

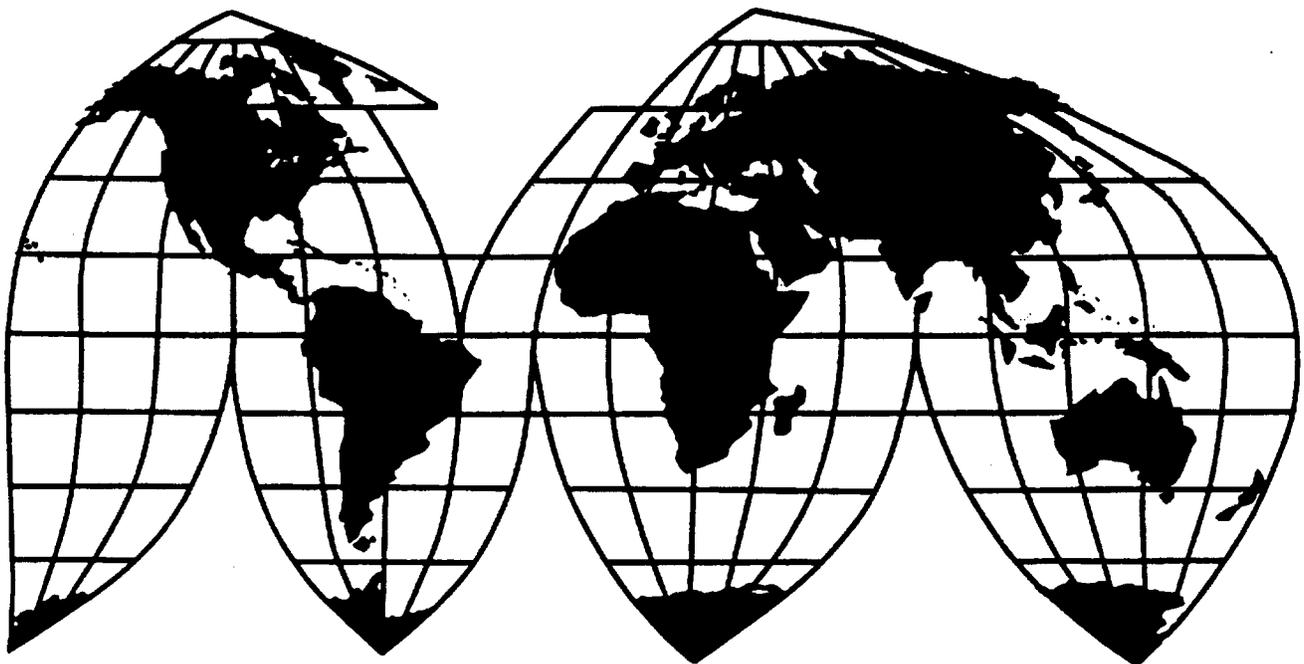
In the Matter of
**Certain Recordable Compact Discs
and Rewritable Compact Discs**

Investigation No. 337-TA-474

Publication 3686

April 2004

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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Washington, DC 20436**

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Washington, DC 20436

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CORRECTED NOTICE
UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of

**CERTAIN RECORDABLE COMPACT DISCS
AND REWRITABLE COMPACT DISCS**

Inv. No. 337-~~EA~~A-474

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RECEIVED
OFFICE OF THE SECRETARY
U.S. INTERNATIONAL TRADE COMMISSION

**NOTICE OF COMMISSION DETERMINATION OF NO VIOLATION
OF SECTION 337**

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined that the U.S. patents asserted by complainant U.S. Philips Corporation are unenforceable for patent misuse, and has therefore found that there is no violation of section 337 of the Tariff Act of 1930 in the above-captioned investigation.

FOR FURTHER INFORMATION CONTACT: Clara Kuehn, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-3012. Copies of the Commission's order, the public version of its opinion, the public version of the presiding administrative law judge's ("ALJ's") final initial determination ("ID"), and all other nonconfidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone 202-205-2000. General information concerning the Commission may also be obtained by accessing its Internet server (<http://www.usitc.gov>). The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at <http://edis.usitc.gov>. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on 202-205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted this investigation on July 26, 2002, based on a complaint filed by U.S. Philips Corporation of Tarrytown, NY ("Philips" or "complainant"). 67 FR 48,948 (2002). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain recordable compact discs and rewritable compact discs by reason of infringement of certain claims of six U.S. patents: claims 1, 5, and 6 of U.S. Patent No. 4,807,209; claim 11 of U.S. Patent No. 4,962,493; claims 1, 2, and 3 of U.S. Patent No. 4,972,401; claims 1, 3, and 4 of U.S. Patent No. 5,023,856; claims 1-5, and 6 of U.S. Patent No. 4,999,825; and claims 20, 23-33, and 34 of

U.S. Patent No. 5,418,764. 67 FR 48,948 (2002).

The notice of investigation named 19 respondents, including GigaStorage Corporation Taiwan of Hsinchu, Taiwan; GigaStorage Corporation USA of Livermore, California (collectively, "GigaStorage"); and Linberg Enterprise Inc. ("Linberg") of West Orange, New Jersey. 67 FR 48,948 (2002). On August 14, 2002, the ALJ issued an ID (Order No. 2) granting a motion to intervene as respondents by Princo Corporation of Hsinchu, Taiwan, and Princo America Corporation of Fremont, California (collectively, "Princo"). That ID was not reviewed by the Commission. GigaStorage, Linberg, and Princo ("respondents") are the only remaining active respondents in this investigation. See ALJ Order No. 6 (an unreviewed ID terminating eight respondents on the basis of a consent order); ALJ Order No. 17 (an unreviewed ID terminating each of three respondents on the basis of a consent order and settlement agreement); ALJ Order No. 18 (an unreviewed ID terminating one respondent on the basis of a consent order and settlement agreement); and ALJ Order No. 21 (an unreviewed ID finding four respondents in default).

On April 7, 2003, the ALJ issued an ID (ALJ Order No. 20) granting complainant's unopposed motion for summary determination that Linberg, GigaStorage, and Princo have each sold for importation, imported, and/or sold after importation products accused of infringing one or more of the asserted patent claims. That ID was not reviewed by the Commission.

A tutorial session was held on June 3, 2003, and an evidentiary hearing was held from June 10, 2003, through June 20, 2003.

On June 30, 2003, the ALJ issued an order (ALJ Order No. 32) granting a motion *in limine* filed by respondents to preclude complainant from asserting the doctrine of unclean hands with respect to respondents' affirmative defense of patent misuse.

The ALJ issued his final ID on October 24, 2003. Although he found that none of the asserted claims are invalid, that the accused products infringe the asserted claims, and that the domestic industry requirement of section 337 has been satisfied, he found no violation of section 337 because he concluded that all of the asserted patents are unenforceable by reason of patent misuse.

On November 5, 2003, complainant Philips petitioned for review of the portion of the final ID that found the asserted patents unenforceable due to patent misuse, and also appealed ALJ Order No. 32. On the same day, respondents filed a paper entitled "Statement of Respondents Princo Corp., Princo America Corp., Gigastorage Corp. Taiwan, Gigastorage Corp. USA, and Linberg Enterprises, Inc. Regarding the Initial Determination," in which respondents urged the Commission to adopt the ID in its entirety. Respondents and the IA filed responses to complainant's petition for review.

On December 8, 2003, the ALJ issued his recommended determination on remedy and bonding.

On December 10, 2003, the Commission determined to affirm ALJ Order No. 32, and to review all of the ID's findings of fact and conclusions of law concerning patent misuse. The Commission determined not to review the remainder of the ID.

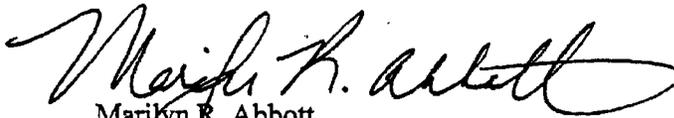
In its review notice, the Commission invited the parties to file written submissions on the issues under review, and invited interested persons to file written submissions on the issues of remedy, the public interest, and bonding. The Commission also requested briefing from the

parties on four questions. Initial submissions were filed on January 9, 2004, and replies were filed on January 16, 2004, and on January 20, 2004.

Having reviewed the record in this investigation, including the parties' written submissions, the Commission determined to affirm the ALJ's conclusion that the asserted patents are unenforceable for patent misuse *per se*, but on the ground that complainant's practice of mandatory package licensing constitutes a tying arrangement between licenses to patents that are essential to manufacture CD-Rs or CD-RWs according to Orange Book standards and licenses to other patents that are not essential to that activity.¹ The Commission determined to adopt the ALJ's conclusion that the asserted patents are unenforceable for patent misuse under a rule of reason standard based on the ALJ's analysis of and findings as to the tying arrangement.² We affirm the ALJ's conclusion that the patent misuse has not been shown to have been purged.

This action is taken under the authority of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. 1337), and in section 210.45 of the Commission's Rules of Practice and Procedure (19 C.F.R. 210.45).

By order of the Commission.



Marilyn R. Abbott
Secretary to the Commission

Issued: March 11, 2004

¹We take no position on the ALJ's conclusion that the asserted patents are unenforceable for patent misuse *per se* based on theories of price fixing and price discrimination.

²We take no position on the ALJ's conclusion that the royalty rate structure of the CD-R/RW patent pools is an unreasonable restraint of trade.

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of

**CERTAIN RECORDABLE COMPACT DISCS
AND REWRITABLE COMPACT DISCS**

Inv. No. 337-TA-474

ORDER

The Commission instituted this investigation on July 26, 2002, based on a complaint filed by U.S. Philips Corporation of Tarrytown, NY (“Philips” or “complainant”). 67 *FR* 48,948 (2002). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930 (19 U.S.C. 1337) in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain recordable compact discs and rewritable compact discs by reason of infringement of certain claims of six U.S. patents: claims 1, 5, and 6 of U.S. Patent No. 4,807,209; claim 11 of U.S. Patent No. 4,962,493; claims 1, 2, and 3 of U.S. Patent No. 4,972,401; claims 1, 3, and 4 of U.S. Patent No. 5,023,856; claims 1–5, and 6 of U.S. Patent No. 4,999,825; and claims 20, 23–33, and 34 of U.S. Patent No. 5,418,764. 67 *FR* 48,948 (2002).

On October 24, 2003, the presiding administrative law judge (“ALJ”) issued his final initial determination (“ID”). Although the ALJ found that none of the asserted claims are invalid, that the accused products infringe the asserted patent claims, and that the domestic industry requirement of section 337 had been satisfied, he found no violation of section 337 because he concluded that all of the asserted patents are unenforceable by reason of patent misuse.

On November 5, 2003, complainant Philips petitioned for review of the portion of the final ID that found the asserted patents unenforceable due to patent misuse, and also appealed ALJ Order No. 32, which granted a motion *in limine* filed by respondents to preclude complainant from asserting the doctrine of unclean hands with respect to respondents' affirmative defense of patent misuse. On the same day, respondents filed a paper entitled "Statement of Respondents Princo Corp., Princo America Corp., Gigastorage Corp. Taiwan, Gigastorage Corp. USA, and Linberg Enterprises, Inc. Regarding the Initial Determination," in which respondents urged the Commission to adopt the ID in its entirety. Respondents and the IA filed responses to complainant's petition for review.

On December 10, 2003, the Commission determined to affirm ALJ Order No. 32, and to review all of the ID's findings of fact and conclusions of law concerning patent misuse. The Commission determined not to review the remainder of the ID, thus adopting it. The Commission issued a notice dated December 10, 2003, in which it requested briefing on the issues under review. In accordance with that notice, all parties to this investigation filed timely written submissions, and timely reply submissions, regarding the issues under review.

Having reviewed the record in this investigation, including the ID and the written submissions of the parties, the Commission hereby **ORDERS THAT:**

1. We affirm the ALJ's conclusion that the asserted patents are unenforceable for patent misuse *per se*, but on the ground that complainant's practice of mandatory package licensing constitutes a tying arrangement between licenses to patents that are essential to manufacture CD-Rs or CD-RWs according to Orange Book standards and licenses to other patents that are not

essential to that activity.¹

2. We adopt the ALJ's conclusion that the asserted patents are unenforceable for patent misuse under a rule of reason standard based on the ALJ's analysis of and findings as to the tying arrangement.²

3. We affirm the ALJ's conclusion that the patent misuse has not been shown to have been purged.

4. This investigation is terminated based on a determination that there is no violation of section 337.

5. The Secretary shall serve copies of this Order on all parties of record and publish notice thereof in the *FR*.

By order of the Commission.


Marilyn R. Abbott
Secretary to the Commission

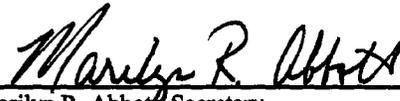
Issued: March 11, 2004

¹We take no position on the ALJ's conclusion that the asserted patents are unenforceable for patent misuse *per se* based on theories of price fixing and price discrimination.

²We take no position on the ALJ's conclusion that the royalty rate structure of the CD-R/RW patent pools is an unreasonable restraint of trade.

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **CORRECTED NOTICE OF COMMISSION DETERMINATION OF NO VIOLATION OF SECTION 337** was served upon the following parties via first class mail and air mail, where necessary on March 16, 2004.



Marilyn R. Abbott, Secretary
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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of

CERTAIN RECORDABLE COMPACT DISCS
AND REWRITABLE COMPACT DISCS

CONFIDENTIAL INFORMATION
DELETED

Inv. No. 337-TA-474

COMMISSION OPINION

This section 337 investigation is before the Commission for final disposition of the issues under review and, if necessary, for determinations on remedy, the public interest, and bonding. We have determined to affirm the presiding administrative law judge's ("ALJ's") conclusion that the asserted patents in this investigation are unenforceable for patent misuse, and consequently find no violation of section 337 of the Tariff Act of 1930.

PROCEDURAL HISTORY

The Commission instituted this investigation on July 26, 2002, based on a complaint filed by U.S. Philips Corporation of Tarrytown, NY ("Philips" or "complainant"). 67 Fed. Reg. 48,948 (2002). The complaint, as supplemented, alleged violations of section 337 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain recordable compact discs ("CD-Rs") and rewritable compact discs ("CD-RWs") by reason of infringement of claims of six U.S. patents (collectively, "the asserted patents"): claims 1, 5, and 6 of U.S. Patent No. 4,807,209 (issued February 21, 1989) ("the '209 patent"); claim 11 of U.S. Patent No. 4,962,493 (issued October 9, 1990) ("the '493 patent"); claims 1, 2, and 3 of U.S. Patent No. 4,972,401 (issued November 20, 1990) ("the '401 patent"); claims 1, 3, and 4 of

U.S. Patent No. 5,023,856 (issued June 11, 1991) (“the ‘856 patent”); claims 1–5, and 6 of U.S. Patent No. 4,999,825 (issued March 12, 1991) (“the ‘825 patent”); and claims 20, 23–33, and 34 of U.S. Patent No. 5,418,764 (issued May 23, 1995) (“the ‘764 patent”). 67 *Fed. Reg.* 48,948 (2002).

The notice of investigation identified 19 respondents, including GigaStorage Corporation Taiwan of Hsinchu, Taiwan; GigaStorage Corporation USA of Livermore, California (collectively, “GigaStorage”); and Linberg Enterprise Inc. of West Orange, New Jersey (“Linberg”). 67 *Fed. Reg.* 48,948 (2002). On August 14, 2002, the ALJ issued an initial determination (“ID”) (Order No. 2) granting a motion to intervene as respondents by Princo Corporation of Hsinchu, Taiwan, and Princo America Corporation of Fremont, California (collectively, “Princo”). That ID was not reviewed by the Commission and thereby became the Commission’s determination. GigaStorage, Linberg, and Princo (“respondents”) are the only remaining active respondents in this investigation.¹

The ALJ issued his final ID on October 24, 2003. Although the ALJ found that the domestic industry requirement of section 337 is satisfied in this investigation, that the asserted patent claims are infringed by the accused products, and that the asserted claims are not invalid, he found no violation of section 337 because he concluded that all of the asserted patents are unenforceable by reason of patent misuse on the part of complainant Philips. ID at 139–220.

¹See ALJ Order No. 6 (an unreviewed ID terminating eight respondents on the basis of a consent order); ALJ Order No. 17 (an unreviewed ID terminating three respondents on the basis of a consent order and settlement agreement); ALJ Order No. 18 (an unreviewed ID terminating one respondent on the basis of a consent order and settlement agreement); and ALJ Order No. 21 (an unreviewed ID finding four respondents in default).

On November 5, 2003, complainant Philips petitioned for review of the subject ID in part. Respondents and the Commission investigative attorney ("IA") opposed the petition. On December 8, 2003, the ALJ issued his recommended determination on remedy and bonding. On December 10, 2003, the Commission determined to review all of the ID's findings of fact and conclusions of law concerning patent misuse. The Commission determined not to review the remainder of the ID. In its review notice, the Commission invited the parties to file written submissions on the issues under review, and it invited interested persons to file written submissions on the issues of remedy, the public interest, and bonding. The Commission also requested briefing from the parties on four questions. Initial submissions were filed on January 9, 2004, and replies were filed on January 16, 2004, and January 20, 2004.

STANDARD ON REVIEW

This investigation is before us on review of the ALJ's final ID on violation, which issued on October 24, 2003. Commission review of an ID is limited to the issues set forth in the notice of review and all subsidiary issues therein. *Certain Bar Clamps, Bar Clamp Pads, and Related Packaging Display and Other Materials*, Inv. No. 337-TA-429, Commission Opinion at 3 (January 1, 2001). "On review, the Commission may affirm, reverse, modify, set aside or remand for further proceedings, in whole or in part, the initial determination of the administrative law judge. The Commission may also make any findings or conclusions that in its judgment are proper based on the record in the proceeding." 19 C.F.R. § 210.45(c).

Once the Commission determines to review an initial determination, its review is conducted under a *de novo* standard. *Certain Polyethylene Terephthalate Yarn and Products*

Containing Same, Inv. No. 337-TA-457, Commission Opinion at 9 (June 18, 2002). Upon review the “Commission has ‘all the powers which it would have in making the initial determination,’ except where the issues are limited on notice or by rule.” *Certain Flash Memory Circuits and Products Containing Same*, Inv. No. 337-TA-382, Commission Opinion on the Issues Under Review and on Remedy, the Public Interest, and Bonding at 9–10 (June 2, 1997), USITC Pub. 3046 (July 1997) (quoting *Certain Acid-Washed Denim Garments and Accessories*, Inv. No. 337-TA-324, Commission Opinion at 5 (Nov. 1992)).

As stated in our review notice, we determined to review in part the ALJ’s final ID. We thereby adopted as our own the unreviewed portions of the ID. With respect to the portions of the ID that are under review, the ALJ’s findings, conclusions, and supporting analysis that are not inconsistent with this opinion are hereby adopted. The ALJ’s findings, conclusions, and supporting analysis that are inconsistent with this opinion are not adopted.

ISSUES UNDER REVIEW

The ALJ found that the asserted patents are unenforceable for patent misuse by complainant Philips. He found patent misuse *per se* and also found patent misuse under a “rule of reason” standard. We affirm the ALJ’s conclusion that the asserted patents are unenforceable for patent misuse *per se*, but on the ground, discussed below, that complainant’s practice of mandatory package licensing constitutes patent misuse *per se* as a tying arrangement between (1) licenses to patents that are essential to manufacture CD-Rs or CD-RWs according to Orange

Book standards² and (2) licenses to other patents that are not essential to that activity.³ We also adopt the ALJ's conclusion that the asserted patents are unenforceable for patent misuse under a rule of reason standard based on the ALJ's analysis of and findings as to the tying arrangement.⁴

I. Analysis of Patent Misuse *Per Se*

Complainant argues that patent misuse *per se* premised on tying arrangements was eliminated by 35 U.S.C. § 271(d)(5). Respondents and the IA oppose this argument. Complainant also contends that, even apart from section 271(d)(5), Federal Circuit case law prohibits finding patent misuse *per se* based on a tying arrangement between two patent licenses (as opposed to between a patent license and a product). The IA takes the position that tying arrangements between two patent licenses should not be patent misuse *per se*, but should be analyzed under the rule of reason. Respondents oppose these arguments. For the reasons discussed in part A, *infra*, we conclude that section 271(d)(5) did not eliminate patent misuse *per se* premised on tying arrangements, and in part B, *infra*, we conclude that patent misuse *per se* may be based on a tying

²The technical standards for the manufacture of CD-Rs and CD-RWs are set out in two publications that are jointly issued by Philips and Sony Corporation ("Sony"). "Compact Disc Recordable System Description" (RX-407C), which is commonly referred to as Part II of the Orange Book, pertains to CD-Rs. "Compact Disc ReWritable System Description" (RX-408C), which is commonly referred to as Part III of the Orange Book, pertains to CD-RWs. ID at 139-40.

