challenged claims. Therefore, having considered the record as a whole, we find that Petitioner has not established persuasivley that Baird discloses each and every limitation of the challenged claims. Accordingly, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1–10 are anticipated by Baird.

B. Obviousness over Baird and the ST Datasheet

Petitioner contends, as an alternative to the previously discussed anticipation ground, that claims 1–10 of the '729 patent are rendered obvious by the combination of Baird and the ST Datasheet. Pet. 50; Pet. Reply 17–25. Patent Owner disagrees. PO Resp. 34–47. In particular, our analysis focuses on Patent Owner's assertion that the ST Datasheet does not qualify as a prior art. *Id*. at 34–38.

1. ST Datasheet

The ST Datasheet describes a TDA7522 Digital Servo and Decoder having a built in microcontroller. Ex. 1005, 1. The ST Datasheet is a twenty-three page document that contains the date of "May 1998" at the bottom of the first page. *Id*. Below the date is a statement that characterized the document as containing "*preliminary* information on a new product now in development. Details are subject to change without notice." *Id*.

(emphasis added). On the last page of the document is a statement that the "[i]nformation furnished is believed to be accurate and reliable." *Id*. at 23. Additionally, the last page of the document states, "Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied." *Id*.

2. Analysis

For a reference to be considered a "printed publication" so as to qualify as a prior art printed publication under 35 U.S.C. § 102(b), the reference must be shown to have been "sufficiently accessible to the public interested in the art" prior to the critical date. *In re Cronyn*, 890 F.2d 1158, 1160 (Fed. Cir. 1989).

Petitioner contends that, if we find that the SCP of Baird is not a digital signal processor, then the ST Datasheet discloses this element such that the combined prior art renders the challenged claims obvious. Pet. 50–51 (citing Ex. 1005, 1, 7). According to Petitioner, the ST Datasheet qualifies as a printed publication under pre-AIA 35 U.S.C. § 102(b) with respect to the '729 patent because the ST Datasheet "was published in May 1998 in the United States." Pet. 50–51. In support of that publication date, the Petitioner relies upon the May 1998 date on the front page of the ST Datasheet, a Technical/Product Press Announcement (Ex. 2012) dated May 18, 1998, describing the TDA7522 Digital Servo and Decoder (Pet. 56), as well as the declaration testimony of Dr. Zech (Ex. 1016 ¶ 90). At the institution phase, we determined that Petitioner provided sufficient evidence tending to show that the ST Datasheet was publicly available and accessible as of May of 1998. Dec. Inst. 16.

In the Patent Owner Response, Patent Owner argues that the ST Datasheet "does not qualify as a prior art printed publication because there is no evidence to prove that it was made sufficiently accessible to the public" during "May 1998," or at any time prior to the critical date of the '729 patent. PO Resp. 34–35. According to Patent Owner, that date printed on the datasheet "is inadequate on its face to demonstrate availability and accessibility to the public." *Id*. at 35. With respect to the press announcement[2] (Ex. 1012), Patent Owner asserts, among other things, that the announcement also "does not provide any evidence to prove that the ST Datasheet was made sufficiently accessible to the public interested in the art before the critical date." *Id*. at 37. Rather, Patent Owner asserts that the press announcement only suggests the availability of a purported *product*, i.e., the ST TDA 7522 chip, and not the availability or accessibility of the *document* at issue, i.e., ST Datasheet, on a particular date. *Id*. at 38.

In the Reply, Petitioner responds to Patent Owner's argument by asserting that the disclaimer information included at the end of the datasheet "is evidence of clear *intent* for the publisher to share the document with potential customers." Pet. Reply 19 (emphasis added). According to Petitioner, it is clear from this "evidence," along with the quality and details of the datasheet itself and the release of the product in May 1998, "that the ST Datasheet was available for interested parties to access well before the priority date of the '729 patent." *Id*.

[2] Ex. 1012 is printed from the Internet Archive's "Wayback Machine."

After considering the admissible evidence and arguments,[3] we find that Patent Owner has challenged persuasively Petitioner's assertion that the ST Datasheet was publicly accessible prior to the critical date. While the ST Datasheet contains a May 1998 date and refers to itself as a "publication" (*see* Ex. 1005, 23) the reference does not provide any definitive statement or identification that it was accessible to the public interested in the art in May 1998. At most, Petitioner has established that the version of ST Datasheet provided as Exhibit 1005 was printed in May 1998. In other words, the document represents a May 1998 version of the "preliminary information" compiled for the TDA7522 product that was in development. *See* Ex. 1005, 1 ("This is preliminary information of a new product now in development."). We also note that the ST Datasheet contains a statement that "[t]his publication supersedes and replaces all information previously supplied." *Id*. at 23. However, the ST Datasheet does not state or otherwise indicate to whom the information was supplied or made available, much less when.