³We take no position on the ALJ's conclusion that the asserted patents are unenforceable for patent misuse *per se* based on theories of price fixing and price discrimination.

⁴We take no position on the ALJ's conclusion that the royalty rate structure of the CD-R/RW patent pools is an unreasonable restraint of trade, but adopt those portions of the ALJ's analysis of the royalty rate mechanism under the rule of reason (ID at 213-19) that are relevant to the issue of whether the anticompetitive effects of including nonessential patents in the list of so-called essential patents outweigh the procompetitive effects.

arrangement between two patent licenses. In part C, *infra*, we discuss the legal standard for demonstrating a tying arrangement between two patent licenses, and in part D, we apply that standard to the licensing arrangements at issue in this investigation.

A. Tying Arrangements as *Per Se* Patent Misuse

Section 271(d)(5) reads in relevant part as follows:

No patent owner otherwise entitled to relief for infringement or contributory infringement of a patent shall be denied relief or deemed guilty of misuse or illegal extension of the patent right by reason of his having . . . conditioned the license of any rights to the patent or the sale of the patented product on the acquisition of a license to rights in another patent or purchase of a separate product, unless, in view of the circumstances, the patent owner has market power in the relevant market for the patent or patented product on which the license or sale is conditioned.

35 U.S.C. § 271(d)(5).

As noted, complainant contends that 35 U.S.C. § 271(d)(5) eliminated patent misuse *per se* premised on tying arrangements. Respondents and the IA take the position that section 271(d)(5) did not eliminate patent misuse *per se* based on tying arrangements. Complainant further argues that, even apart from section 271(d)(5), Federal Circuit case law prohibits finding patent misuse *per se* based on a tying arrangement between two patent licenses. The IA argues that, even if section 271(d)(5) does not eliminate patent misuse *per se* based on tying arrangements, a tying arrangement between two patent licenses (as opposed to a tying arrangement between a patent license and a product) should not be deemed patent misuse *per se*.

We conclude, as did the ALJ, that under section 271(d)(5) an infringement action may be precluded by a patent misuse defense based on a patent tying arrangement that is found to be illegal *per se*. Pursuant to section 271(d)(5), the defense requires a finding of market power based

on an analysis that includes an inquiry into whether substitutes for the patented product are available.

Section 271(d)(5) expressly refers to conditioning a patent license on (1) the purchase of a separate product or (2) the acquisition of another patent license. Thus, it encompasses both patent-product and patent-patent tie-ins with respect to a defense of patent misuse based on tying arrangements. In *Virginia Panel Corp. v. MAC Panel Co.*, the Federal Circuit reversed a district court's conclusion that a proposed licensing agreement conditioned on the prospective licensee's purchase of unpatented products constituted patent misuse. 133 F.3d 860, 868 (Fed. Cir. 1998).

The Federal Circuit outlined the approaches to the analysis of patent misuse issues as follows:

The courts have identified certain specific practices as constituting *per se* patent misuse, including so-called "tying" arrangements in which a patentee conditions a license under the patent on the purchase of a separable, staple good, *see, e.g., Morton Salt Co. [v. G.S. Suppiger Co.]*, 314 U.S. [488,] 491 [(1942)], and arrangements in which a patentee effectively extends the term of its patent by requiring post-expiration royalties, *see, e.g., Brulotte v. Thys Co.*, 379 U.S. 29, 33 (1964). Congress, however, has established that other specific practices may not support a finding of patent misuse. *See* 35 U.S.C. § 271(d) (1994); *Dawson Chem. Co. v. Rohm & Haas Co.*, 448 U.S. 176, 202 (1980) (construing earlier version of § 271(d)). A 1988 amendment to § 271(d) provides that, *inter alia*, in the absence of market power, even a tying arrangement does not constitute patent misuse. *See* 35 U.S.C. § 271(d)(5) (1994) (added by Pub. L. No. 100-703, § 201, 102 Stat. 4676 (1988)).

When a practice alleged to constitute patent misuse is neither *per se* patent misuse nor specifically excluded from a misuse analysis by § 271(d), a court must determine if that practice is "reasonably within the patent grant, *i.e.*, that it relates to subject matter within the scope of the patent claims." *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 708 (Fed. Cir. 1992). If so, the practice does not have the effect of broadening the scope of the patent claims and thus cannot constitute patent misuse. *Id.* If, on the other hand, the practice has the effect of extending the patentee's statutory rights and does so with an anti-competitive effect, that practice must then be analyzed in accordance with the "rule of reason." *Id.* Under the rule of reason, "the finder of fact must decide whether the questioned practice imposes an unreasonable restraint on competition, taking into account a variety of factors, including specific

information about the relevant business, its condition before and after the restraint was imposed, and the restraint's history, nature, and effect." *State Oil Co. v. Kahn*, 118 S. Ct. 275, 279 (1997) (citing *Arizona v. Maricopa County Med. Soc.*, 457 U.S. 332, 343 & n.13 (1982)).

133 F.3d 860, 869 (Fed. Cir. 1997) (parallel citations omitted). In the above-quoted passage, the Federal Circuit recognized that the conditioning of a patent license on the purchase of a separable, staple good was a tying arrangement that constituted *per se* patent misuse, and that section 271(d) added a market power requirement.⁵ Thus, the Federal Circuit has concluded that section 271(d) did not eliminate *per se* patent misuse.

In support of its argument that the *per se* rule for patent misuse based on tying was eliminated by section 271(d)(5), complainant relies on the legislative history of the statute and a district court case, *Texas Instruments Inc. v. Hyundai Electronics Industries, Co.*, 49 F. Supp.2d 893 (E.D. Tex. 1999)). Complainant submits that the statute adds not just a market power test, but also a rule-of-reason balancing of anticompetitive and pro-competitive effects test. In *Texas Instruments*, the district court dismissed *Virginia Panel* as "merely recogniz[ing] that the courts

⁵As to the proposed licensing arrangement that was alleged to constitute patent misuse in *Virginia Panel*, the court stated that the patentee's "proposal to the [prospective licensee] was not a consummated tying arrangement and for that reason was not *per se* patent misuse." 133 F.3d at 871. The Federal Circuit explained that, unlike the tying cases on which defendant-appellant relied, the patentee and prospective licensee "never entered into any license agreement that required [the prospective licensee] to purchase unpatented, staple goods. See 35 U.S.C. § 271(d)(5) (by implication, limiting tying arrangements to the conditioning of an actual license or sale of the patented product)." 133 F.3d at 871. Having determined that the license proposal at issue was not *per se* patent misuse as a tying arrangement, the court went on to that portion of the misuse analysis outlined *supra* that could lead to a rule of reason inquiry: "Furthermore, because [the patentee], on the advice of counsel, voluntarily and unilaterally revoked the proposal to link the license to the purchase of unpatented items, [the patentee's] activities did not extend the scope of its patent rights. Accordingly, we conclude that [the patentee's] truncated negotiations with [the prospective licensee] did not constitute patent misuse." 133 F.3d 871.

have *historically* identified tying practices as constituting *per se* patent misuse.” 49 F.Supp.2d at 910. (The district court did not address the discussion in *Virginia Panel* of the licensing proposal at issue.) The district court then discussed the legislative history of section 271(d)(5) as follows:

[Section] 271(d)(5) specifically notes that patent misuse tying analysis is to be considered “in view of the circumstances,” strongly suggesting that rule-of-reason analysis — not *per se* analysis — applies. According to the Supreme Court, when conducting a rule-of-reason analysis, “the factfinder weighs *all of the circumstances of a case* in deciding whether a restrictive practice should be prohibited as imposing an unreasonable restraint on competition.” *Continental T.V. v. GTE Sylvania*, 433 U.S. 36, 49, 97 S.Ct. 2549, 2557, 53 L.Ed.2d 568 (1977) (emphasis added); accord *National Soc’y of Professional Engineers v. United States*, 435 U.S. 679, 690, 98 S.Ct. 1355, 55 L.Ed.2d 637 (1978).

49 F.Supp.2d 893 at 910–11. The district court quoted from remarks by Rep. Kastenmeier and Senators DeConcini and Leahy, including their discussions of the phrase “in view of the circumstances.” 49 F.Supp.2d at 911–12. It found that the remarks expressed an intent to eliminate *per se* rules due to tying, and that “[n]o contrary statement appears in the legislative history of Section 271(d)(5).” 49 F.Supp.2d at 912.

The Federal Circuit recently stated in *International Business Machines Corp. v. United States*, 201 F.3d 1367 (Fed. Cir. 2000), that statutory interpretation “begin[s] with the language of the statute itself. If that language is clear and unambiguous, then it controls, and we need not — indeed we may not — go further.” 201 F.3d at 1372 (2000). In deciding whether the language is clear and unambiguous, a court looks to “the language itself, the specific context in which that language is used, and the broader context of the statute as a whole.” *Robinson v. Shell Oil Co.*, 519 U.S. 337, 341 (1997).

Section 271(d)(5) states that “[n]o patent owner otherwise entitled to relief for

infringement . . . of a patent shall be . . . deemed guilty of misuse . . . by reason of his having . . . conditioned the license of any rights to the patent . . . on the acquisition of a license to rights in another patent or purchase of a separate product, unless, *in view of the circumstances*, the patent owner has market power in the relevant market for the patent . . . on which the license . . . is conditioned.” 35 U.S.C. § 271(d)(5) (emphasis added). The Federal Circuit has stated that undefined terms in a statute are deemed to “have their ordinary meaning, for which [one] may consult a dictionary.” *IBM*, 201 F.3d at 1372. *The American College Dictionary* defines “in view of” as “in consideration of.”⁶ The same dictionary defines “circumstance” as “a condition, with respect to time, place, manner, agent, etc., which accompanies, determines, or modifies a fact or event.” *Id.* at 219; accord *Black’s Law Dictionary* 243 (6th ed. 1990) (“Circumstances. Attendant or accompanying facts, events or conditions. Subordinate or accessory facts; e.g. evidence that indicates the probability or improbability of an event”). Thus, in the context of section 271(d)(5), the phrase “in view of the circumstances” means “in consideration of the accompanying facts or conditions that determine whether” “the patent owner has market power in the relevant market for the patent or patented product on which the license or sale is conditioned.”⁷ Because the language of section 271(d)(5) is not ambiguous and the statutory scheme is coherent (*see Virginia Panel*, 133 F.3d at 869), we decline to follow *Texas Instruments Inc. v. Hyundai*

⁶*The American College Dictionary* 1356 (Random House 1970) (“view . . . 17. in view of, a. in sight of. b. in prospect or anticipation of. c. in consideration of. d. on account of”).

⁷As respondents note, where the intent of a statute is to overrule prior common law, that statutory purpose must be clear. *United States v. Texas*, 507 U.S. 529, 534 (1993). Such is not the case here.

Electronics Industries Co., 49 F. Supp.2d 893, 912 (E.D. Tex. 1999)) (relying on legislative history to adopt an interpretation of section 271(d)(5) that is contrary to its plain meaning).⁸ We are guided instead by the Federal Circuit's analysis of patent misuse, as articulated in *Virginia Panel*, 133 F.3d at 869, 871.

B. Applicability of *Per Se* Analysis to Package Licensing and Pooling Arrangements

Relying on *Standard Oil Co. v. United States*, 283 U.S. 163, 171, 174, 175 (1931), and *Broadcast Music, Inc. v. Columbia Broadcasting System, Inc.*, 441 U.S. 1, 24–25 (1979), complainant also argues that a *per se* analysis is inapplicable because the Supreme Court has instead used a rule of reason analysis in evaluating patent pools and package licenses. In *Standard Oil*, the Supreme Court recognized that the cross-licensing and division of royalties from blocking patents could be procompetitive. 283 U.S. at 171. The Court also “examine[d] the evidence to ascertain the operation and effect” (283 U.S. at 175) of certain agreements for cross-licensing and division of royalties between patentees of “competing patented processes” (283 U.S. at 175, 180–81). However, *Standard Oil* did not discuss any tying allegations. Although complainant asserts that *Standard Oil* involved “a license that offered a package of patents and did not permit licensees to select which patents they preferred” (complainant’s submission at 45 (citing *Standard Oil*, 283 U.S. at 174)), its citation does not support that statement. *See also Standard Oil*, 283 U.S. at 170 (“There is no provision in any of the agreements which restricts the freedom of the primary defendants individually to issue licenses under their own patents

⁸We also do not rely on the ALJ’s discussion of the legislative history of section 271(d)(5) set forth in the ID at 150.

alone or under the patents of all the others; and no contract between any of them, and no license agreement with a [manufacturer of the product] executed pursuant thereto, now imposes any restriction upon the quantity of gasoline to be produced, or upon the price, terms, or conditions of sale, or upon the territory in which sales may be made. The only restraint thus charged is that necessarily arising out of the making and effect of the provisions for cross-licensing and for division of royalties.”) Thus, *Standard Oil* does not preclude a *per se* analysis for tying arrangements.

The Supreme Court opinion in *Broadcast Music* also did not involve allegations of tying. Although the licensee (CBS) argued below that the blanket license at issue was an illegal tying arrangement, the district court rejected the tie-in argument because “direct negotiation with individual copyright owners is available and feasible.” *Broadcast Music*, 441 U.S. at 6 (citing 400 F.Supp. 737, 781–83 (S.D.N.Y. 1975)). The Second Circuit affirmed the rejection of the tying argument. 562 F.2d 130, 135 (2d Cir. 1977). CBS did not petition for a writ of *certiorari* on that issue. *Broadcast Music*, 441 U.S. at 6–7, 25 n.43.

Complainant asserts that “the Federal Circuit has prohibited application of the *per se* misuse doctrine unless the practice at issue has been held to be *per se* illegal by the [Supreme] Court.”⁹ However, the Supreme Court has recognized that tying arrangements may be anticompetitive *per se*. *Jefferson Parish Hospital Dist. No. 2 v. Hyde*, 466 U.S. 2 (1984); *Morton*

⁹Complainant’s submission at 47 (relying on *Windsurfing International, Inc. v. AMF, Inc.*, 782 F.2d 995, 1001 (Fed. Cir. 1986) (“[t]o sustain a misuse defense involving a licensing arrangement not held to have been *per se* anticompetitive by the Supreme Court, a factual determination must reveal that the overall effect of the license tends to restrain competition unlawfully in an appropriately defined relevant market” (footnote omitted))).

Salt Co. v. G.S. Suppiger Co., 314 U.S. 488, 491 (1942); see also *Mallinckrodt v. Medipart Inc.*, 976 F.2d 700, 706, 708 (Fed. Cir. 1992) (holding that district court contravened *Windsurfing* precedent, but stating that “this is not a price-fixing or tying case, and the *per se* antitrust and misuse violations found in [*Bauer & Cie v. O’Donnell*, 229 U.S. 1 (1913); *Straus v. Victor Talking Machine Co.*, 243 U.S. 490 (1917); *Boston Store of Chicago v. American Graphophone Co.*, 246 U.S. 8 (1918)] and *Motion Picture Patents Co. [v. Universal Film Mfg. Co.*, 243 U.S. 502 (1917)] are not here present”). We recognize that the particular facts in the patent misuse cases involve a tying patent and a tied *product*, rather than a tying patent and a tied *patent*. However, finding patent misuse based on a tying arrangement between patents in a mandatory package license is a reasonable application of Supreme Court precedent.

More than thirty years before *Broadcast Music*, the Supreme Court held that the “block booking”¹⁰ of copyrighted films was illegal *per se*. Thus, the Supreme Court has held the practice of mandatory package licensing of intellectual property illegal *per se*. The Court stated that “[w]e do not suggest that films may not be sold in blocks or groups, when there is no requirement, express or implied, for the purchase of more than one film. All we hold to be illegal is a refusal to license one or more copyrights unless another copyright is accepted.” *United States v. Paramount Pictures, Inc.*, 334 U.S. 131, 159 (1948). In *Broadcast Music*, in contrast, “[t]he [d]istrict [c]ourt found that there was no legal, practical, or conspiratorial impediment to [the

¹⁰“Block-booking is the practice of licensing, or offering for license, one feature [film] or group of features on condition that the exhibitor will also license another feature or group of features released by the distributors during a given period.” *United States v. Paramount Pictures, Inc.*, 334 U.S. 131, 156 (1948).

licensee's] obtaining individual licenses; [the licensee], in short, had a real choice." 441 U.S. at 24.

The IA and complainant urge the Commission to follow the lead of the DOJ Antitrust Division and use the rule of reason approach to evaluating package licenses that involve patent tying arrangements. The *Antitrust Guidelines for the Licensing of Intellectual Property* state that "[p]ackage licensing — the licensing of multiple items of intellectual property in a single license or in a group of related licenses — may be a form of tying arrangement if the licensing of one product is conditioned upon the acceptance of a license of another, separate product." U.S. Dep't of Justice & FTC, *Antitrust Guidelines for the Licensing of Intellectual Property* § 5.3 (1995) ("DOJ/FTC Antitrust Guidelines"). The DOJ/FTC Antitrust Guidelines state that "[i]f a package license constitutes a tying arrangement, the [DOJ and FTC] will evaluate its competitive effects under the same principles they apply to other tying arrangements." DOJ/FTC Antitrust Guidelines § 5.3. The DOJ/FTC Antitrust Guidelines also state that the DOJ will apply the rule of reason standard in deciding whether to challenge a tying arrangement:

In the exercise of their prosecutorial discretion, the Agencies will consider both the anticompetitive effects and the efficiencies attributable to a tie-in. The Agencies would be likely to challenge a tying arrangement if: (1) the seller has market power in the tying product, (2) the arrangement has an adverse effect on competition in the relevant market for the tied product, and (3) efficiency justifications for the arrangement do not outweigh the anticompetitive effects. The Agencies will not presume that a patent, copyright, or trade secret necessarily confers market power upon its owner.

DOJ/FTC Antitrust Guidelines § 5.3 (footnotes omitted) (emphasis added). Given the DOJ's acknowledgment that its standard is a matter of prosecutorial discretion, the DOJ's choice of the rule of reason standard for its antitrust investigations provides little guidance on the standard that

we should apply in this investigation; however, it indicates that a *per se* approach is valid.

Complainant argues that “it would be poor public policy to adopt a *per se* approach that condemns all package licenses if market power is found.” Complainant’s submission at 47. It asserts that a mandatory package license of all patents in a pool may have no anticompetitive effects at all, while offering the well-recognized benefits of reduced transaction costs and reduced uncertainty concerning the rights needed to manufacture a product. Complainant is correct that a *per se* approach condemning *all* mandatory patent license packages is unwarranted because licensing blocking patents as a package is pro-competitive. The application of the *per se* patent misuse doctrine to tying arrangements in a mandatory package license would not, however, encompass blocking patent complexes so long as the traditional separate product requirement, discussed in part C, *infra*, is retained. *International Manufacturing Co. v. Landon*, 336 F.2d 723 (9th Cir. 1964).

The IA opposes even such a narrowly crafted *per se* rule. He suggests that, in the hypothetical situation “where 20 patentees, some of which refuse to license their blocking patents separately, have properly pooled into a mandatory package license 200 essential patents but have errantly included a single nonessential patent along with the essential ones,” it would be improper to find patent misuse *per se* because “the anticompetitive effects of wrongly adding the one nonessential patent to the pool may be outweighed by the procompetitive effects of the arrangement, *e.g.*, reducing the transaction costs that would result if a licensee had to negotiate contracts with each licensee and avoiding a ‘hold-out’ situation where certain patent holders refuse to license their patents alone.” IA’s submission at 15–16. We do not find the IA’s

hypothetical persuasive, however, because it is not necessary to eliminate the package license in his hypothetical altogether in order to avoid patent misuse. All that is necessary is to provide potential licensees with a backstop — the choice of individually licensing the patents; there is nothing wrong with offering the package license as an option, rather than as a requirement.¹¹

Relying on *Jefferson Parish*, complainant urges us to examine the competitive consequences of the challenged conduct. The character of the potential harm flowing from including, in a mandatory package license of blocking patents, an extra patent license that is not necessary to use the blocking patents is widely recognized, viz., the suppression of emerging technologies that compete with the technology covered by the extra patent license. CX-358 at 10; CX-357 at 9; CX-355 at 11. As the Supreme Court noted in *Jefferson Parish*:

¹¹Complainant cites no authority for the proposition that tying is “inherent” in a pool license (Complainant’s submission at 47). The DOJ Antitrust Division MPEG-2 business review letter states that —

[a]lthough it offers the Portfolio patents [viz., the patents identified as essential to compliance with the video and/or systems parts of the MPEG-2 standard] only as a package, the Portfolio license does not appear to be an illegal tying agreement. The conditioning of a license for one intellectual property right on the license of a second such right could be a concern where its effect was to foreclose competition from technological alternatives to the second. In this instance, however, the essentiality of the patents — determined by the independent expert — means that there is no technological alternative to any of them and that the Portfolio license will not require licensees to accept or use any patent that is merely one way of implementing the MPEG-2 standard, to the detriment of competition. *Moreover, although a licensee cannot obtain fewer than all the Portfolio patents from MPEG LA, the Portfolio license informs potential licensees that licenses on all the Portfolio patents are available individually from their owners or assignees. While the independent expert mechanism should ensure that the Portfolio will never contain any unnecessary patents, the independent availability of each Portfolio patent is a valuable failsafe.*

CX-355 at 11 (emphasis added).

There is general agreement in the cases and among commentators that the fundamental restraint against which the tying proscription is meant to guard is the use of power over one product to attain power over another, or otherwise to distort freedom of trade and competition in the second product. This distortion injures the buyers of the second product, who because of their preference for the seller's brand of the first are artificially forced to make a less than optimal choice in the second. And even if the customer is indifferent among brands of the second product and therefore loses nothing by agreeing to use the seller's brand of the second in order to get his brand of the first, such tying agreements may work significant restraints on competition in the tied product.

Jefferson Parish, n.19 (quoting *Fortner Enterprises v. United States Steel Corp.*, 394 U.S. 495, 512-514 (1969) (dissenting opinion)). The inclusion of the extra, unneeded patent in the package with the blocking patents could foreclose competing technologies from use by manufacturers licensed under the package; because the manufacturers would obtain the unneeded patent with the package they might choose not to license any of the competing technologies. CX-358 at 10; CX-357 at 9; CX-355 at 11.¹²

Thus, for the reasons discussed above, we conclude that patent misuse *per se* may be based on a tying arrangement between two patent licenses.

C. Legal Standard for Demonstrating Patent Misuse *Per Se* Based on a Tying Arrangement Between Patent Licenses

As discussed *supra*, we have concluded that patent misuse *per se* may be based on a tying arrangement between two patent licenses. In *Senza-Gel Corp. v. Seiffhart*, 803 F.2d 661 (Fed. Cir. 1986), the Federal Circuit affirmed a grant of summary judgment on a defense of patent misuse *per se* premised on a patent-product tying arrangement. (*Senza-Gel* pre-dates enactment

¹²The principal objective of the U.S. patent system is the promotion of the progress of science and the useful arts. *U.S. Const.* art. I, § 8; *U.S. v. Masonite Corp.*, 316 U.S. 265, 278 (1942). The suppression of emerging technology is directly contrary to that purpose.

of section 271(d)(5).) In finding patent misuse, the *Senza-Gel* district court employed a three-step analysis, viz., (1) whether two separable items are tied, (2) whether the tied item is a staple in commerce, and (3) whether the two items are tied in fact. The district court certified as a question for interlocutory appeal whether its three step analysis was proper for analyzing a patent misuse claim in the tying context. The Federal Circuit found “no impropriety in the district court’s employment of the three-step analysis,” although the Federal Circuit “caution[ed] that [it was] not . . . explicating all of the analytical parameters that may be applicable to patent misuse questions in future cases.” 803 F.2d at 665. Complainant argues that, in addition to the market power requirement imposed by section 271(d)(5), to establish a tying arrangement in the patent misuse context, a proponent must also establish each of the three *Senza-Gel* elements.

Respondents assert that “[a] tying arrangement in patent licensing constitutes *per se* patent misuse where (1) the patentee has market power in a market for licensing certain essential patents (which the licensee may want to license), and (2) conditions the licensing of those patents on the acceptance of a license to other nonessential patents (which the licensee may not want to license).” Respondents’ submission at 9. Respondents contend that not all mandatory package licenses are unlawful tying arrangements that would be subject to the *per se* rule. Relying on *Jefferson Parish*, respondents assert that “[t]ying only arises where the parties include in the pool both an item in which they legitimately have market power (*e.g.*, essential patents), and an item for which competition on the merits would otherwise occur (*e.g.*, nonessential patents), and refuse to offer a legitimate choice of obtaining each item separately.” Respondents’ reply at 25–26, 29 (“if only essential patents are ‘tied’ together in a single package, then the arrangement

does not implicate the *per se* rule”). Respondents assert that because “[n]onessential’ patents by definition are not necessary to practice the Orange Book standard” “there could be competition among nonessential technologies.” Respondents’ reply at 5. Citing *Jefferson Parish*, they assert that the *per se* prohibition against tying protects competition by ensuring that it not be suppressed by leveraging the market power in the essential patents by tying the essential to nonessential patents.

We agree that establishing patent misuse *per se* based on a tying arrangement between patent licenses requires establishing both market power pursuant to section 271(d)(5) and conditioning (*i.e.*, the patent licenses are tied in fact). We disagree with respondents’ position that the antitrust market demand standard should be used to determine whether the “tying” and “tied” patents are separate items. The Federal Circuit stated in *Senza-Gel* that “[t]he law of patent misuse in licensing need not look to consumer demand (which may be non-existent) but need look only to the nature of the claimed invention as the basis for determining whether a product is a necessary concomitant of the invention or an entirely separate product. The law of antitrust violation, tailored for situations that may or may not involve a patent, looks to a consumer demand test for determining product separability.” 803 F.2d at 670 n.14.

We conclude that the second prong of the three-prong *Senza-Gel* analysis, *viz.*, whether the tied product is a staple in commerce, is inapplicable to tying arrangements between two patent licenses. In approving the three-prong standard applied by the district court to the patent-product tying arrangement at issue in *Senza-Gel*, the Federal Circuit cited *Dawson Chemical Co. v. Rohm & Haas Co.*, 448 U.S. 176 (1980). *Dawson Chemical* involved a process patent on a

method of using the chemical propanil as an herbicide. 448 U.S. 176, 181–82 (1980). Before the Supreme Court, the petitioners did not dispute that their manufacture and sale of propanil with instructions for using it as an herbicide was contributory infringement of the patent under 35 U.S.C. § 271(c), but they raised the defense of patent misuse. 448 U.S. at 185–86. Section 271(c) defines contributory infringement, as follows:

Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and *not a staple article or commodity of commerce suitable for substantial noninfringing use*, shall be liable as a contributory infringer.

35 U.S.C. § 271(c) (emphasis added). It was undisputed that propanil was a nonstaple article, *i.e.*, “one that has no commercial use except in connection with respondent’s patented invention.” 448 U.S. at 184, 186–87. The conduct at issue was the patentee’s practice of licensing its patented method (the tying patent) only to purchasers of propanil (the tied product).¹³ 448 U.S. at 186, 214. The question was whether the patentee’s activities were not patent misuse because they fell within the safe havens of section 271(d)(1)–(3).¹⁴ The Supreme Court focused on the relationship between 35 U.S.C. § 271(c) and (d), and held that “the provisions of 271(d) effectively confer upon the patentee, as a lawful adjunct of his patent rights, a limited power to exclude others from competition in nonstaple goods.” 448 U.S. at 201.

¹³This was accomplished through an implied license. 448 U.S. at 186, 202.

¹⁴*Dawson* was decided prior to the Patent Misuse Reform Act of 1988, which enacted 35 U.S.C. §§ 271(d)(4), (5).

The IA argues that the three-prong test articulated in *Senza-Gel* in reliance on *Dawson* — is structured to ensure that a patentee accused of an illegal tie has not engaged in conduct that falls within the safe haven of section 271(d)(1). However, the test is inapplicable here because the tying of two patents can never fall within the safe haven. This follows from the unquestionable fact that a third party under 271(c) — the section that defines the breadth of the safe haven — can never be found liable for contributory infringement for licensing a patent that it owns.

IA's reply at 13. We agree with the IA that the act of licensing a patent does not implicate contributory infringement under section 271(c). Thus, the staple/nonstaple distinction analyzed in *Dawson* would not be applicable to a patent-patent tying analysis, and that prong of the *Senza-Gel* analysis is not applicable here.

International Manufacturing Co. v. Landon, Inc., 336 F.2d 723 (9th Cir. 1964), while not binding precedent, is both on point and persuasive on the issue of applying the traditional separate product test (the first prong of the *Senza-Gel* analysis) in the context of patent-patent tie-ins.¹⁵ In that case, the Ninth Circuit held that the mandatory package licensing of blocking patents

¹⁵In discussing the first prong of the *Senza-Gel* analysis, viz., “whether [the tied] product is a necessary concomitant of the invention or an entirely separate product” (803 F.2d at 670 n.14), complainant cites an unpublished Federal Circuit opinion (*Ricoh Co. v. Nashua Corp.*, 1999 WL 88969); *Broadcast Music Inc. v. Columbia Broadcasting System, Inc.*, 441 U.S. 1, 21 (1979); *Texas Instruments, Inc. v. Hyundai Electronics Industries Co.*, 49 F. Supp.2d 893, 913, 915 (E.D. Tex. 1999); and *Milliken Research Corp. v. Dan River, Inc.*, 739 F.2d 587, 594 (Fed. Cir. 1984). *Broadcast Music* is inapposite because, not only is it an antitrust case, it is not even an antitrust tying case. The district court opinion in *Texas Instruments* is not binding precedent on the Commission. As discussed in Part A, *supra*, we disagree with the district court's conclusion that the enactment of 35 U.S.C. § 271(d)(5) in the Patent Misuse Reform Act of 1988 eliminated the *per se* approach to patent tie-ins. We also disagree with the district court's conclusion that *Senza-Gel* has “limited, if any, significance after the Patent Misuse Reform Act of 1988.” 49 F.Supp.2d at 915. The district court perceived an inconsistency between the language of section 271(d)(5), which refers to “condition[ing] the license of any rights to the patent or the sale of the patented product on the acquisition of a license to rights in another patent or purchase of a separate product,” 49 F.Supp.2d at 914 (quoting 35 U.S.C. § 271(d)(5))

was not patent misuse, distinguishing *American Securit Co. v. Shatterproof Glass Corp.*, 268 F.2d 769 (3d Cir. 1959), on the ground that the patents at issue in that case “could possibly be used independently without infringing one another.”¹⁶ 336 F.2d at 729. The Ninth Circuit reasoned that —

it is not an unlawful tying arrangement for a seller to include several items in a single mandatory package when the items may be reasonably considered to constitute parts of a single distinct product. A license package containing blocking patents may be considered a single distinct product. By definition, blocking patents disclose interdependent parts of the same product. The product . . . is no less a single product because its novel aspects are disclosed by two interlocking patents. In such a case, not only is it not unreasonable to treat both patents as constituting a single product, but also licensing them in a package deal appears to be the most practical way of making them available for public use. . . .

* * *

Appellants argue that mandatory package licensing of blocking patents should not be condoned because it may result in a prospective licensee being compelled to accept an entire license package — thought by its owner to contain only interlocking patents — even though the licensee believes that he can produce a commercially feasible product under only part of the license package.

This argument is premised on a hypothetical set of facts not involved in our case. *If we had a case where the licensee could produce a commercially acceptable product utilizing one patent but not infringing the others in the package, then clearly we would not have a case involving blocking patents. That we do not have such a*

(emphasis added by district court)), and the reference to “separable or inseparable items” in *Senza-Gel*, 803 F.2d at 664. The district court’s reliance on this difference in language is problematic given the statement in *Senza-Gel* that “[t]he law of patent misuse in licensing . . . need look only to the nature of the claimed invention as the basis for determining whether a product is a necessary concomitant of the invention or an *entirely separate product*.” 803 F.2d at 670 n.14 (emphasis added).

¹⁶The Ninth Circuit went on to state that “[t]he evil of mandatory package licensing in [*Shatterproof Glass*] was that the prospective licensee, in order to obtain a license under one patent, would be compelled to accept licenses under patents that were not necessarily needed. The same evil does not arise in mandatory package licensing of blocking patents. In such a case, the prospective licensee is being compelled to accept no more than he would, in any event, have to obtain in order to make worthwhile a license under any of the patents.” 336 F.2d at 729–30.

hypothetical case is confirmed by the fact that appellants have not attempted to show what kind of device could be made under one of the patents in this case without violating the other. It is further confirmed by the fact that the product that the appellants did in fact manufacture infringed both patents.

336 F.2d at 730–31 (emphasis added) (footnote omitted). The Ninth Circuit noted that there was testimony that “possibly a structure can be made” that would infringe one patent without infringing the other, but found that the testimony “dealt with hypothetical possibilities insofar as physical structure is concerned, and not with any practical use which could be made of the structure.” 336 F.2d at 731 n.5.

Thus we conclude that, in addition to the market power requirement imposed by section 271(d)(5), to establish a tying arrangement between patent licenses in the patent misuse context, a proponent must prove the first and third requirements of the *Senza-Gel* analysis, viz., that the “tying” and “tied” patent licenses are “separate” and tied in fact.

D. The Licensing Arrangements Are Patent Misuse *Per Se* as a Tying Arrangement

The “tying” patent licenses are licenses for U.S. patents that are actually essential for the manufacture of CD-R/RWs in accordance with Orange Book standards, and the “tied” patent licenses are licenses for U.S. patents that the licensors have identified as “essential” but that are actually nonessential for the manufacture of CD-R/RWs. For the reasons discussed below, we conclude that each of the patents asserted in this investigation is unenforceable for patent misuse. In section 1, *infra*, we discuss the market power requirement of section 271(d)(5). The first and third prongs of the three-prong *Senza-Gel* test, viz., the requirements that the “tying” and “tied” patent licenses be tied in fact and separate, are discussed in sections 2 and 3, *infra*.

We conclude that in the Philips-only CD-RW license (e.g., CX-469C; FF 71, 72), licenses

to the U.S. patents that are actually essential for the manufacture of CD-RWs in accordance with Orange Book standards (the "tying" patent licenses) are tied in fact to a license to the Farla '692 patent (the "tied" patent license), that the market power requirement of section 271(d)(5) is met, and that the Farla '692 patent is "separate" from the tying patents.

We also conclude that in the Philips-only CD-RW license (*e.g.*, CX-469C; FF 71, 72), licenses to the U.S. patents that are actually essential for the manufacture of CD-RWs in accordance with Orange Book standards (the "tying" patent licenses) are tied in fact to a license to the Lockhoff '219 patent (the "tied" patent license), that the market power requirement of section 271(d)(5) is met, and that the Lockhoff '219 patent is "separate" from the tying patents. The Philips-only CD-RW license contains a list of so-called essential patents in Exhibit B4, and every option under the license requires the licensee to "choose[]" to license those essential patents. CX-469C art. 1.10. The list of patents in Exhibit B4 includes each of the six asserted patents in this investigation,¹⁷ as well as the Farla '692 patent and the Lockhoff '219 patent. CX-469C, Exhibit B4 at 4, 5.

We conclude that in certain Philips-only CD-R licenses (*e.g.*, RX-872C) and in certain joint CD-R licenses (*e.g.*, 1999 Gigastorage CD-WO/MO Disc Agreement (RX-1832, RX-

¹⁷Because the essentiality of four of the six patents asserted in this investigation has not been challenged, those four patents (*viz.*, the '401 patent, the '856 patent, the '825 patent, and the '764 patent) are among the "tying" patents. The parties dispute whether two of the asserted patents (the Kramer '493 and the Kramer '209 patents) are essential. Either the Kramer patents are properly deemed "essential" or they are actually nonessential patents that should not have been included in the list of so-called essential patents. If the former, they are "tying" patents; if the latter, "tied" patents. In either case, the Kramer '493 and '209 patents are part of the tying arrangement, and therefore both patents should be found unenforceable for patent misuse.

2024C, Trans. at 834), RX-755C), licenses to the U.S. patents that are actually essential for the manufacture of CD-Rs in accordance with Orange Book standards (the “tying” patent licenses) are tied in fact to a license to the Farla ‘692 patent¹⁸ and to a license to the Lockhoff ‘219 patent (the “tied” patent licenses), that the market power requirement of section 271(d)(5) is met, and that the Farla ‘692 patent and the Lockhoff ‘219 patent are each “separate” from the tying patents. The list of so-called essential patents in certain Philips-only CD-R licenses (e.g., RX-872C, PH 098381–82, 098404) includes each of the six asserted patents in this investigation, as well as the Farla ‘692 patent and the Lockhoff ‘219 patent.

We further conclude that in the 1999 Gigastorage joint CD-RW license (RX-903C), licenses to the U.S. patents that are actually essential for the manufacture of CD-RWs in accordance with Orange Book standards (the “tying” patent licenses) are tied in fact to each of the following “tied” patent licenses: a license to the Ricoh Iwasaki ‘149 patent; a license to the Sony Yamamoto ‘719 patent; a license to the Farla ‘692 patent; and a license to the Lockhoff ‘219 patent. We also conclude that each of these “tied” patents is “separate” from the tying patents, and that the market power requirement of section 271(d)(5) is met. The list of patents in Exhibit B5 of the license (RX-903C, PH002750–54) also includes each of the six asserted patents in this investigation, as well as each of the “tied” patents listed above.

¹⁸The ALJ found that the patents identified by the licensors as so-called “essential” patents have changed over time. *See, e.g.*, FF 104–06. He further found that some licensees are operating under license agreements that include nonessential patents. FF 78. The burden of demonstrating a purge of patent misuse rests on complainant and requires, *inter alia*, that licenses containing improper provisions must have expired, or at least that the improper provisions be removed. ID at 147 (citing cases).

1. The Market Power Requirement of Section 271(d)(5)

We find that the relevant market for analyzing market power is the United States market for licensing the essential U.S. patents for the manufacture of CD-R/RW discs in compliance with Orange Book standards, and adopt¹⁹ the ALJ's market definition and market power analysis.²⁰

¹⁹We take no position on the ID's statement that "Philips, Sony, Taiyo Yuden, and Ricoh are horizontal competitors in the patent licensing market" (ID at 173), and also take no position on the statement that "the Philips CD-R and CD-RW patent pools constitute horizontal agreements among competitors" to control royalty rates (ID at 175).

²⁰We disagree with complainant's contention that in excluding recordable/rewritable DVDs from the relevant product market, the ALJ shifted the burden of proof to complainant. Respondents' expert (Bratic) testified that recordable DVDs are not reasonably interchangeable with CD-Rs. Trans. (Bratic) at 1698:20–1701:2. He noted that a recordable DVD would not play in a CD player and that consumers typically paid ten times more for DVD players than for CD players. The ALJ could reasonably reject the conflicting opinion of complainant's expert (McCarthy) that DVDs were interchangeable with CD-R/RWs, and in the ID he explained his reasons for doing so. Thus, the burden of proof on this issue was not shifted to complainant.

Complainant asserts that Bratic was qualified by the ALJ over its objection "on the issue of patent misuse." Complainant's submission at 61 n.38 (quoting Trans. at 1620). The ALJ stated as follows:

I will accept Mr. Bratic as an expert in licensing practices and economic matters that pertain to licensing, and facts which indicate to him misuse. Now, I don't accept that as binding on me in any way or on the Commission in any way as to what the law is on misuse, but merely the opinion of a person who has had a lot of experience, obviously, in his views on what the market considers to be regular and normal and what appears to be abnormal.