Upon further consideration of the press announcement, dated May 18, 1998, describing the TDA7522 chipset, Ex. 1012, we agree with Patent Owner that the press announcement describes the availability of a *product*, i.e., the ST TDA 7522 chip (*see* Ex. 1012, 1 ("a special version of the TDA 7522 is available")), but not the availability or accessibility of the ST Datasheet at that time. The press announcement does not refer to the ST Datasheet or mention that such information regarding the product was available.

[3] *See infra* Section III (addressing the Motion to Exclude with respect to Exhibits 1015 and 1016).

Indeed, Petitioner's declarant, Dr. Zech, acknowledges that the press announcement refers only to the availability of the TDA7522 chip in May 1998. Ex. 1006 ¶ 90. Beyond that acknowledgement, Dr. Zech offers only conjecture stating that "it stands to *reason* that the ST Datasheet also was available in May 1998, as chip companies typically disseminate a datasheet when they introduce a new chip." *Id*. (emphasis added). Dr. Zech, however, did not provide testimony or evidence to support that *reasoning*. Nor did Dr. Zech assert that he had knowledge specifically relating to ST Micro's business practices in 1998. Thus, we do not afford persuasive weight to Dr. Zech's statements regarding the asserted availability of the ST Datasheet. *See* Trial Practice Guide 48763 ("Affidavits expressing an opinion of an expert must disclose the underlying facts or data upon which the opinion is based. *See* Fed. R. Evid. 705; and § 42.65. Opinions expressed without disclosing the underlying facts or data may be given little or no weight.").

Without more, for example, a declaration from a knowledgeable representative of ST Micro regarding the normal business practice in May 1998 of making datasheets available for download on or near the date provided on the publication, we do not find that Petitioner has supported adequately its contention that ST Micro made the ST Datasheet, submitted as Exhibit 1005, available for download on its public website or otherwise publicly accessible, prior to the critical date. *See, e.g., In re Enhanced Security Research, LLC*, 739 F.3d 1347, 1354–55 (Fed. Cir. 2014)(finding dated manual was "publically-available" based, in part, upon the declaration of the Chief Executive Officer of the company that produced the product described in the manual averring that the version of the manual relied upon was accessible to public on the date inscribed on the manual).

A determination whether a particular reference qualifies as a printed publication "must be approached on a case-by-case basis." *In re Hall*, 781 F.2d 897, 899 (Fed. Cir. 1986). In this case, based on the foregoing facts and discussion, we determine that Petitioner has not established that the ST Datasheet was publicly accessible prior to the critical date so as to render it a "printed publication" for the purposes of 35 U.S.C. § 102(b). Thus, the ST Datasheet does not qualify as prior art.

Accordingly, Petitioner has not shown by a preponderance of the evidence that the challenged claims would have been obvious over the combination of Baird and the ST Datasheet because the ST Datasheet is not available as prior art.

III. MOTION TO EXCLUDE

Patent Owner filed a Motion to Exclude Exhibits 1005, 1012, 1015, and 1016. Paper 24. In the motion, Patent Owner characterizes its challenge of Exhibit 1005 (the ST Datasheet) and Exhibit 1012 (the Press Announcement) as "lacking authentication, inadmissible hearsay, and/or irrelevant." *Id*. at 1. It is apparent, however, from Patent Owner's argument in support of those contentions that the issue instead relates to a sufficiency of the evidence with respect to whether Exhibits 1005 and 1012 establish that Exhibit 1005 qualifies as a "printed publication." For example, Patent Owner asserts that Exhibits 1005 and 1012 are inadmissible because "there is insufficient evidence to support finding that [those exhibits] are documents that were publicly available at the time the time Petitioner purports they were." *Id*. at 2. That issue is properly addressed in our analysis above, rather than in the context of a Motion to Exclude. Accordingly, we *deny* the motion to exclude with respect to Exhibits 1005

and 1012.

Regarding Exhibits 1015 and 1016, Patent Owner asserts that those exhibits should be excluded as "untimely" because Petitioner submitted them in response to Patent Owner's objections of Exhibits 1005 and 1012 more than ten business days after being served with those objections. *Id*. at 8–9 (citing 37 C.F.R. § 42.64(b)). Additionally, Patent Owner asserts that Exhibits 1015 and 1016 should be excluded because Petitioner failed to seek authorization to file a motion to submit supplemental information pursuant to 37 C.F.R. § 42.123(b). *Id*. at 10.

Petitioner submitted Exhibits 1015 and 1016 for the first time with its Reply Brief, without authorization. Petitioner describes Exhibit 1015 as a current STMicro webpage containing a link to a downloadable datasheet for a digital UV index sensor, i.e., "UNIS25." Reply 19. Petitioner describes Exhibit 1016 as an "Internet Archive screenshot of one of STMicro's websites as of December 4, 2000" purportedly displaying a list of downloadable ST Micro datasheets describing "Audio & Radio" products, including the datasheet for "part number 'TDA7522.'" *Id*. Exhibit 1016 includes a declaration by an employee at the Internet Archive stating that the screenshots submitted as Exhibit 1016 "are true and accurate copies of printouts of the Internet Archive's records of the HTML files for URLs and the dates specified in the footer of the printout." Ex. 1016, 1.