Trans. at 1623:3–11; *see generally* 1620:1–1624:18. Complainant also asserts that "Bratic, an accountant, not an economist, has never before testified or been qualified to testify about relevant market definitions, market power or anticompetitive effects in relevant markets. (Bratic Tr. 1908–09.) For these and other reasons, Mr. Bratic was not qualified to testify on the definition of a relevant market, and it was error for the ALJ to adopt in whole Mr. Bratic's testimony." Complainant's submission at 61. Bratic testified that he had "testified on relevant markets and market definitions in many patent cases" (Trans. at 1909:13–14), and that he had "also testified

Philips has market power in the United States market for licensing essential U.S. patents for the manufacture of CD-R/RWs according to Orange Book standards because, as the ALJ found, there are no close substitutes for CD-R/RWs (ID at 160–64); the relevant market for licensing essential CD-R/RW patents is coextensive with the relevant product market for CD-R/RWs because “manufacturers are constrained to enter into those licenses in order to make such unique products” (ID at 166–67); and licenses to at least some of the Philips patents are essential to the manufacture of CD-R/RWs (ID at 173). The ALJ did not, as complainant contends, erroneously presume that because complainant had a patent, it has market power. Identifying the “tying” patent licenses as licenses for U.S. patents that are essential for the manufacture of CD-R/RWs according to Orange Book standards, the ALJ’s analysis demonstrates that the market power requirement of section 271(d)(5) is met.

2. Tied in Fact

To find patent misuse *per se* based on a tying arrangement between two patent licenses, in addition to finding that the market power requirement of section 271(d)(5) is met, we must also find that the “tying” and “tied” patent licenses are tied in fact. We find, as did the ALJ, that in the Philips-only CD-RW license (*e.g.*, CX-469C; FF 71, 72), licenses to the U.S. patents that are actually essential for the manufacture of CD-RWs in accordance with Orange Book standards (the “tying” patent licenses) are tied in fact to a license to the Farla ‘692 patent and are also tied in fact to a license to the Lockhoff ‘219 patent (the “tied” patent licenses).

on price erosion issues and the effects of anticompetitive behavior as they relate to price erosion in patent infringement matters” (Trans. (Bratic) at 1911:18–20). *See* Trans. (Bratic) at 1908–13;1610–19 (educational background and work experience).

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The ALJ found that, for the Philips-only CD-R and CD-RW licenses, the package of so-called “essential” patents had to be taken as a whole and a licensee could not break up the so-called “essential” patents by selecting only certain of the so-called “essential” patents to license individually. FF 69–73. Philips asserts that prospective licensees have been given the option to license patents individually. In support of this argument, Philips relies on the following language, which appears in several CD-RW joint licenses issued in 1999: “WHEREAS, Licensee understands, that Philips is willing to license *any one or more patent rights* for optical disc manufacturing, owned or controlled by Philips, whether within or outside of the CD-RW Standard Specification as defined hereafter and to disclose and make available the requested basic information, all on reasonable terms and conditions.” CX-414C at 2 (“CD-RW Disc License Agreement” with [[]]) (June 16, 1999)) (emphasis added).²¹ Because complainant Philips has not identified *any* Philips-only CD-RW license, or *any* CD-R license (Philips-only or joint) that contains similar language, the cited language does not suggest that prospective licensees under the Philips-only CD-RW license or the CD-R licenses (Philips-only or joint) were given the option of licensing individual patents as opposed to being forced to take all of the so-called essential patents as found by the ALJ. FF 64, 69–72. Thus, in the Philips-only

²¹Accord CX-422C at 2 (“CD-RW Disc License Agreement” with [[]]) (Dec. 21, 1999)); Philips’ complaint appendix N, tab 10 (“CD-RW Disc Agreement” with [[]]) (Feb. 12, 1999); CX-420 C at 2 (“CD-RW Disc License Agreement” with Gigastorage Corporation (Oct. 12, 1999)); see also CX-412C at 2 (“CD-RW Recorder Agreement” with [[]]) (Feb. 12, 1999) (“WHEREAS, Licensee understands, that Philips is willing to license *any one or more patent rights* owned or controlled by Philips for optical recording equipment manufacturing, whether within or outside of the CD-RW Standard Specifications as defined hereinafter and to disclose and make available the requested basic information, all on reasonable terms and conditions”) (emphasis added).

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CD-RW license (CX-469C), licenses to the “tying” patents, viz., the U.S. patents that are essential to the manufacture of CD-RWs in accordance with Orange Book standards (and which appear on the list of so-called essential patents in the license) are tied in fact to licenses to patents that appear on the list of so-called essential patents even though those patents are *not* actually essential to the manufacture of CD-RWs (*e.g.*, the Farla ‘692 patent).

Relying on the ALJ’s factual findings, FF 93 and FF 94, complainant contends that prospective licensees have always had the option of choosing to negotiate individual licenses. We disagree with complainant’s interpretation because the supporting deposition testimony cited by the ALJ refers to single-licensor package licenses, rather than to individual licenses. FF 93 and 94 read as follows:

FF 93: “The current joint CD-R disc license makes clear that ‘interested manufacturers may opt to take out individual licenses under the relevant patents of each of Philips, Sony and Taiyo Yuden instead of a combined license.’ *See, e.g.*, RX-992C (PH [076996]); CX-451C (p. 2); [Depo. Trans. (Van Dijk) at] 53–54.”

FF 94: “The joint CD-RW disc license also makes clear to licensees that Sony, Ricoh, and Philips retain the right to separately license their patents rights related to CD-RW. *See, e.g.*, CX-436C (p.2).”

The Van Dijk deposition transcript cited by the ALJ in support of FF 93 discusses [[

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Trans. Depo. (Van Dijk) at 53:12 - 54:25. Although complainant also relies on additional testimony from the same deposition, that testimony lends no support to its contention:

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Trans. Depo. (Van Dijk) at 71:13 - 73:17. In addition to being inconsistent with the deposition testimony of Van Dijk, Philips' interpretation of FF 93 and FF 94 is also inconsistent with the ALJ's statement that "[m]anufacturers in the market for CD-R/RW discs are unable to negotiate a reasonable royalty rate with Philips for only particular *blocking* patents for the purpose of making CD-R/RWs that comply with Orange Book standards" (ID at 182 n.111) (emphasis in the ID).

We find, based on the above, that licenses to each of the so-called "essential" patents are tied in fact in the Philips-only CD-RW and CD-R patent licenses, in that none of the so-called essential patents could be licensed individually for the manufacture of CD-RWs or CD-Rs apart from the package. We therefore find a tie in fact between the "tying" patent licenses (licenses for U.S. patents that are actually essential for the manufacture of CD-Rs or CD-RWs in accordance with Orange Book standards) and the "tied" patent licenses (licenses for so-called "essential" patents that are actually nonessential to the manufacture of CD-Rs or CD-RWs) in the Philips-only CD-RW and CD-R patent licenses.

With respect to the joint licenses for CD-R and CD-RW technology, we also find, based

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on the ALJ's findings and analysis, a tie in fact between the "tying" patent licenses (licenses for U.S. patents that are actually essential for the manufacture of CD-Rs or CD-RWs in accordance with Orange Book standards) and the "tied" patent licenses (licenses for so-called "essential" patents that are actually nonessential to the manufacture of CD-Rs and CD-RWs). Prior to 2000, as the ALJ found, the option to license only the essential patents of a single licensor, such as Philips, was not available. ID at 177-78; Trans. (Smith) at 1423-24; FF 166-67, 369-74. The ALJ further found, however, that even when the Philips-only and other individual licensor packages became available in 2000, licensees continued operating under pooled license agreements that included nonessential patents and that, indeed, 80 percent of CD-R/RW licenses worldwide currently are licensed under the joint licenses, while only 20 percent have a separate Philips-only license. FF 78, 95. The ALJ further found, as explained more fully below, that licensees were discouraged from purchasing the single licensor packages, as opposed to the joint license. Indeed, the ALJ specifically found that Philips offered no evidence that the anticompetitive effects of including many nonessential patents in the lists of essential patents in the CD-R/RW pools had dissipated. FF 602.

In support of its argument that prospective licensees have been given the option to license patents individually, complainant Philips notes that CX-414C ("CD-RW Disc License Agreement" with [[[]] (June 16, 1999)) provides that "Philips is willing to license any one or more patent rights for optical disc manufacturing, owned or controlled by Philips, whether within or outside of the CD-RW Standard Specification." The record does not support complainant's argument. The quoted language also appears in the 1999 joint CD-RW license to

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Gigastorage (CX-420C at 2, FF 250). The ALJ heard testimony regarding negotiations concerning the 1999 Gigastorage licenses and found that Gigastorage was told that separate licenses from the licensors would be more expensive than a joint license, that separate licenses could not be converted to a joint license at a later date, and that the royalty rate was the same regardless of the number of patents used. FF 369–376. He found that manufacturers like Gigastorage were “forced to license technology that they do not want.” ID at 194. We also note that the cited language is not present in more recent joint CD-RW license agreements. *See, e.g.*, Philips’ complaint confidential appendix N, tabs 1, 7, 16, 17, and 18.²²

The ALJ found that “[w]hen Gigastorage discussed with Philips entering into the CD-R patent pool license agreement, Gigastorage did not believe it needed a license to every patent in the pool and inquired into obtaining a license to less than all of the patents on Philips’ patent list. Gigastorage hoped that by eliminating some patents the royalty rate would be lower. Philips responded that the royalty is the same regardless of the number of patents used.” FF 376 (citing *Trans. (J. Chen)* at 840:15–841:13, 848:4–11, 918:12–919:7. The ALJ also found that “the evidence of record shows that manufacturers know enough about the patents in the pools to realize that they are being forced to license technology that they do not want.” ID at 194 (citing *Trans. (J. Chen)* 918:4–920:7); FF 439. The relevant testimony of Mr. Chen of Gigastorage reads

²²Appendix N is entitled “License Agreements of CD-RW Licensees.” Tab 1 is “CD-RW Disc Patent License Agreement” with [[[redacted]]] (June 17, 2000). Tab 7 is “CD-RW Disc Patent License Agreement” with [[[redacted]]] (July 1, 2000). Tab 16 is “CD-RW Disc Patent License Agreement” with [[[redacted]]] (June 16, 2000). Tab 17 is “CD-RW Disc Patent License Agreement” with [[[redacted]]] (June 21, 2000). Tab 18 is “CD-RW Disc Patent License Agreement” with [[[redacted]]] (Sept. 25, 2000).

as follows:

Q: You had a copy of the license and the patent list before you entered into the license; is that right, sir?

A: In the --

Q: No, I'm just asking you, you had a copy of the license and the patent list before you entered into the license with Philips?

A: They give us, yes.

Q: And you didn't look at that patent list, did you?

A: Of course, yes. I just explained that. I will explain again. Before we signed the patent license, we have a patent list, because Philips offer us so-called standard joint license agreement to us, so of course, including the patent list. But in the patent list, there are over 100, over 100 patents. So -- and also, there are a lot of irrelevant patents in the list, for example the CD audio, CD-ROM and CD-I, and also the CD-MO patent in the list. Of course, we have a list, and also, we expressed such opinion to Philips Taipei. So I have a phone call with Danny Lin. He's a manager of Philips Taipei who is in charge of patent licensing in Taiwan. I, on the phone, spoke with him regarding this issue, those patents we don't need, why they need to put in the list. But we got the answer I just explained. We got the answer, *even if you use one patent of the list or two or more, you still need to pay the same royalty rate, the same amount. So I have, before, we signed a joint license agreement.*

Q: Mr. Chen, I want to direct you to tab 2 of your binder, which is a copy of your deposition testimony, and direct your attention to page 158, line 13. Page 158, line 13.

A: Line 13.

Q: You testified at your deposition "I have looked at the patent list, this is an attachment to the agreement, and there are so many numbers that I didn't look at them in detail, and I remember there were over 100." Do you remember that

testimony?

A: Yeah, that's my answer, right.

JUDGE HARRIS: Yes, he remembers that.

BY MS. AQUINO: So you didn't look at the patents in detail; correct?

A: Yes. I also explained that we have a patent list, but we don't have the patent in very detail, but from the patent list, I remember in the deposition, I also explain to you, it's very easy to take a look in the list, there are different category for the patent. So at that time I explained to you they are CD audio, CD-ROM and CD-I and also the CD-MO in the patent list. So it's very obvious we don't need that, but in the detail, we don't have time, we don't have the manpower to go into the detail, and also, that's over 100 patents.

Trans. (J. Chen) at 918:4-920:7 (emphasis added).

Relying upon the italicized portion of the above-quoted testimony, complainant argues that, rather than demonstrating that Gigastorage could not choose the patents it wanted to license, the "testimony demonstrates only that Philips was prepared to license whatever patents Gigastorage wanted, but that the royalty would not change." Complainant's submission on review at 84. The ALJ concluded, however, that the witness understood Philips' response as a rejection of Gigastorage's request to license fewer patents at a lower royalty (*i.e.*, the witness "realize[d] that [he was] being forced to license technology that [he did] not want" (ID at 194)), rather than as expressing a willingness to license individually the patents in the CD-R joint license. The ALJ is in the best position to evaluate trial testimony, and we believe his

interpretation is the correct one.²³

As discussed above, we find, as did the ALJ, that licensees are unable to license individual patents but must take a license to all of the so-called "essential" patents. The availability of single-licensor package licenses would negate a tie in fact in the joint license between so-called essential patents that are owned by different licensors because the licensee has the option of single-licensor packages from each of the different licensors. The ALJ found, however, that Philips-only package licenses did not become available until 2000. ID at 177-78; Trans. (Smith) at 1423-24; FF 166-67, 369-74. We affirm his finding that the option to license only the essential patents of a single licensor under a single-licensor package license, as opposed

²³In support of its argument that it "is willing to negotiate licenses under whatever patent a licensee chooses" (Complainant's submission on review at 81), complainant also cites the following hearing testimony of Brian Wieghaus, complainant's general manager of optical licensing in North America:

Q: What is Philips's policy with respect to offering its patents for use other than in the field of use of a joint licensing program?

A: Essentially, it's negotiable.

Q: What is Philips's policy with respect to offering individual patents for license?

A: Again, it's negotiable.

Trans. at 305. However, the testimony of Wieghaus that precedes the above-quoted excerpt concerns unusual nonstandard optical products in niche fields. Trans. (Wieghaus) at 303-05. Thus, rather than being directed to licensing patents for use in implementing the CD-R/RW standard, the question relates to negotiations for the use of patents in such non-standard fields. The Wieghaus testimony therefore provides no support for complainant's contention that prospective CD-R/RW manufacturer licensees had the option of obtaining licenses to individual patents.

to licensing every one of the so-called essential patents of every one of the licensors under a joint license, was not available earlier. We therefore find, in the joint licenses negotiated prior to that point in time, a tie in fact between the “tying” patent licenses (licenses for U.S. patents that are actually essential for the manufacture of CD-Rs or CD-RWs in accordance with Orange Book standards) and the “tied” patent licenses (licenses for so-called “essential” patents that are actually nonessential to the manufacture of CD-Rs or CD-RWs) regardless of ownership. In the joint licenses negotiated after that point in time, we find a tie in fact between the “tying” patent licenses (licenses for U.S. patents that are actually essential for the manufacture of CD-Rs or CD-RWs in accordance with Orange Book standards) and the “tied” patent licenses (licenses for so-called “essential” patents that are actually nonessential to the manufacture of CD-Rs or CD-RWs) owned by the same licensor.

3. Separability

As discussed in the previous section, we find that in the Philips-only CD-RW license (e.g., CX-469C; FF 71, 72), licenses to the U.S. patents that are actually essential for the manufacture and sale of CD-RWs in accordance with Orange Book standards (the “tying” patent licenses) are tied in fact to a license to the Farla ‘692 patent (the “tied” patent license). We affirm the ALJ’s finding that the Farla ‘692 patent, which is included in the Philips-only CD-RW patent license as a so-called “essential” patent, is actually nonessential to the manufacture of CD-RWs (or CD-Rs) according to Orange Book standards.²⁴

²⁴ID at 201–05. The ALJ found that the Farla ‘692 patent “was included in the CD-R license agreement for many years before it was removed from the list of essential patents in 2001.” ID at 204 (citing RX-840, RX-778, RX-755, RX-914). He also found that “at least as of a

Complainant asserts that “[t]here is no evidence or finding that any pooled patent is not infringed by the making of an Orange Book disc.” Complainant’s submission at 78. It notes that —

[t]he ALJ’s conclusion regarding which patents are “essential” and which patents should or should not be pooled together — based . . . on a standard that ignores whether patents are actually infringed — has no applicability to the law of patent misuse based on tying which examines whether the alleged tied products are separate products by looking at the nature of the invention to determine whether the product is a “necessary concomitant of the invention.” *See Senza-Gel*, 803 F.2d at 670 n.14. Whatever may be said of the ALJ’s determination of essentiality, it was not based on what patent the licensee needs or infringes in making a licensed product.

Complainant’s submission at 78 n.52 (citations omitted). We disagree with complainant’s contentions, and find that the Farla ‘692 patent is “separate” from the tying patents.

The ALJ found that “[l]icenses to at least some of the Philips patents are essential to the manufacture of CD-R/RWs that are in technical and practical compliance with the Orange Book.” ID at 173; FF 222. Contrary to complainant’s contentions, the record in this investigation establishes that a licensee could produce an Orange Book compliant CD-R or CD-RW disc (using the so-called “essential” patents that are actually essential) without infringing the Philips Farla ‘692 patent.²⁵ The evidence supporting this finding is the testimony of respondents’ expert

license agreement signed in January 2002, the Farla ‘692 patent was still being listed as an essential patent under the CD-RW license agreement.” ID at 204 (citing RX-770 at PH087634). As pointed out by the IA, the following additional CD-RW licenses also include the Farla ‘692 patent: RX-766 at PH087728, RX-773 at PH088934.

²⁵As discussed in Part C, *supra*, the mandatory package licensing of blocking patents is not patent misuse *per se* because such patents may be considered to be a single product. As the Ninth Circuit stated in *International Manufacturing Co. v. Landon, Inc.*, 336 F.2d 723, 731 (9th Cir. 1964), “where the licensee could produce a commercially acceptable product utilizing one

(McLaughlin).²⁶

Complainant generally asserts that the testimony of respondents' expert (McLaughlin) is not evidence that alternative technologies exist that do not infringe the patents. It notes that McLaughlin testified on cross-examination that he was "not intimately familiar with the term infringement," and asserts that "the ALJ refused to permit [complainant's counsel] to question Dr. McLaughlin on the importance of an infringement analysis in determining essentiality, stating that [the ALJ said that] 'this expert's task was not to consider the question of infringement but to consider the question of essentiality.'" Complainant's reply at 29 n.24 (quoting Trans. at 1583). While McLaughlin stated that he was "not intimately familiar with the term 'infringement,'" we do not believe that this means that his testimony is incompetent that certain patents (including, *e.g.*, the Farla '692 patent) do not "cover" Calimetrics' alternative OPC and write strategy technology.²⁷ This is because in his testimony McLaughlin compared an exemplary claim in the patent at issue and explained why the technology was not covered. The

patent but not infringing the others in the package, then clearly we would not have a case involving blocking patents."

²⁶Respondents assert that in appendix B of complainant's submission on review, complainant for the first time challenges the opinion of its expert (McLaughlin) as to the essentiality of specific patents, raising arguments that were never presented to the ALJ. Respondents concede, however, that the appendix also "discusses factual or legal issues that may have been raised before the ALJ." Respondents' reply at 78. The Commission need not consider arguments raised by complainant in appendix B of its submission on review challenging the patent-by-patent essentiality opinion testimony of respondents' expert that were not raised before the ALJ. *Hazani v. United States Int'l Trade Comm'n*, 126 F.3d 1473, 1476-77 (Fed. Cir. 1997). However, as discussed below, the Commission finds complainant's arguments unpersuasive.

²⁷Calimetrics is a company owning alternative technology. *See, e.g.*, ID at 203.

hearing testimony cited by complainant does not suggest that the ALJ prevented complainant from questioning McLaughlin about his findings concerning those patents on cross-examination.

The ALJ found that the “claims of the Farla ‘692 patent are directed to a particular method of carrying out a strategy for writing data, otherwise known as a ‘write strategy,’ onto a blank recordable disc.” ID at 201; FF 471–72. He noted that “Dr. McLaughlin testified that at least one economically viable alternative for performing write strategy exists that does not infringe the Farla patent,” and that “Dr. McLaughlin identified an OPC and write strategy method available from Calimetrics, Inc., where he is employed as a Principal Scientist, as an alternative that is not covered by the Farla ‘692 patent and that would comply with the requirements of the Orange Book if it were used.” ID at 203; FF 482–485; Trans. (McLaughlin) at 1493:3–8; 1520:16–22; 1527:7–1528:8; 1563:18–1564:23; 1571:3–1571:10.

Complainant asserts that, rather than requiring that respondents prove patent misuse, the ALJ improperly shifted the burden of proof on the issue to it. Complainant contends that the ALJ required it to demonstrate that the Farla ‘692 patent had been removed from the CD-RW licenses, although the burden of proof should have remained on respondents to demonstrate that the Farla ‘692 patent was still included in the CD-RW licenses.

In response, respondents assert that “[g]iven that there was undeniable evidence that Farla was listed as essential in the past, the ALJ properly placed the burden on Philips to show that it no longer was [on the list of essential patents]. (FF 486, 488.) In any event, the fact that a nonessential patent has in the past been on the list is sufficient to support a finding of patent misuse.” Respondents’ reply at 85 n.46.

The ALJ did not shift the burden of proof on this issue to complainant. The ID states as follows:

The [Farla '692] patent was included in the CD-R license agreement for many years before it was removed from the list of essential patents in 2001. *Compare* RX-840; RX-778; RX-755; RX-914. However, at least as of a license agreement signed in January 2002, the Farla '692 patent was still being listed as an essential patent under the CD-RW license agreement. See RX-770 at PH087634.

It is unclear whether the Farla '692 patent remains listed on Philips' standard license agreements as an essential patent in the CD-RW pool. Philips' website of form license agreements does not include the lists of essential and nonessential patents for the CD-RW disc pool. See "Philips Intellectual Property and Standards, CD-R/RW Patents," at <http://www.licensing.philips.com/licenses/patent/ob/> (CD-R/RW hyperlink) (last visited on August 26, 2003). In the absence of evidence to the contrary, it can only be assumed that the Farla '692 patent continues to be listed as an essential patent on the form CD-RW license as well as on the agreements of all existing CD-RW licenses. As such, it unreasonably forecloses competition from alternative technologies that also comply with the Orange Book.

ID at 204–05 (emphasis added). Thus, the basis for the ALJ's conclusion that the Farla '692 patent continues to be listed as an essential patent in CD-RW licenses is that, although the patent had been removed in 2001 from the list of essential *CD-R patents*, the patent was still listed as an essential patent in a 2002 *CD-RW* patent license (RX-770 at PH087634 (Jan. 1, 2002)). The ALJ could permissibly infer from this evidence that the Farla '692 continues to be listed as an essential CD-RW patent. No party has directed us to evidence in the record that the patent has been removed from the list of essential CD-RW patents. We conclude that complainant's arguments concerning the Farla patent are without merit.

As discussed above, the record in this investigation establishes that a licensee could produce an Orange Book compliant CD-RW disc without infringing the Philips Farla '692 patent. Thus, the Farla '692 patent is not in a blocking relationship with the U.S. patents that are

actually essential for the manufacture of CD-RWs, and we find that the Farla '692 patent is separate from those patents.

As discussed in the previous section, we also find that in certain joint CD-R and CD-RW licenses there is a tie in fact between the "tying" patent licenses (licenses for U.S. patents that are actually essential for the manufacture of CD-Rs or CD-RWs in accordance with Orange Book standards) and the "tied" patent licenses (licenses for so-called "essential" patents that are actually nonessential to the manufacture of CD-Rs or CD-RWs) regardless of ownership. For the reasons discussed below, we affirm the ALJ's findings that the Ricoh Iwasaki '149 patent and the Sony Yamamoto '719 patent, which are included in certain joint licenses, are actually nonessential to the manufacture of CD-RWs (or CD-Rs) according to Orange Book standards, and find that they are separate from the essential patents in the joint licenses.

The ALJ found that "[l]icenses to at least some of the Philips patents are essential to the manufacture of CD-R/RWs that are in technical and practical compliance with the Orange Book." ID at 173. As discussed below, the record in this investigation establishes that a licensee could produce an Orange Book compliant CD-RW disc using the so-called "essential" patents that are actually essential, without infringing either the Ricoh Iwasaki '149 patent or the Sony Yamamoto '719 patent.²⁸ Thus, none of these patents is part of the complex of blocking patents that are required for the manufacture of Orange Book compliant CD-R or CD-RW discs, and we

²⁸We do not decide whether the Spruit '351 patent, the Hamada '388 or '009 patents, the Lagadec '565 patent, the Ogawa '994 patent, the Kramer '493 or '209 patents, or the Mimmagh '462 patent are "separate" from the tying patents.

conclude that each of these patents is “separate” from the “tying” patents.²⁹

The Iwasaki '149 Patent

The ALJ found that the “claims of the Iwasaki '149 patent are directed to a particular method of performing the OPC procedure, which is setting laser power to an appropriate level to record onto a particular disc.” ID at 205; Trans. (McLaughlin) at 1516:24–1518:7; 1520:24–1521:11. He also found that “at least one economically viable alternative for performing OPC exists that does not infringe the Iwasaki '149 patent,” and that “[t]he OPC and write strategy method available from Calimetrics, Inc. was identified by Dr. McLaughlin as an alternative that is not covered by the Iwasaki patent and would comply with the requirements of the Orange Book if it were used.” ID at 205–06; 1517:2–20; 1521:12–1522:13; 1563:18–1564:23; 1571:3–10.

Complainant states that the Ricoh Iwasaki '149 patent is not listed as a patent in the CD-R patent pool and that Ricoh is not a CD-R pool licensor.

The ALJ found the Ricoh Iwasaki '149 patent to be nonessential, reasoning as follows:

Respondents contend, without contest by Complainant, that the Ricoh Iwasaki '149 patent is nonessential and should not be included as such in the Philips CD-R and CD-RW patent pools. RPHB at 13-15. The claims of the Iwasaki '149 patent are directed to a particular method of performing the OPC procedure, which is setting laser power to an appropriate level to record onto a particular disc. McLaughlin Tr. 1516:24–1518:7; RX-52 (Iwasaki '149 patent). The OPC method defined by the Iwasaki patent consists of calculating a standardized gradation factor by monitoring the amplitudes of signals from test data patterns. McLaughlin Tr. 1520:23–1421:11; RX-52 (Iwasaki '149 Patent).

Respondents assert that the Iwasaki '149 patent is not essential to practice the

²⁹General challenges to the testimony of respondents' expert (McLaughlin) raised by complainant are discussed *supra* in connection with our discussion of the Farla '692 patent.

Orange Book for at least two reasons. First, the Orange Book does not mandate a particular method for carrying out the OPC function. McLaughlin Tr. 1507:10-1509:17; RX-407C (Orange Book CD-R Standard at PH015759); RX-408C (Orange Book CD-RW Standard at PH023331-023332). Philips's employee and technical witness, Hans Mons, testified that some of the characteristics the Orange Book defines for CD-Rs and CD-RWs are not mandatory, and that Orange Book-compliant CD-Rs and CD-RWs do not need to conform to the non-mandatory characteristics defined by the Orange Book. Mons Tr. 453:18-454:2; McLaughlin Tr. 1504:10-18.

Second, as stated earlier in connection with the Farla '692 patent, the Iwasaki '149 patent is not essential as a practical matter because at least one economically viable alternative for performing OPC exists that does not infringe the Iwasaki '149 patent. McLaughlin Tr. 1563:1-12. The OPC and write strategy method available from Calimetrics, Inc. was identified by Dr. McLaughlin as an alternative that is not covered by the Iwasaki patent and would comply with the requirements of the Orange Book if it were used. McLaughlin Tr. 1521:12-1522:13; 1523:5-13.

Finally, Respondents contend that the Calimetrics method is not covered by the Iwasaki '149 patent. McLaughlin Tr. 1521:12-18. The Iwasaki patent requires the calculation of a certain mathematical quantity, and the calculation of that mathematical quantity does not occur during the Calimetrics OPC procedure. McLaughlin Tr. 1521:19-1522:13.

Dr. Rubenstein has not rendered any opinion as to the essentiality of the Iwasaki '149 patent. Rubenstein Tr. 2263:11-2264:12. Neither has Complainant offered any expert testimony to counter the evidence presented by Dr. McLaughlin on the patent's nonessentiality. Thus, the evidence of record demonstrates that the Iwasaki '149 patent is nonessential to the practice of the Orange Book, and its inclusion among the list of "essential" patents in the pools unreasonably forecloses competition.

ID at 205-06. To the extent that the ALJ found the Iwasaki '149 patent to be "nonessential" to practice the CD-R technology, we modify the ALJ's findings of fact to reflect that the record indicates that the patent concerns only CD-RW technology. Trans. (McLaughlin) at 1500-01; RX-2381.

In his ID the ALJ specifically relied on the fact that complainant did not challenge the testimony of respondents' expert (McLaughlin) concerning the Iwasaki '149 patent. Nonetheless, in its submission on review, complainant now asserts that the OPC procedure in attachment C3

of Part III of the Orange Book is mandatory because certain parameters must be included in the ATIP. It contends that the OPC procedure in attachment C3 is mandatory because these parameters are determined according to that OPC procedure. Complainant's argument is not persuasive, however, because there is testimony in the record that, although attachment C3 "gives an example of an OPC-like procedure" in section 3.3 (CX-162C at PH023332), the title of the section, "A procedure for the determination of the OPC parameters for media," indicates that "there's more than one way to do that." Trans. (McLaughlin) at 1509:3-17. We conclude that the ALJ's findings of fact are not clearly erroneous.

The Yamamoto '719 Patent

The ALJ found that the "claims of the Yamamoto '719 patent contain functional limitations for creating a master disc. [Trans. (McLaughlin) at] 1534:14-25; RX-50. The limitations define a method of using a single laser beam to create a master containing both a wobbled pre-groove and pre-recorded data." ID at 206. He further found that "[a]t least one economically viable alternative for creating a master exists that does not infringe the Yamamoto patent. [Trans. (McLaughlin) at] 1535:7-15. According to Dr. McLaughlin, the Calimetrix two-beam mastering method is a commercially viable alternative to the patent. [Trans. (McLaughlin) at] 1568:3-15;1570:1-9." ID at 207.

Complainant contends that the ALJ's reasoning is erroneous because it depends on McLaughlin's erroneous construction of the claims of the Yamamoto patent. According to complainant, the claims are not limited to producing a master disc with a single laser beam. It asserts that because, for example, claim 7 uses the transition term "comprising," "infringement of

this claim requires *at least one recording beam*, but it is plainly not limited to exclude methods using more than one beam.” Complainant’s submission app. B at 41 (emphasis in original). Complainant further argues that McLaughlin did not testify that Calimetrics developed a two-beam mastering technique, but merely speculated about possible alternatives to the Yamamoto patent.

We do not find complainant’s argument that the scope of the claims of the Yamamoto patent is not restricted to a single recording beam persuasive. The “Background of the Invention” section of the Yamamoto patent specification states that “[h]itherto, in the case of forming patterns of different widths onto a mother disc, the pits 31, groove 32, and recording spots corresponding to their widths are prepared and both of these recording spots are switched.” RX-50, col. 1, ll. 23–27. The specification goes on to identify as a “problem” the fact that “since it is necessary to form two beams, the laser power must . . . be set to a large value.” RX-50, col. 1, ll. 37–38. The “Summary and Object of the Invention” section of the patent specification specifically states that “an object of the present invention [is] to provide an optical recording apparatus in which both the pits and a wide groove can be formed by *using only one recording spot* and the foregoing drawbacks are eliminated.” RX-50, col. 1, ll. 46–50 (emphasis added). The specification goes on to state that “[b]oth of the pits and the wide groove are formed by *using the single recording beam as explained above. Thus, the foregoing problem which . . . occurs when two beams are switched and used can be avoided.*” RX-50, col. 2, ll. 7–11 (emphasis added). *See also* RX-50, col. 4, ll. 38–43, 46–48. Thus, the specification identifies a problem and clearly states that the use of a single recording beam in the present invention avoids

the problem.

The ALJ stated that McLaughlin referred to the two-beam mastering method that is a commercially viable alternative to the Yamamoto patent as “Calimetrics two-beam mastering method.” ID at 207 (citing Trans. (McLaughlin) at 1568:3–15, 1570:1–9). We agree with complainant that the supporting testimony (*see also* 1568:16–20 and 1571:3–10) does not identify the two-beam mastering method as a Calimetrics method. McLaughlin did testify, however, that the two-beam method is a commercially viable alternative to the Yamamoto patent. We conclude that complainant’s argument regarding the scope of the Yamamoto patent claims and its argument that the two-beam alternative to the Yamamoto patent is speculative are without merit.

The Lockhoff ‘219 Patent

As stated above, we find that in certain Philips-only CD-R licenses (*e.g.*, RX-872C), licenses to the U.S. patents that are actually essential for the manufacture of CD-Rs in accordance with Orange Book standards (the “tying” patent licenses) are tied in fact to a license to the Lockhoff ‘219 patent and to a license to the Farla ‘692 patent (the “tied” patent licenses). As also discussed in the previous section, we find that in the Philips-only CD-RW licenses (*e.g.*, CX-469C; FF 71, 72), licenses to the U.S. patents that are actually essential for the manufacture of CD-RWs in accordance with Orange Book standards (the “tying” patent licenses) are tied in fact to a license to the Lockhoff ‘219 patent. For the reasons discussed below, we affirm the ALJ’s finding that the Lockhoff ‘219 patent is actually nonessential to the manufacture of CD-Rs or CD-RWs according to Orange Book standards, and find that it is separate from the essential

patents.

The Lockhoff '219 patent is directed to a method of copy control (FF 553). Complainant contends that because the Lockhoff '219 patent is "technically essential" to practice the Orange Book standard, the fact that an alternative technology exists to the Lockhoff '219 patent is irrelevant for purposes of an "essentiality" analysis — because a "technically essential" patent reads on the Orange Book. The ALJ found the evidence in conflict, however, and relied on the hearing testimony of respondents' expert McLaughlin. ID at 213.

The ALJ stated that Rubenstein found the Lockhoff '219 patent to be technically essential (ID at 212). The ALJ took specific note of RX-126C (May 14, 2002 Rubenstein Status Report) at PH065726), which is the relevant evidence complainant identifies on this point.³⁰ The ALJ found that alternative methods existed "such as embedding the copy control in the content" and that "[e]mbedding copy control in the content would satisfy the Orange Book but would not be covered by the Lockhoff '219 patent." FF 556, 557 (citing Trans. (McLaughlin) at 1529:14–1531:21). Thus, we affirm the ALJ's findings of fact, and find that the Lockhoff '219 patent is separate from the essential patents.

4. Conclusion

For the reasons discussed above, we conclude that the patents asserted in this

³⁰Complainant's references to CX-163C at PH015771 (B12.1 – 12.3 of attachment B12 of part II of the Orange Book (CD-R)) and CX-162C at PH023341 (C9.1 – 9.3 of attachment C9 of part III of the Orange Book (CD-RW)) are inconsistent with the cited portion of Rubenstein's status report (RX-126C at PH065726), which identifies attachments B1 and C1.1 as relevant to the Lockhoff '219 patent and which also identifies attachments B12-1, B12-2, C9-1, and C9-2 as relevant to U.S. Patent No. 5,428,598.

investigation are unenforceable for patent misuse *per se*.

II. Analysis of Patent Misuse Under the “Rule of Reason” Standard

The ALJ also found patent misuse under the rule of reason standard. ID at 152–53, 182–83, 219–20. He found that complainant’s CD-R/RW patent license agreements included as so-called “essential” patents for manufacturing CD-R/RW discs according to the Orange Book standard certain patents that were actually nonessential. ID at 185–213. He concluded that this practice constituted an extension of complainant’s statutory right to exclude under its patents. ID at 183–85. He also found that such inclusion of nonessential patents in the license agreements had the anticompetitive effect of foreclosing competition in alternative technology that competes with the technology covered by a nonessential patent that was included as a so-called “essential” patent. ID at 196–213. We adopt this portion of the ALJ’s analysis under the rule of reason standard with the modifications discussed below.

As to the ALJ’s conclusion that certain patents included as so-called “essential” patents in complainant’s licensing agreements are actually nonessential, we adopt the ALJ’s analysis and conclusions with respect to the Farla ‘692 patent, the Yamamoto ‘719 patent, the Lockhoff ‘219 patent, and the Iwasaki ‘149 patent.³¹ We take no position on the ALJ’s conclusion that the following patents included as so-called “essential” patents in the licensing agreements are actually nonessential: the Kramer ‘493 and ‘209 patents, the Ogawa ‘994 patent, the Lagadec ‘565 patent, the Spruit ‘351 patent, the Mimmagh ‘462 patent, and the Hamada ‘388 and ‘009

³¹Arguments raised by complainant in its submissions concerning the ALJ’s analysis of the Farla ‘692 patent, the Lockhoff ‘219 patent, the Yamamoto ‘719 patent, and the Iwasaki ‘149 patent are addressed *supra*.

patents.

The ALJ also found that the CD-R/RW patent pooling arrangements between complainant and its colicensors constituted horizontal agreements among competitors who controlled the royalty rate for patents in the pools, and concluded that these horizontal restraints rose to the level of patent misuse *per se* as price fixing and price discrimination. We take no position on these conclusions, and also take no position on the ALJ's conclusion that the royalty rate mechanism of the patent pooling arrangements is an unreasonable restraint on competition.³²

As explained below, we find patent misuse under the rule of reason standard based on the ALJ's findings that the Philips-only CD-RW license included as a purported essential patent the Farla '692 patent, which is in fact nonessential; that such inclusion had the anticompetitive effect of foreclosing an alternative technology developed by Calimetrics; and that the anticompetitive effects outweigh the procompetitive effects. We also find patent misuse under the rule of reason standard based on the ALJ's findings that certain joint CD-RW licenses (*e.g.*, RX-903C) included as purported essential patents the Philips Farla '692 patent and the Ricoh Iwasaki '149

³²We adopt those portions of the ALJ's analysis of the royalty rate mechanism under the rule of reason (ID at 213–19) that are relevant to the issue of whether the anticompetitive effects of including nonessential patents in the list of so-called essential patents outweigh the procompetitive effects, *e.g.*, ID at 214–15 (attributing the development of CD-R and CD-RW consumer market to standardization), ID at 215–16 (acknowledging well-recognized procompetitive effects of pools that license technically essential patents, but identifying inherent competitive problems posed by pools that encompass nonessential patents); ID at 217–18 (discussing separate lists of essential and nonessential patents that are under control of Philips and its licensor partners and are not negotiable); ID at 219 (“Efforts on the part of pool members to have their patents included in the pool as ‘essential as a practical matter,’ even though those patents do not cover anything in the Orange Book, [are] merely an attempt to forestall competing technologies”).

patent, which are in fact nonessential; that such inclusion had the anticompetitive effect of foreclosing an alternative technology developed by Calimetrics; and that the anticompetitive effects outweigh the procompetitive effects.

A. Legal Standard for Patent Misuse under the Rule of Reason

We adopt the ALJ's articulation of the legal standard for finding patent misuse under the rule of reason. ID at 182–83. Essentially, “[a] rule of reason analysis requires a determination of whether an agreement is on balance an unreasonable restraint of trade, that is, whether its anti-competitive effects outweigh its pro-competitive effects.” *Columbia Broad. Sys., Inc. v. Am. Soc’y of Composers, Authors & Publishers*, 620 F.2d 930, 934 (2d Cir. 1980) (citing *Nat’l Soc’y of Prof’l Eng’rs v. United States*, 435 U.S. 679 (1978); *Cont’l T.V., Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36 (1977); and *Bd. of Trade of Chicago v. United States*, 246 U.S. 231 (1918)).

A rule of reason analysis should be applied in evaluating allegations of patent misuse that do not constitute patent misuse *per se*. *Virginia Panel Corp. v. MAC Panel Co.*, 133 F.3d 860, 869 (Fed. Cir. 1997) (referencing the rule of reason standard applied in the antitrust case *State Oil Co. v. Kahn*, 118 S. Ct. 275, 279 (1997)). To the extent that respondents’ arguments with respect to the cases of *Berlenbach v. Anderson & Thompson Ski Co.*, 329 F.2d 782 (9th Cir. 1964); *Jack Winter, Inc. v. Koratron Co.*, 375 F. Supp. 1 (N.D. Cal. 1970); and *Columbus Auto. Corp. V. Oldberg Mfg. Co.*, 264 F. Supp. 779 (D. Colo. 1967), *aff’d*, 387 F.2d 643 (10th Cir. 1968), are understood as urging us to adopt a different course, we reject those arguments.³³

³³See also Robert J. Hoerner, “The Decline (and Fall?) Of the Patent Misuse Doctrine in the Federal Circuit,” 69 *Antitrust Law Journal* 669 (2002), discussing inconsistency between Federal Circuit cases and those cited by respondents.