Petitioner admits that those exhibits were neither served nor filed under 37 C.F.R. § 42.64(b) in response to Patent Owner's evidentiary objections (*see* Ex. 2009 (serving objections to Exhibits 1005 and 1012 on Mar. 24, 2015); Ex. 2010 (serving objections to Exhibits 1015 and 1016 on Sept. 21, 2015)), nor filed under 37 C.F.R. § 42.123(b) as "supplemental

information." Opp. 14–15. Instead, according to Petitioner, Exhibits 1015 and 1016 "were introduced for purposes of responding to Patent Owner's arguments in its Response (Paper 16) pursuant to 37 C.F.R. § 42.23." *Id*.

Petitioner's reliance on 37 C.F.R. § 42.23 as justification for submitting evidence not initially part of the record is misplaced. Section 42.23(b) states that "A reply may only respond to arguments raised in the corresponding opposition or patent owner response." That section does not authorize or otherwise provide a means for supplementing the evidence of record. As explained in the Office Patent Trial Practice Guide, "a reply that . . . belatedly presents evidence will not be considered and may be returned." 77 Fed. Reg. at 48,767.

An *inter partes* review is subject to strict statutory deadlines at both the institution stage and at the final decision. 35 U.S.C. §§ 314(b), 316(a)(11). Unnecessary delay in the presentation of arguments or evidence by either party impedes the Board in fulfilling its mandate "to secure a just, speedy, and inexpensive resolution of every proceeding." 37 C.F.R. § 42.1(b); *see Redline Detection, LLC v. Star Envirotech, Inc.*, 811 F.3d 435, 445 (Fed Cir. 2015) ("The guiding principle for the PTAB in making any determination is to 'ensure efficient administration of the Office and the ability of the Office to complete IPR proceedings in a timely manner.'" (citations omitted)). The Petition represents Petitioner's case-in-chief, and Petitioner is tasked with presenting the evidence, upon which Petitioner relies in support of its challenges to Patent Owner's claims in its Petition. 35 U.S.C. § 312(a)(3); *see* 37 C.F.R. § 42.104(b)(5).

Nevertheless, our Rules expressly provide procedures for introducing supplemental evidence or supplemental information into a proceeding. *See*

37 C.F.R. §§ 42.64(b)(2) (supplemental evidence), 42.123(a)–(c) (supplemental information). Petitioner was aware of Patent Owner's challenge to the public accessibility of the ST Datasheet by at least December 11, 2014, the filing date of the Preliminary Response (*see* Prelim. Resp. 19–23), and certainly by no later than March 24, 2015, the service date of Exhibit 2009 noting objections to Exhibits 1005 and 1012. *See* Ex. 2010 (serving objections to Exhibits 1015 and 1016 on Sept. 21, 2015). Although Petitioner was aware early on of the possible need for such supplemental evidence or information in this proceeding, Petitioner made no apparent effort to take advantage of the available procedures. *See Avocent Huntsville Corp. v. Cyber Switching Patents, LLC*, Case IPR2015-00690, slip op. at 5–7 (PTAB Oct. 2, 2015) (Paper 28) ("Supplemental evidence, served in response to an evidentiary objection, is offered solely to support admissibility of the originally filed evidence and to defeat a motion to exclude that evidence, and not to support any argument on the merits (i.e., regarding the patentability or unpatentability of a claim)."); *Palo Alto Networks, Inc. v. Juniper Networks, Inc.*, Case IPR2013-00369, slip op. at 2–3 (PTAB Feb. 5, 2014) (Paper 37) (granting a motion to submit supplemental information regarding public accessibility of references serving as a basis for instituted grounds). Petitioner does not contend that Exhibit 1015 or 1016 was not available to Petitioner prior to the filing of Petitioner's Reply (Opp. 14–15; *see* Pet. Reply 17–20 (discussing Exhibits 1015 and 1016)), and Petitioner has not provided any other persuasive explanation for the undue delay in submitting Exhibits 1015 and 1016.

Accordingly, we *grant* Patent Owner's Motion to Exclude with respect to Exhibits 1015 and 1016. Therefore, we exclude Exhibits 1015 and 1016, and we do not consider those exhibits, or the arguments in the Reply Brief addressing those exhibits in this proceeding.

IV. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–10 are unpatentable.

V. ORDER

For the reasons given, it is:

ORDERED that Petitioner's request for cancellation of claims 1–10 of the '729 patent is *denied*;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *denied* as to Exhibits 1005 and 1012;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *granted* as to Exhibits 1015 and 1016; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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