The ALJ found patent misuse because nonessential patents are included in the list of so-called “essential” patents in the licenses at issue, and such inclusion forecloses economically viable alternative technology for making CD-R/RWs that competes with technology covered by the “nonessential” patent. He found the Farla ‘692 patent to be “nonessential” because respondents’ expert (McLaughlin) “testified that at least one economically viable alternative for performing write strategy exists that does not infringe the Farla patent.” ID at 203. The ALJ found that McLaughlin identified an economically viable alternative for performing an Optimum Power Control (OPC) and write strategy available from Calimetrics that would comply with the requirements of the Orange Book if it were used and that was not covered by the Farla ‘692 patent. ID at 203–04; FF 482–485. He also found the Iwasaki ‘149 patent to be “nonessential” because McLaughlin identified an economically viable alternative for performing OPC available from Calimetrics that is not covered by the Iwasaki patent and would comply with the requirements of the Orange Book if it were used. ID at 205–06.

In its petition for review, complainant asserts that the *per se* standard of patent misuse in tying cases that was applied in *American Securit Co. v. Shatterproof Glass Corp.* has been legislatively over-ruled by the 1988 Patent Misuse Reform Act, which it characterizes as imposing (as a threshold requirement) a finding of market power and requiring a “rule of reason” analysis in analyzing patent misuse.³⁴ Complainant submits that because an inquiry under the “rule of reason” is now required to support a finding of patent misuse in a tying case,

³⁴We address the question of whether 35 U.S.C. § 271(d)(5) eliminated the *per se* approach to patent tie-ins in section I.A. *supra*.

Shatterproof's holding that mandatory package licensing extends the scope of a patent is no longer good law.³⁵

Relying on *International Manufacturing Co. v. Landon, Inc.*, 336 F.2d 723 (9th Cir. 1964),³⁶ complainant argues that *Shatterproof* “does not support a determination that Philips has broadened the scope of its CD-R or CD-RW patents by package licensing them.” Complainant’s petition for review at 40. It contends that the package licenses are intended to “enable a manufacturer” to make CD-R or CD-RW discs, and that the licenses provide manufacturers with the patents “need[ed] to manufacture the product.” *Id.* at 40. It asserts that “[b]ecause each of the patents in the package covers aspects of a single product *and each is licensed for the limited purpose of making the product*, the package licensing of the patents does not extend their scope.” *Id.* at 40 (emphasis in original). Complainant argues that the benefits of package licensing are recognized in section 5.5 of the DOJ/FTC Antitrust Guidelines and in the three Business Review Letters from the DOJ Antitrust Division involving package licensing. Respondents and the IA oppose complainant’s position.

³⁵We reject complainant’s contention that *Shatterproof* is “directly contrary” to *Broadcast Music*. As pointed out by the ALJ (ID at 182 n.111), *Broadcast Music* did not involve mandatory package licensing.

³⁶Complainant points out that the *Landon* court stated that “it is not an unlawful tying arrangement for a seller to include several items in a single mandatory package when the items may be reasonably considered to constitute parts of a single distinct product,” and that “[t]he product . . . is no less a single product because its novel aspects are disclosed by two interlocking patents. In such a case, not only is it not unreasonable to treat both patents as constituting a single product, but also licensing them in a package deal appears to be the most practical way of making them available for public use.” Complainant’s petition for review at 40–41 (quoting 336 F.2d at 730).

A leading treatise indeed characterizes *Landon* as “recogniz[ing] an exception to the *American Securit* rule against mandatory package licensing in the case of blocking patents.” Donald S. Chisum, *Chisum on Patents* § 19.04[3][c]. And the DOJ has also recognized in its business review letters that packaging blocking patents can be procompetitive:

A starting point for an antitrust analysis of any patent pool is an inquiry into the validity of the patents and their relationship to each other. A licensing scheme premised on invalid or expired intellectual property rights will not withstand antitrust scrutiny. [footnote omitted] *And a patent pool that aggregates competitive technologies and sets a single price for them would raise serious competitive concerns. On the other hand, a combination of complementary intellectual property rights, especially ones that block the application for which they are jointly licensed, can be an efficient and procompetitive method of disseminating those rights to would-be users.*

CX-355 (MPEG-2 Business Review Letter) at 9 (emphasis added).

If the [three] [l]icensors [participating in the pool] owned patent rights that could be licensed and used in competition with each other, they might have an economic incentive to utilize a patent pool to eliminate competition among them. A pool that served that purpose “would raise serious competitive concerns.” [footnote omitted] In combining such substitute patents, the pool could serve as a price-fixing mechanism, ultimately raising the price of products and services that utilize the pooled patents. *If, on the other hand, the pool were to bring together complementary patent rights, it could be “an efficient and procompetitive method of disseminating those rights to would-be users.”* [footnote omitted] By reducing what would otherwise be three licensing transactions to one, the pool would reduce transactions costs for [l]icensors and licensees alike. *By ensuring that each [l]icensor’s patents will not be blocked by those of the other two, the pool would enhance the value of all three [l]icensors’ patents.*

CX-357 (3C DVD Business Review Letter) at 9 (quoting MPEG-2 Business Review Letter (CX-355) at 9) (emphasis added); *accord* CX-358 (6C DVD Business Review Letter) at 9. Under the

standard articulated by the *Landon* court,³⁷ however, neither the Farla '692 patent nor the Iwasaki '149 patent are in a blocking relationship with the other patents included in the pool.³⁸

The DOJ business review letters also identify two anticompetitive effects arising from the inclusion in the pool of patents that are substitutes for one another. CX-358 at 10. The 6C DVD business review letter discusses the effects as follows:

Consider, for example, a situation in which there are several patented methods for placing DVD-ROMs into packaging — each a useful complement to DVD-ROM manufacturing technology, but not essential to the standard. A DVD-ROM maker would need to license only one of them; they would be substitutes for each other. Inclusion in the pool of two or more such patents would risk turning the pool into a price-fixing mechanism. Inclusion in the pool of only one of the competing nonessential patents, which the pool would convey along with the essential patents, could in certain cases unreasonably foreclose the non-included competing patents from use by manufacturers; because the manufacturers would obtain a license to the one patent with the pool, they might choose not to license any of the competing patents, even if they otherwise would regard the competitive patents as superior. Limiting a pool to essential patents ensures that neither of these concerns will arise; rivalry is foreclosed neither among patents within the pool nor between patents in the pool and patents outside it.

CX-358 (6C DVD Business Review Letter) at 10; *see also* CX-357 (3C DVD Business Review Letter) at 9; CX-355 (MPEG-2 Business Review Letter) at 9–10.

In this investigation, the ALJ found that a viable alternative technology exists *outside the*

³⁷"If we had a case where the licensee could produce a commercially acceptable product utilizing one patent but not infringing the others in the package, then clearly we would not have a case involving blocking patents." 336 F.2d at 731.

³⁸The ALJ found that at least one economically viable alternative exists to the Farla '692 patent that would comply with the requirements of the Orange Book and would not infringe the Farla '692 patent if it were used and that at least one economically viable alternative exists to the Iwasaki '149 patent that would comply with the requirements of the Orange Book and would not infringe the Iwasaki '149 patent if it were used. ID at 203–06.

pools for the technology covered by some of the patents that are included in the pools, that is, at least one economically viable alternative exists to the Farla '692 patent that would comply with the requirements of the Orange Book and would not infringe the Farla '692 patent if it were used and at least one economically viable alternative exists to the Iwasaki '149 patent that would comply with the requirements of the Orange Book and would not infringe the Iwasaki '149 patent if it were used. Complainant asserts that there is no evidence that its licensees aren't using all of the patents included in the pools to manufacture the CD-R/RWs. Even if true, that fact does not obviate the competitive harm identified by the ALJ — which is that alternative technologies that could be used to manufacture CD-R/RWs are “foreclosed” because licensee manufacturers are forced to take licenses to nonessential patents covering technology that competes with the alternative technology.

B. Certain So-Called “Essential” Patents Are Not Essential

Complainant also argues that the ALJ adopted an incorrect standard for evaluating “essentiality.” It contends that the essentiality standard which it advanced (through the testimony of Dr. Rubenstein), and which was rejected by the ALJ, was approved by the DOJ Antitrust Division.

We do not find persuasive complainant's contention that the ALJ assumed, contrary to “uncontested evidence,” that sections of the Orange Book labeled “recommendations and clarifications” are optional (complainant's submission at 111). Although complainant relies on the testimony of Dr. Rubenstein on this point, the ALJ considered Dr. Rubenstein's position but rejected it based on the testimony of respondents' expert (McLaughlin), complainant's witness

(Mons); and the text of the Orange Book. *See, e.g.*, ID at 188–89, 205; Trans. (McLaughlin) at 1504:10–18, 1507:10–1509:17; Trans. (Mons) at 453:18–454:2; *see also* Trans. (McLaughlin) at 1504:19–1506:6; RX-407C (Orange Book CD-R Standard § 1.3 at PH015684); RX-408C (Orange Book CD-RW Standard § 1.3 at PH023245).

We also disagree with complainant’s characterization of the 6C DVD Business Review Letter as “noting that both ‘optional or mandatory features of the standard’ would be considered in determining essentiality.” Complainant’s submission at 106 (citing CX-358 § II.B). The language upon which complainant relies appears in connection with the allocation of royalties, not the determination of essentiality. CX-358 at 6. Complainant’s position that a patent that is necessarily infringed by compliance with an optional portion of the standard is “technically essential” is not supported by the DOJ Business Review Letters.³⁹

In the MPEG-LA business review letter, the DOJ stated that “[t]he limitation of the Portfolio [(i.e., the patents in the package)] to technically essential patents, as opposed to merely advantageous ones, helps ensure that the Portfolio patents are not competitive with each other

³⁹According to Dr. Rubenstein, “essential” patents include those that are either (1) “technically essential” or (2) “essential as a practical matter” (also referred to by Dr. Rubenstein as “commercially essential”). In determining whether a patent is “essential as a practical matter,” Dr. Rubenstein considers whether alternative technology exists — but he does not consider the existence of alternative technology in deciding whether a patent is “technically essential.” Complainant’s submission at 104–05 (“Dr. Rubenstein does not consider whether there are any alternatives to technically essential patents”), 107 (Trans. (Rubenstein) at 2185–86).

The ALJ recognized that a “technically essential” patent is one that is “inevitably infringed by compliance with the specification.” *E.g.*, ID at 189. He also recognized, however, that “if the manufacturer practices a methodology that is identified in the Orange Book as an ‘alternative’ or ‘optional’ methodology that is *not* covered by any patent in the pool, a manufacturer utilizing such optional technology would be in technical compliance with the Orange Book and would not be an infringer [of any patent in the pool].” ID at 189.

and that the Portfolio license does not, by bundling in nonessential patents, foreclose the competitive implementation options that the MPEG-2 standard has expressly left open.” CX-355 at 10 (emphasis added). Later in the same letter, the DOJ explained that “conditioning of a license for one intellectual property right on the license of a second such right could be a concern where its effect was to foreclose competition from technological alternatives to the second. In this instance, however, the essentiality of the patents — determined by the independent expert — means that there is no technological alternative to any of them and that *the Portfolio license will not require licensees to accept or use any patent that is merely one way of implementing the MPEG-2 standard, to the detriment of competition.*” CX-355 at 11 (emphasis added).

As explained in the ID —

In the . . . 3C DVD Business Review Letter, the patent pools in question were limited to “essential” patents that were defined somewhat more broadly from the MPEG-2 pool as being “necessary (as a practical matter) for compliance with the DVD[-Video or DVD-ROM] Standard Specifications.” See CX-357 (3C DVD Business Review Letter at p. 3). The DOJ stated that it understood this definition “to encompass patents which are technically essential — *i.e.* inevitably infringed by compliance with the specifications — and those for which existing alternatives are economically unfeasible.” See *id.* at 3 n.8.

ID at 143. The DOJ continued with this same approach in the 6C DVD Business Review Letter (CX-358), which is the letter cited by complainant. In that letter, the DOJ stated that, in the proposed licensing arrangement, a patent is “essential” “if it is ‘*necessarily infringed,*’ or ‘there is no realistic alternative’ to it, ‘in implementing the DVD Standard Specifications.’”⁴⁰ CX-358

⁴⁰The DOJ letter goes on to note that the definition of “essential” in the proposed licensing arrangement —

introduces some uncertainty. By asking the expert to identify not only those patents

at 3 (quoting agreement at issue) (emphasis added).

The 6C DVD Business Review Letter also states that —

[a]fter deducting its licensing-administrator fee, Toshiba will distribute the remaining royalties among the Licensors pursuant to an agreed allocation formula set forth in the Ground Rules for Royalty Allocation. This formula takes into account how often a Licensor's "essential" patents are infringed by either manufacture or sale of licensees' products, the age of the patents, and, in the case of patents "essential" to disc standards, whether the Licensor's patents relate to optional or mandatory features of the standard.

CX-358 at 6 (footnote omitted). Although the above-quoted statement indicates that a patent relating to "optional" features of the standard may be deemed "essential," it does *not* follow that a patent relating to "optional" features of the standard could be deemed "technically essential." This is because a patent is essential (1) if it is necessarily infringed by compliance with the standard (*i.e.*, technically essential) *or* (2) if there is no realistic alternative to it in implementing the standard (*i.e.*, necessary as a practical matter). Consistent with the concerns expressed by the DOJ in the MPEG-LA Business Review Letter quoted above, although a patent that relates to "optional" features of the standard may be deemed "essential," such a patent must be "necessary as a practical matter" — and cannot be "technically essential."⁴¹

that are literally essential to compliance with the DVD-ROM and DVD-Video standards, but also those for which there is no "realistic" alternative, the definition introduces a degree of subjectivity into the selection process. Based on your representations, however, it appears that the expert will interpret "realistic" to mean economically feasible.

CX-358 at 10.

⁴¹To allow a patent that relates to "optional" features of the standard to be deemed "technically essential" because the patent is necessarily infringed by compliance with the optional features of the standard (even if the patent is not infringed by practice of the mandatory

We disagree with complainant's assertion that the ALJ ignored the "essential as a practical matter" criterion. *See, e.g.*, ID at 142–43, 193. As stated by the ALJ (ID at 143), in approving the necessary as a practical matter standard in the 3C DVD Business Review Letter, the DOJ stated that this definition encompassed patents "for which existing alternatives are economically unfeasible." CX-357 at 3 n.8, 10 (no "economically viable substitutes"); *see also* CX-358 at 3, 10 (no "economically feasible alternatives"). Although respondents' expert (McLaughlin) testified that his essentiality analysis did not use "essentiality as a practical matter,"⁴² that does not mean that the ALJ could not rely on McLaughlin's testimony that a particular alternative technology exists, is economically feasible, can be used to practice the Orange Book standard, and is not covered by a patent in applying the "essential as a practical matter" standard. *See, e.g.*, ID at 203–04 (finding that the Farla '692 patent has not been shown to be "essential as a practical matter"); ID at 205–06 (finding that the Iwasaki '149 patent is not essential as a practical matter).

C. The ALJ's Finding of Anticompetitive Effect Is Supported by the Evidence

The ALJ identified specific patents that were identified in complainant's licenses as so-called "essential" patents even though (1) the patent was not "technically essential" to practice the Orange Book, and (2) economically viable, alternative technology existed to that covered by the patent. He concluded that the inclusion of actually nonessential patents among the so-called

portions of the standard) would foreclose alternative competitive implementation options that the standard has expressly left open.

⁴² Trans. (McLaughlin) at 1558:17–1559:4.

“essential” patents unreasonably foreclosed competition. He found that alternative technologies that compete with the technology of those patents are unreasonably foreclosed from use by licensee manufacturers because the manufacturers are wedded to the nonessential patents that they are compelled by the pools to accept. ID at 196. Thus, the anticompetitive effect of the tying arrangement (*i.e.*, including actually nonessential patents in the list of so-called “essential” patents and requiring a licensee to take all of the so-called “essential” patents) is foreclosure of competition.

While not stated explicitly in the ID, the injury to competition occurs in the market for the “tied” patent, *viz.*, the technology licensing market for the actually nonessential patent (and substitute technology) that is included in the list of so-called “essential” patents. The foreclosure occurs because the ability of owners of competing technology to license their technology to CD-R/RW manufacturers is impaired by the requirement that the manufacturers license the nonessential patents, which is a disincentive for them to license alternative, substitute technologies for the nonessential patents. FF 177, 179, 454–456.

D. The ALJ Balanced the Pro-Competitive Effects

We do not find persuasive complainant’s argument that the ALJ failed to consider the procompetitive effects of its licensing practices and weigh them against the anticompetitive effects. The ALJ considered the procompetitive effects advanced by complainant at several points in the ID.⁴³ ID at 192–94, 214–16, 219. He considered and rejected complainant’s

⁴³As noted *supra* in footnote 32, we have adopted those portions of the ALJ’s analysis of the royalty rate mechanism under the rule of reason (ID at 213–19) that are relevant to the rule of reason balancing of the procompetitive effects against the anticompetitive effects of including

argument that its licensing practices created a new consumer product (CD-R/RWs) and a new industry. ID at 214–15. He regarded those benefits as flowing from the Orange Book standards. Complainant’s argument — that the ALJ’s analysis is incorrect because a license is required to produce CD-R/RWs — is misguided because (as complainant concedes in its submission at 131 n.83) all necessary patent rights could be obtained from individual licensors without a pool license. The ALJ considered and rejected complainant’s contention that a broad package is convenient to manufacturers; he specifically found that the convenience to manufacturers of a broad package of patents was outweighed by the anticompetitive effect on alternative technologies of packaging nonessential patents with essential patents. ID at 192–94.

For the foregoing reasons, we conclude that the patents asserted in this investigation are unenforceable for patent misuse under the rule of reason.

Thus, we have found the asserted patents unenforceable for patent misuse *per se* and have also found the asserted patents unenforceable for patent misuse under the rule of reason. We affirm the ALJ’s conclusion that although patent misuse can be purged if the patent holder shows that he has completely abandoned the improper practices that were found to be misuse and that the consequences of the misuse have been fully dissipated, no such showing has been made by complainant in this investigation. ID at 146–47, 220; FF 602.

nonessential patents in the list of so-called essential patents.

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **COMMISSION OPINION**, was served upon the following parties via first class mail and air mail, where necessary on April 8, 2004.



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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of)
)
)

CERTAIN RECORDABLE COMPACT DISCS)
AND REWRITABLE COMPACT DISCS)
)

Inv. No. 337-TA-474

**NOTICE OF COMMISSION DECISION TO REVIEW PORTIONS OF
AN INITIAL DETERMINATION FINDING NO VIOLATION OF SECTION 337 OF
THE TARIFF ACT OF 1930**

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to review portions of the presiding administrative law judge's ("ALJ's") final initial determination ("ID") and to affirm ALJ Order No. 32.

FOR FURTHER INFORMATION CONTACT: Clara Kuehn, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-3012. Copies of the public version of the ALJ's final ID and all other nonconfidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone 202-205-2000. General information concerning the Commission may also be obtained by accessing its Internet server (<http://www.usitc.gov>). The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at <http://edis.usitc.gov>. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on 202-205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted this investigation on July 26, 2002, based on a complaint filed by U.S. Philips Corporation of Tarrytown, NY ("Philips" or "complainant"). 67 *Fed. Reg.* 48,948 (2002). The complaint, as supplemented, alleged violations of section 337 of the Tariff Act of 1930 in the importation into the United States, the sale for importation, and the sale within the United States after importation of certain recordable compact discs and rewritable compact discs by reason of infringement of certain claims of six U.S. patents: claims 1, 5, and 6 of U.S. Patent No. 4,807,209; claim 11 of U.S. Patent No. 4,962,493; claims 1, 2, and 3 of U.S. Patent No. 4,972,401; claims 1, 3, and 4 of U.S. Patent No. 5,023,856; claims 1-5, and 6 of U.S. Patent No. 4,999,825; and claims 20, 23-33, and 34 of U.S. Patent No. 5,418,764. 67 *Fed. Reg.* 48,948 (2002).

The notice of investigation named 19 respondents, including GigaStorage Corporation Taiwan of Hsinchu, Taiwan; GigaStorage Corporation USA of Livermore, California (collectively, "GigaStorage"); and Linberg Enterprise Inc. ("Linberg") of West Orange, New Jersey. 67 Fed. Reg. 48,948 (2002). On August 14, 2002, the ALJ issued an ID (Order No. 2) granting a motion to intervene as respondents by Princo Corporation of Hsin-Chu, Taiwan, and Princo America Corporation of Fremont, California (collectively, "Princo"). That ID was not reviewed by the Commission. GigaStorage, Linberg, and Princo ("respondents") are the only remaining active respondents in this investigation. See ALJ Order No. 6 (an unreviewed ID terminating eight respondents on the basis of a consent order); ALJ Order No. 17 (an unreviewed ID terminating each of three respondents on the basis of a consent order and settlement agreement); ALJ Order No. 18 (an unreviewed ID terminating one respondent on the basis of a consent order and settlement agreement); and ALJ Order No. 21 (an unreviewed ID finding four respondents in default).

On April 7, 2003, the ALJ issued an ID (ALJ Order No. 20) granting complainant's unopposed motion for summary determination that Linberg, GigaStorage, and Princo have each sold for importation, imported, and/or sold after importation products accused of infringing one or more of the asserted patent claims. That ID was not reviewed by the Commission.

A tutorial session was held on June 3, 2003, and an evidentiary hearing was held from June 10, 2003, through June 20, 2003.

On June 30, 2003, the ALJ issued an order (ALJ Order No. 32) granting a motion *in limine* filed by respondents to preclude complainant from asserting the doctrine of unclean hands with respect to respondents' affirmative defense of patent misuse.

The ALJ issued his final ID on October 24, 2003. Although he found that none of the asserted claims are invalid, that the accused products infringe the asserted claims, and that the domestic industry requirement of section 337 has been satisfied, he found no violation of section 337 because he concluded that all of the asserted patents are unenforceable by reason of patent misuse.

On November 5, 2003, complainant Philips petitioned for review of the portion of the final ID that found the asserted patents unenforceable due to patent misuse, and also appealed ALJ Order No. 32. On the same day, respondents filed a paper entitled "Statement of Respondents Princo Corp., Princo America Corp., Gigastorage Corp. Taiwan, Gigastorage Corp. USA, and Linberg Enterprises, Inc. Regarding the Initial Determination," in which respondents urged the Commission to adopt the ID in its entirety. Respondents and the IA filed responses to complainant's petition for review.

On December 8, 2003, the ALJ issued his recommended determination on remedy and bonding.

Having reviewed the record in this investigation, including the parties' written submissions, the Commission determined to affirm ALJ Order No. 32 and to review the ID's findings of fact and conclusions of law concerning patent misuse. The Commission has determined not to review the remainder of the ID, including the findings of fact and conclusions on the issues of infringement and invalidity of the asserted claims and the domestic industry requirement of section 337.

In connection with the final disposition of this investigation, the Commission may issue

(1) an order that could result in the exclusion of the subject articles from entry into the United States, and/or (2) cease and desist orders that could result in respondents being required to cease and desist from engaging in unfair acts in the importation and sale of such articles. Accordingly, the Commission is interested in receiving written submissions that address the form of remedy, if any, that should be ordered. If a party seeks exclusion of an article from entry into the United States for purposes other than entry for consumption, the party should so indicate and provide information establishing that activities involving other types of entry either are adversely affecting it or are likely to do so. For background information, see the Commission Opinion, *In the Matter of Certain Devices for Connecting Computers via Telephone Lines*, Inv. No. 337-TA-360.

If the Commission contemplates some form of remedy, it must consider the effects of that remedy upon the public interest. The factors the Commission will consider include the effect that an exclusion order and/or cease and desist orders would have on (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) U.S. production of articles that are like or directly competitive with those that are subject to investigation, and (4) U.S. consumers. The Commission is therefore interested in receiving written submissions that address the aforementioned public interest factors in the context of this investigation.

If the Commission orders some form of remedy, the President has 60 days to approve or disapprove the Commission's action. During this period, the subject articles would be entitled to enter the United States under a bond, in an amount to be determined by the Commission and prescribed by the Secretary of the Treasury. The Commission is therefore interested in receiving submissions concerning the amount of the bond that should be imposed.

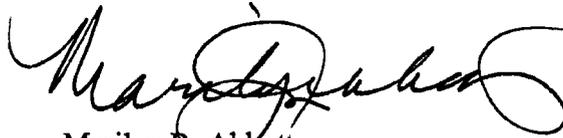
WRITTEN SUBMISSIONS: The parties to the investigation are requested to file written submissions on the issues under review. The submission should be concise and thoroughly referenced to the record in this investigation, including references to exhibits and testimony. Additionally, the parties to the investigation, interested government agencies, and any other interested persons are encouraged to file written submissions on the issues of remedy, the public interest, and bonding. Such submissions should address the ALJ's December 8, 2003, recommended determination on remedy and bonding. Complainant and the Commission investigative attorney are also requested to submit proposed remedial orders for the Commission's consideration. The written submissions and proposed remedial orders must be filed no later than the close of business on January 9, 2004. Reply submissions must be filed no later than the close of business on January 16, 2004. No further submissions will be permitted unless otherwise ordered by the Commission.

Persons filing written submissions must file with the Office of the Secretary the original and 14 true copies thereof on or before the deadlines stated above. Any person desiring to submit a document (or portion thereof) to the Commission in confidence must request confidential treatment unless the information has already been granted such treatment during the proceedings. All such requests should be directed to the Secretary of the Commission and must include a full statement of the reasons why the Commission should grant such treatment. *See* 19 C.F.R. § 201.6. Documents for which confidential treatment is granted by the Commission will be treated accordingly. All nonconfidential written submissions will be available for public

inspection at the Office of the Secretary.

This action is taken under the authority of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in sections 210.42 - .45 of the Commission's Rules of Practice and Procedure (19 C.F.R. §§ 210.42 - .45).

By order of the Commission.

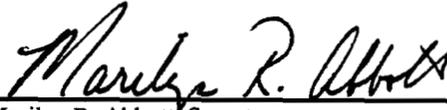
A handwritten signature in black ink, appearing to read "Marilyn R. Abbott", written in a cursive style.

Marilyn R. Abbott
Secretary

Issued: December 10, 2003

CONFIDENTIAL CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached NOTICE OF COMMISSION DECISION TO REVIEW PORTIONS OF AN INITIAL DETERMINATION FINDING NO VIOLATION OF SECTION 337 OF THE TARIFF ACT OF 1930, was served upon parties via first class mail and air mail where necessary on December 10, 2003.



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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of

**CERTAIN RECORDABLE COMPACT
DISCS AND REWRITABLE COMPACT
DISCS**

Investigation No. 337-TA-474

INITIAL DETERMINATION
Administrative Law Judge Sidney Harris

Pursuant to the Notice of Investigation, 67 Fed. Reg. 48948 (2002), this is the Administrative Law Judge's Initial Determination in the Matter of Certain Recordable Compact Discs and Rewritable Compact Discs Containing Same, United States International Trade Commission Investigation No. 337-TA-474. 19 C.F.R. § 210.42(a).

The Administrative Law Judge hereby determines that no violation of section 337 of the Tariff Act of 1930, as amended, has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain recordable compact discs or rewritable compact discs by reason of infringement of claims 1, 5, or 6 of U.S. Letters Patent 4,807,209, claim 11 of U.S. Letters Patent 4,962,493, claims 1, 2, or 3 of U.S. Letters Patent 4,972,401, claims 1, 3, or 4 of U.S. Letters Patent 5,023,856, claims 1-5 or 6 of U.S. Letters Patent 4,999,825, or claims 20, 23-33, or 34 of U.S. Letters Patent 5,418,764.

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The following abbreviations may be used in this Initial Determination:

- ALJ - Administrative Law Judge
- ALJX - Administrative Law Judge Exhibit
- CDX - Complainants' Demonstrative Exhibit
- CPX - Complainant's Physical Exhibit
- CX - Complainant's Exhibit
- Dep. - Deposition
- EDIS - Electronic Document Imaging System
- FF - Finding(s) of Fact
- JPX - Joint Physical Exhibit
- JX - Joint Exhibit
- PCL - Proposed Conclusion of Law (CPCL, RPCL or SPCL)
- PFF - Proposed FF (CPFF, RPFF or SPFF)
- PRF - Proposed Reply or Rebuttal Finding (CPRF, RPRF or SPRF)
- RDX - Respondents' Demonstrative Exhibit
- RPX - Respondents' Physical Exhibit
- RX - Respondents' Exhibit
- SX - Commission Investigative Staff Exhibit
- Tr. - Transcript.

I. BACKGROUND

A. Institution and Procedural History of This Investigation

On July 26, 2002, by publication of a Notice of Investigation in the *Federal Register*, this investigation was instituted, pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, to determine:

[W]hether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain recordable compact discs or rewritable compact discs by reason of infringement of claims 1, 5, or 6 of U.S. Letters Patent 4,807,209, claim 11 of U.S. Letters Patent 4,962,493, claims 1, 2, or 3 of U.S. Letters Patent 4,972,401, claims 1, 3, or 4 of U.S. Letters Patent 5,023,856, claims 1-5 or 6 of U.S. Letters Patent 4,999,825, or claims 20, 23-33, or 34 of U.S. Letters Patent 5,418,764, and whether there exists an industry in the United States as required by subsection (a)(2) of section 337.

67 Fed. Reg. 48948 (2002).

The complainant is: U.S. Philips Corporation of Tarrytown, New York.¹ *Id.*

The respondents named in the Notice of Investigation are:

Acme Production Industries of Kowloon, Hong Kong;

Bregusa Micro International LLC of Lake Forest, California;

Digital Storage Technology Co., Ltd. of Taipei Hsien, Taiwan;

DiscsDirect.Com of Campbell, California;

Gigastorage Corporation Taiwan of Hsinchu Industrial Park,

¹ Philips is a wholly-owned subsidiary of Koninklijke Philips Electronics N.V., a corporation based in the Netherlands. *See* CPFF 2. Throughout this investigation and in the post-hearing briefs, the parties have referred to the complainant and to its parent corporation, individually and collectively, as “Philips.” Similarly, both entities are referred to as “Philips” in this Initial Determination.

Hsinchu, Taiwan (“Gigastorage Taiwan” or “Gigastorage”);

Gigastorage Corporation USA of Livermore, California
 (“Gigastorage USA” or “Gigastorage”);

Jacsonic Group of San Gabriel, California;

J&E Enterprises, Inc. of Sun Valley, California;

KingPro Mediatek Inc. of Tainan Hsien, Taiwan;

Linberg Enterprise Inc. of West Orange, New Jersey;

NewEgg.Com, Inc. of La Puente, California;

PNY Technologies, Inc. of Parsippany, New Jersey;

QTC Computer Systems, Inc. of Santa Ana, California;

STI Certified Products, Inc. of Fremont, California;

Symmetry Group, Inc. of Long Island City, New York;

Tiger Direct, Inc. of Miami, Florida;

TKO Media Inc. of El Monte, California;

U.S. DigitalMedia, Inc. of Phoenix, Arizona; and

Xtraplus Corporation of Newark, California.

Id.

Additional respondents were added through their intervention, namely Princo Corporation of Hsin-Chu, Taiwan (“Princo Taiwan”) and Princo America Corporation of Fremont, California (“Princo America”) (collectively or individually, Princo Taiwan and Princo America may be referred to as “Princo”). *See* Order No. 2 (Initial Determination); Commission Notice Not to Review (Aug. 30, 2002).

All respondents other than Princo Taiwan, Princo America, Gigastorage Taiwan, Gigastorage USA and Linberg, have settled with Complainant or have been found to be in default.² *See* Order No. 6 (Initial Determination), Commission Notice Not to Review (Nov. 25, 2002); Order No. 17 (Initial Determination), Commission Notice Not to Review (Apr. 24, 2003); Order No. 18 (Initial Determination), Commission Notice Not to Review (Apr. 25, 2003); Order No. 21 (Initial Determination), Commission Notice Not to Review (May 7, 2003).

On October 28, 2002, early in the investigation, a change of investigative attorney was made by the Office of Unfair Import Investigations (“OUII”), and Rett V. Snotherly, Esq. has served as the investigative attorney since that time. *See* Notice of Change of Commission Investigative Attorney (Oct. 28, 2002).

On April 9, 2003, Philips filed its Motion for Sanctions against Respondents. Motion Docket No. 474-38. Philips argued that Respondents refused to provide discovery that they had agreed to provide, had failed to answer numerous interrogatories and document requests, and had not conducted appropriate searches. Philips requested that the Administrative Law Judge make certain inferences of infringement, preclude related arguments and evidence from being offered by Respondents, and require Respondents to pay Philips’ costs related to the alleged refusal to produce documents and the costs associated with the pending Motion. Respondents opposed Philips’ Motion. The Commission Investigative Staff supported Philips’ Motion with respect to certain attorneys’ fees. The Staff opposed all other sanctions requested by Philips, arguing, among other things, that it is not clear whether some of the allegedly withheld discovery had been compelled, which is required by 19 C.F.R. § 210.33 for the imposition of sanctions.

² The remaining respondents are referred to collectively as “Respondents.”

Having reviewed the evidence offered by the parties in this investigation, and the post-hearing briefs filed by the parties, the Administrative Law Judge finds that the sanctions requested in Philips' Motion are not appropriate, and that the relevant issues may be resolved without delay despite the alleged failure of Respondents to provide the discovery at issue or to provide the discovery in a timely manner. Nor is it clear that Respondents have engaged in improper conduct that has appreciably increased the costs of this litigation. Consequently, Philips' Motion for Sanctions is DENIED.

On April 22, 2003, Respondents filed their Motion for Sanctions directed against Philips. Motion Docket No. 474-41. Respondents sought evidentiary sanctions against Philips for allegedly failing to comply with Order No. 8 and Order No. 11, compelling certain discovery. The Motion was opposed by Philips and the Commission Investigative Staff.

On May 19, 2003, the Administrative Law Judge issued Order No. 25, requiring Philips to produce certain additional discovery immediately, denying in part Respondents' Motion for Sanctions, and deferring a complete ruling on the Motion until after the evidentiary hearing on the question of violation of section 337.

Having reviewed the evidence of record, and the parties' post-hearing briefs, the Administrative Law Judge finds that the sanctions requested in Respondents' Motion are not appropriate, and that the relevant issues may be resolved without delay despite the alleged failure of Philips to comply with discovery Orders. Consequently, Respondents' Motion for Sanctions is DENIED.

On June 10, 2003, Respondents filed their "Stipulation and Statement of Non-Opposition of Respondents Princo Corp., Prince America Corp., Gigastorage Corp. Taiwan, Gigastorage

Corp USA, and Linberg Enterprises, Inc. to Satisfaction by Complainant U.S. Philips Corp. of the Domestic Industry Requirement” (“Stipulation and Statement”). EDIS No. 185077.

On June 3, 2003, a tutorial session was held, followed by a pre-hearing conference. *See* Tr. 1-120 (tutorial), 121-155 (prehearing conference).³

On June 10, 2003, another prehearing conference was held. *See* Tr. 156-204. The hearing on the question of violation of section 337 also commenced on June 10, 2003. The hearing concluded on June 20, 2003.⁴ *See* Tr. 205-2649.

Post-hearing briefing commenced on July 14, 2003, and concluded on July 22, 2003. The parties have submitted main and reply briefs, as well as proposed findings.⁵ The issues are ripe

³The Administrative Law Judge notes that in this instance, the record of the tutorial is paginated with the record of the prehearing conferences and the hearing on the question of violation of section 337. The tutorial, which was presented by Complainant and Respondents, provided the Administrative Law Judge with background science and technology information relevant to this investigation. The tutorial is not, however, part of the record developed through the adversarial process, which allows for cross-examination. Findings on controverted issues are not based on the information provided during the tutorial. *See* (Tutorial) Tr. 4-8.

⁴ On July 9, 2003, by agreement of the parties and with leave granted by the Administrative Law Judge, Respondents’ technical expert witness filed a Declaration concerning a portion of the rebuttal testimony of Complainant’s technical expert witness. *See* Declaration of Dr. Masud Mansuripur (dated July 8, 2003); Tr. 2644-2645.

On July 30, 2003, the Administrative Law Judge issued Order No. 33, granting a joint motion (Motion Docket No. 474-67) to correct the hearing transcript.

On August 20, 2003, the Administrative Law Judge issued Order No. 34, granting a joint motion (Motion Docket No. 474-68) to reopen the proceedings to admit the deposition designations made by Complainant, Respondents and the Commission Investigative Staff in this investigation. Joint Exhibit 1 (JX-1C), which contains several highlighted deposition transcripts, was admitted into evidence.

⁵ Pursuant to the request of the Administrative Law Judge, the parties made separate post-hearing filings for (1) patent issues such as infringement and validity, and for (2) the patent misuse issue (related to Respondents’ misuse affirmative defense). The Administrative Law Judge also permitted the total number of briefing pages to exceed the number ordinarily allowed.

(continued...)

for determination.

B. The Products at Issue

The products at issue in this investigation are recordable compact discs (“CD-Rs”) and rewritable compact discs (“CD-RWs”). CD-Rs and CD-RWs are disc-shaped media used for data storage. Mansuripur (Tutorial) Tr. 79-80. A standard CD-R or CD-RW can hold over 400 to 500 times the amount of information of a 1.44 MB high density floppy disc. CX-50 at Bates No. PA033204. Information written on a CD-R or CD-RW runs along a spiral-shaped track that is read and recorded in a direction from near the center of the disc to its outer circumference. Hesselink (Tutorial) Tr. 19-20. On a modern disc, if that spiral track were unwound, it would be approximately 3½ miles long. Hesselink (Tutorial) Tr. 20; Mansuripur (Tutorial) Tr. 97.

A laser is used to write on a CD-R. A beam of laser light contacts a layer on the disc that is light-absorbent. Mansuripur (Tutorial) Tr. 96-97. By turning the laser on and off, a series of “pits” (depressions caused by the laser) and “lands” (flat surfaces) occurs that represents a series of binary values (0s and 1s). *Id.* A CD-RW contains a light-sensitive layer comprised of a compound exhibiting high reflectivity under certain heating conditions. Mansuripur (Tutorial) Tr. 89-91. As with a CD-R, the power of the laser used during writing to a CD-RW can be alternated to form a pattern on the disc that represents a series of binary values. *Id.* However, unlike a CD-R, which may be written upon (or “written to”) only once, a CD-RW may be erased and written to many times because the compound in the light-sensitive area can be reverted back to its original state under certain heating conditions caused by the laser. *Id.*

⁵ (...continued)

In accordance with the Administrative Law Judge’s ordinary practice, no limitation was placed on the number of proposed findings that a party could file. *See* Tr. 2528-2532.

A CD-R can be read and played by a standard CD audio player because the properties of the pits and lands formed in the CD-R have characteristics similar to those of a conventional compact disc, which is sometimes referred to a "CD-DA." Hesselink (Tutorial) Tr. 55. Yet, a CD-RW requires a different type of player that has an optical pickup capable of reading the lower reflectivity of these discs. Heemskerk Dep. (RX-1477C/JX-1C) Tr. 177-178. CD-Rs and CD-RWs can be used to store either audio or other data files. CX-162, p. I-1; CX-163, p. I-1; Mansuripur Tr. 1176.

The accused products in this investigation are CD-Rs and CD-RWs manufactured overseas by Princo Taiwan and Gigastorage Taiwan. The other respondents import and/or sell the accused products. *See* CPFF 3-24; Respondents' Identification of Unopposed Findings of Fact and Conclusions of Law at 1.

As authorized by the Notice of Investigation, Philips accuses Respondents' products of infringing certain claims of the U.S. Letters Patent 4,807,209, U.S. Letters Patent 4,962,493, U.S. Letters Patent 4,972,401, U.S. Letters Patent 5,023,856, U.S. Letters Patent 4,999,825 and U.S. Letters Patent 5,418,764.⁶ Respondents deny Philips' allegations of patent infringement. Respondents allege that the accused products are outside the scope of the asserted claims, and further that the asserted claims are invalid.

II. IMPORTATION OR SALE

On April 4, 2003, the Administrative Law Judge granted Philips' motion for summary determination of importation and sale with respect to Respondents' CD-R and CD-RW discs.

⁶ It appears that the particular claims asserted by Philips following the hearing are the same as as those covered by the Notice of Investigation, except for one claim, i.e., claim 3 of the '825 patent, as to which no evidence was adduced. *See, e.g.*, CPFF 1226-1237.

The Initial Determination became the determination of the Commission. Order No. 20 (Initial Determination); Commission Decision Not to Review (Apr. 24, 2003). Consequently, the importation or sale requirement of section 337 has been established for purposes of this Initial Determination.⁷

III. THE '209 PATENT AND THE '493 PATENT

A. Claim Construction

Any finding of infringement or non-infringement requires a two-step analytical approach. First, the asserted claims of a patent must be construed as a matter of law to determine their proper scope. Second, a factual determination must be made as to whether the properly construed claims read on an accused device. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976, 979 (Fed. Cir.1995)(*en banc*), *aff'd*, 517 U.S. 370 (1996).

To construe a claim, one first looks to the claim language. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir.1999)("The starting point for any claim construction must be the claims themselves."); *Comark Communications, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186 (Fed. Cir.1998) ("The appropriate starting point . . . is always the language of the asserted claim itself."). Then, one looks to the other intrinsic evidence, beginning with the specification and concluding with the prosecution history, if in evidence. *Vitronics Corp. v. Conceptor, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996); *Markman*, 52 F.3d at 979 ("Claims must be read in view of the specification, of which they are a part.").

If the claim language is clear on its face, then a court's consideration of other intrinsic evidence is restricted to determining if a deviation from the clear language of the claims is

⁷ Furthermore, no party has contested the Commission's *in rem* and personal jurisdiction.

specified. A deviation may be necessary if a patentee has chosen to be his own lexicographer and use terms in a manner other than their ordinary meaning. *Vitronics*, 90 F.3d at 1582. Any such special definition given to a word must be clearly defined in the specification. *Markman*, 52 F.3d at 980. A deviation may also be necessary if a patentee has “relinquished [a] potential claim construction in an amendment to the claim or in an argument to overcome or distinguish a reference.” *Interactive Gift Express*, 231 F.3d at 865 (quoting *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 979 (Fed. Cir. 1999)).

One looks “to the specification to ascertain the meaning of the claim term as it is used by the inventor in the context of the entirety of his invention,” and not merely to limit a claim term. Examples or embodiments appearing in the written description may not be read into a claim. *Comark*, 156 F.3d at 1186-87. Thus, care must be taken to avoid reading “limitations appearing in the specification . . . into [the] claims.” *Intervet Am., Inc. v. Kee-Vet Lab., Inc.*, 887 F.2d 1050, 1053 (Fed. Cir.1989).

If the meaning of the claim limitation is apparent from the totality of the intrinsic evidence, then the claim has been construed. If, however, a claim limitation remains unclear, one may look to extrinsic evidence to help resolve the lack of clarity.⁸ Relying on extrinsic evidence to construe a claim is “proper only when the claim language remains genuinely ambiguous after consideration of the intrinsic evidence.” *Bell & Howell Document Mgmt. Prods. Co. v. Altek Sys.*, 132 F.3d 701, 706 (Fed. Cir.1997); *Vitronics*, 90 F.3d at 1583-85 (“Such instances will rarely, if

⁸ Dictionaries are a form of extrinsic evidence with a special place in claim construction, and may sometimes be considered along with the intrinsic evidence. See *Vitronics*, 90 F.3d at 1584 n.6 (stating that, although technically the court is free to consult dictionaries at any time to help determine the meaning of claim terms, it may do so “so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents.”).

ever, occur.”).

Extrinsic evidence may always be consulted, however, to assist in understanding the underlying technology. *See Pitney Bowes*, 182 F.3d at 1309 (“[C]onsultation of extrinsic evidence is particularly appropriate to ensure that [a judge’s] understanding of the technical aspects of the patent is not entirely at variance with the understanding of one skilled in the art.”); *Vitronics*, 90 F.3d at 1585 (“Had the district court relied on the expert testimony and other extrinsic evidence solely to help it understand the underlying technology, we could not say the district court was in error.”). Extrinsic evidence may never be used “for the purpose of varying or contradicting the terms in the claims.” *Markman*, 52 F.3d at 981.

As stated in the in the *Markman*, opinion, “the focus in construing disputed terms in claim language is not the subjective intent of the parties to the patent contract when they used a particular term. Rather the focus is on the objective test of what one of ordinary skill in the art at the time of the invention would have understood the term to mean.” 52 F.3d at 968. *Accord Hoechst Celanese Corp. v. BP Chems. Ltd.*, 78 F.3d 1575, 1578 (Fed. Cir.1996)(The court assigns a claim term the meaning that it would be given by persons experienced in the field of the invention.). Nevertheless, it is a basic principle of claim construction that “[w]hen claims are amenable to more than one construction, they should when reasonably possible be interpreted so as to preserve their validity.” *Modine Mfg. Co. v. U.S. Int’l Trade Comm’n*, 75 F.3d 1545, 1557 (Fed. Cir. 1996), *overruled on other grounds, Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co.*, 234 F.3d 558 (Fed. Cir. 2000), *rev’d*, 535 U.S. 722 (2002).

The ‘209 and ‘493 patents are discussed in tandem in the parties’ briefs, and are considered together in this Initial Determination. The ‘203 and ‘493 patents share much of the

same related application data, and were issued by the United States Patent and Trademark Office (“PTO”) to the same inventors, i.e., Pieter Kramer and Jan Roos of the Netherlands. The ‘493 patent application is a continuation of the application upon which the ‘209 patent issued, and the disclosures contained in the specifications of the two patents are the same.⁹ See CX-12/RX-58 (‘209 Patent); CX-13 (‘493 Patent).

United States Patent No. 4,807,209, entitled “Record Carrier Body with a Follow-On Track and Apparatus for Recording Information Thereon,” issued on February 21, 1989. CX-12/RX-58 (‘209 Patent).¹⁰ The asserted claims of the ‘209 patent are independent claim 1

⁹ The ‘209 patent issued upon United States Application No. 499,571, which was filed on May 31, 1983, based on a foreign application priority date of February 9, 1973 (Netherlands Application 7301830). The United States ‘571 application is based on a series of abandoned applications. In particular, the ‘571 application is a continuation of application Serial No. 318,169, filed on November 4, 1981. The ‘169 application is a continuation of Serial No. 127,354, filed on March 5, 1980. The ‘354 application is a continuation of Serial No. 902,713, filed on May 4, 1978. The ‘713 application which is a continuation of Serial No. 619,039, filed on October 2, 1975. The ‘039 application is a continuation of Serial No. 431,422, filed on January 7, 1974. See CX-12/RX-58 (‘209 Patent).

The ‘493 patent issued upon United States Application No. 262,555, which was filed on October 25, 1988. As in the case of the ‘209 patent, the ‘493 patent and its underlying ‘555 application are based on a foreign application priority date of February 9, 1973 (Netherlands Application 7301830). The United States ‘555 application is a continuation of application Serial No. 499,571, filed on May 31, 1983, the same application upon which the ‘209 patent issued. See CX-13 (‘493 Patent).

Both the ‘209 and ‘493 patents were assigned to U.S. Philips Corporation, the complainant in this investigation. See CX-12/RX-58 (‘209 Patent); CX-13 (‘493 Patent).

¹⁰ The Abstract of the ‘209 patent refers to:

A disk-shaped record carrier body for storing information which is recorded thereon by a beam of radiation. The carrier body comprises a follow-on track which is capable of being scanned with an opto-electronic system so as to produce an electrical signal for controlling the position of the beam during recording of the information.

(continued...)

and dependent claims 5 and 6. The asserted claims are as follows:

1. A disk-shaped record carrier body for recording thereon information with a write beam of radiation, said record carrier body having a radiation-sensitive layer on which the information to be recorded is written with the write beam and a continuous, generally circular, diffractive follow-on track extending about the center of said disk-shaped record carrier body for guiding the write beam during recording of the information, said follow-on track being configured to diffract radiation incident thereon when scanned with a spot of radiation of a predetermined size and having a width which is smaller than the dimension of the spot in the width direction so that the intensity distribution of the radiation coming from the record carrier body varies with movement of the spot relative to the center of said follow-on track due to said diffraction so as to enable the position of the spot relative to said follow-on track to be determined.

* * *

5. The record carrier body according to claims 1 or 2^[11] wherein said follow-on track is a groove formed in said record carrier body.

6. The record carrier body according to claim 1 wherein said follow-on track contains prerecorded data capable of being read with a read beam of radiation.

CX-12/RX-58 ('209 Patent), col. 5, lines 2-19, col. 5, lines 32-34, col. 5, lines 34-37.

United States Patent No. 4,962,493, entitled "Record Carrier Body With A Follow-On Track And Apparatus For Recording Information Thereon," issued on October 9, 1990, about a

¹⁰ (...continued)
CX-12-RX-58.

¹¹ Claim 2 is a dependent claim, and is not asserted by Philips in this investigation. It provides:

2. The record carrier body according to claim 1, wherein the surface of said carrier body is reflective so that the diffracted radiation of the spot is reflected back from the record carrier body.

CX-12/RX-58 ('209 Patent), col. 5, lines 20-23.

year-and-a-half after the '209 patent.¹² CX-13 ('493 Patent). Philips asserts only claim 11 of the '493 patent in this investigation. Claim 11 is an independent claim, and is as follows:

11. A record carrier body for recording thereon information with a write beam of radiation, said record carrier body having a radiation-sensitive layer on which the information to be recorded is written with the write beam and a diffractive follow-on track in the form of an elongated groove formed in said record carrier body for guiding the write beam during recording of the information, said groove being configured to diffract radiation incident thereon when scanned with a spot of radiation of a predetermined size and having a width which is smaller than the dimension of the spot in the width direction so that the intensity distribution of the radiation coming from the record carrier body varies with movement of the spot relative to the center of said groove due to said diffraction so as to enable the position of the spot relative to said groove to be determined.

CX-13 ('493 Patent), col. 6, lines 38-53.

With respect to the '209 patent, the '493 patent, and all of the asserted patents in this investigation, a person of ordinary skill in the art of optical data storage (the field of the inventions at issue) would have a bachelor's degree in electrical engineering, physics, optics or a similar science, with two to five years of work experience with optical data storage. *See* Hesselink Tr. 590; Mansuripur Tr. 1099. Beyond this threshold issue, there are certain areas of fundamental dispute between Philips, the Staff and Respondents as to the proper interpretation of

¹² The '493 patent Abstract refers to:

An apparatus for recording information on a disk-shaped record carrier body by a beam of radiation. The carrier body comprises a diffractive follow-on track which is capable of being scanned with an opto-electronic system so as to produce an electrical signal for controlling the position of the beam during recording of the information.

CX-13 ('493 Patent).

the asserted claims. The disputes concern the asserted independent claims, and affect all of the '209 and '493 patent claims at issue.

The claim construction issues relevant to the '209 and '493 patent concern the concept of tracking and scanning a disc, or a portion thereof, to make sure that the laser beam used to read or write data is properly directed at the elongated track that runs in a spiral out from near the center of the disc.

There are always imperfections in the overall systems used to read or write discs. For example, the center of the disc may not be placed exactly on the spindle axis, or the disc may have been warped due to exposure to heat. As the disc spins under the focus of a beam, it may move to the right or to the left. Thus, a particular part of a track may not always be where it is supposed to be. A device used to read a CD or to record data upon a CD (i.e., "write to" a CD) must find out where the track is relative to the focused beam, and must also try to move the focused beam to keep it on track at all times. A CD must be made in a way so that a method of tracking can be used.

The technical experts who testified in this investigation provided information about two common methods of tracking. One tracking method involves three beams of light, and the other tracking method uses one beam. *See, e.g.,* Mansuripur (Tutorial) Tr. 97-107; Hesselink (Tutorial) Tr 29-32, 45-53; Hesselink Tr. 523-528.

Typically, in the three-beam method, a laser travels through a splitter that breaks up the beam of laser light into the three beams. All three beams are directed toward the disc by the beam splitter and focused on the disc by lenses. Consequently, three beams are focused on the disc, which may be called beams, A, B and C. Beam B is the brightest of the three, and must stay

on the track, for example to read the pits and lands by which data is encoded. Beams A and C are not as bright, and are offset to either side of beam B in a radial direction – i.e., although beams A and C remain relatively close to beam B, one beam is offset toward the center of the disc, and one toward the edge of the disc. Beams A and C are used to determine whether the system is on track.

Light from the three beams is received by three photodetectors, one for each beam. The system processes information from the detectors for beams A and C to determine whether the laser beam transmitted from the player or recorder is on track or not. The basis for this determination is the difference between the output or signal of detectors A and C. This is known as the track error signal, mathematically represented by A minus C.

For example, when the laser (and thus beam B split from it) is perfectly on track, beam B is centered on the center line of the track, A is slightly offset to the top, C is slightly offset to the bottom. At the detectors, the light from beam A and the light from beam C should be of equal intensity. When the system notices that A and C have equal brightness, no action is needed. However, if the disc shifts off-center in one direction, all three beams A, B and C are slightly off track. So, for example, during a read operation, beam A might shine mostly on the flat area of the land adjacent to the groove,¹³ while C might shine in the groove, possibly in a pit. In that

¹³ As discussed, *supra*, in Section II B containing basic information about the products at issue, the term “land” refers to flat surfaces, as distinguished from the pits formed in a disc. While lands are found between pits as they spiral out from the center of the disc in a track (often a groove), there are also land regions which lie adjacent to the pits (and groove). The latter lands or land regions are not the lands between the pits that combine with pits to distinguish coded binary 0s from coded binary 1s. *See, e.g.*, Staff Post-Hearing Patent Brief at 11 n.14. During the tutorial, this was clarified, as follows:

(continued...)

case, the light coming from beam A to the detector for beam A would be exceptionally strong, while the light coming from beam C would then be mostly lost, and thus little light would be detected by the detector for beam C. The system should notice that A is brighter than C, and that should indicate that all three beams have moved off track. In that case, although the beams have moved off track due to the way the disc is spinning, it is not the disc that is adjusted. Rather, the device adjusts a lens through which the laser shines, and shifts it down slightly to make sure that B remains on the center. In other instances, an opposite shift may occur, and the light detected from beam C would be stronger than the light from beam A. In that case, the device would shift the focus of the laser, and thus beams A, B and C would move in the other direction to stay on

¹³ (...continued)

JUDGE HARRIS: What do you mean by “the land”?

[DR.] HESSELINK: The land is this area in between the pits or surrounding the pits. So if you took the total surface, which is a flat surface, and put one dimple into it, then that is one pit. And then everything else surrounding it is land.

JUDGE HARRIS: I see.

[DR.] HESSELINK: Sometimes people refer to the land as being the land in between the pits, but there is also land in between these other portions of the track. So the simplest way to look at it is this is a pit, a physical pit in the ground, and everything else around it is the land.

But the interesting part is that along a track, the information is really encoded in the lengths of these pits and in the lengths of the lands. So you use both the lands and the pits to encode the information.

So this pattern, then, is a particular pattern that represents digital data, and I will explain to you a little bit later as to how that is done.

* * *

track.

When one beam is used, the system it is often referred to as the “push-pull” method, referring to the fact that the system has either to push or to pull the laser beam in order to stay on the track. In the one-beam method, the laser light is focused on the disc in one beam, which shines on the groove and on the adjacent lands. Diffracted light in the form of three beams arrives back from the disc at the photodetector. The photodetector is sometimes called a “split photodetector” because it can detect differences in the light on one side of the detector versus the other.

Light comes from the laser towards the disc “in phase,” with the same oscillations. However, light takes longer to reach the groove than it takes to reach the adjacent lands, and as a result a “phase shift” occurs. The light from the groove is phase-shifted relative to the light coming back from the two land regions. This phase-shifting is a disturbance that causes interference and diffraction. Although one beam is transmitted toward the disc, three beams are returned to the lens. Of the three returning beams, the center beam is returned to the system in its entirety, and if the laser is centered on the track, equal parts – although not all – of the two beams created to either side of the center beam (i.e., the beams from lands) are returned. Thus, a pattern of intensity resembling the pattern of stitching on a baseball is formed on the lens. This system of scanning or tracking is sometimes called the “baseball pattern” method. If the laser beam is centered correctly on the track, the pattern on the lens is symmetric, and the intensity of the signals at the photodetector (or split photodetector) are the same on both sides.

If the beam shifts up, due to imperfections in the spinning of the disc, the baseball pattern becomes asymmetric or disappears. For example, the left half may be bright and the right half

will be less bright. When the system senses such a “positive” signal, it knows that the beam has shifted up relative to the position of the disc, and so the device proceeds to bring the beam down. The opposite shift can also occur, in which case, the right half of the split detector becomes bright, the left half becomes dark, the different signal is considered “negative,” and the device proceeds to push the spot back up.

Respondents raise three areas of disputed claim construction, which are intertwined with their defenses of patent invalidity and non-infringement. Respondents argue that the ‘209 and ‘493 patents are limited exclusively to a “push-pull” tracking system based on the diffraction pattern produced by a single scanning spot of radiation. It is argued that the scanning spot of radiation is wider than the diffractive follow-on track, that the “diffractive follow-on track” is wider than the groove, and that the scanning spot must overlap both land regions surrounding the groove by a significant amount so that radiation appears in a “baseball pattern” of sufficient intensity to be accurately detected. Respondents argue that the “diffractive follow-on track” required by the asserted claims is equal to what is called the “track pitch” on the disc, i.e., the radial distance on a disc from the center of a land region, across a groove, to the center of the adjacent land region. Respondents also argue that the asserted claims of the ‘209 and ‘493 patents require a system that includes a record carrier and a recording device. It is argued that it is impossible to determine whether the claims are practiced by examining a disc alone, and it is necessary to operate a disc in a recorder/player to determine if a radiation spot is wider than the width of the follow-on track, and if the system is properly tracking the scanning spot. *See* Respondents’ Post-Hearing Patent Brief at 9-12; Respondents’ Post-Hearing Patent Reply Brief at 2-5, 11; *see also* RPPF 1225 (defining “track pitch”).

Philips argues that the '209 and '493 patents claim and disclose a record carrier (i.e., a disc) with a "follow-on track" configured to use light diffracted by the track to generate an error tracking signal that keeps the write laser on the center of the track while it is recording data. It is argued that the claim language itself defines what makes the "follow-on track" "diffractive," i.e., that the laser spot is wider than the track it is following. Philips also argues that the patents claim and enable one of ordinary skill to make a disc that may be used with a three-beam tracking system, as disclosed in the patent specifications, and that a disc need not actually be used in a recorder in order to infringe the asserted claims. *See* Philips' Post-Hearing Patent Brief at 2-4, 11-18; Philips' Post-Hearing Patent Reply Brief at 1-3.

The Commission Investigative Staff argues that Philips' proposed construction of the "follow-on track" is correct, and is the only logical interpretation supported by the claim language and specifications that would yield a working embodiment of the patent. The Staff rejects Respondents' argument that the "follow-on track" should be interpreted to include the groove and half of the land on each side. OUII Post-Hearing Patent Brief at 10-12. The Staff further argues that independent claim 1 of the '209 patent and independent claim 11 of the '493 patent are not limited to a system in which there can be only a single spot of radiation used for tracking purposes. It is argued that, following the usual practice in claim interpretation, reference to "a spot" in the claim language should be understood to refer to one or more than one of the particular item in question, and further that the claims were clearly intended to cover more than just a single spot inasmuch as the preferred embodiment disclosed in the specifications is a three-beam system used to keep the laser centered on the track. OUII Post-Hearing Patent Brief at 13 (citing *Tate Access Floors, Inc., v. Interface Architectural Resources, Inc.*, 279 F.3d 1357,

1370 (Fed. Cir. 2002); OUII Post-Hearing Patent Reply Brief at 1-2.

The Width of the "Follow-On Track"

The text of the asserted '209 and '493 patent claims are for the most part a description of the "follow-on track." In the first five-and-one-half lines of independent claim 1 of the '209 patent, the inventors claim a "disk-shaped record carrier body" (or "disc" in today's common usage) for recording information with a beam of radiation. In order to accomplish this task, the claim recites that the disc or "disk-shaped record carrier" must have a radiation-sensitive layer. *See CX-12/RX-58 ('209 Patent)*, col. 5, lines 1-6. The next thirteen lines of the claim describe the "follow-on track" that is to be placed in a "generally circular" pattern on the disc "for guiding the write beam during recording of information." *See Id.*, col. 5, lines 6-19.

Claim 1 of the '209 patent specifies that the follow-on track must be "diffractive," and subsequently, the claim provides details about how a spot of radiation can be used to scan the disc "so as to enable the position of the spot relative to said follow-on track to be determined." The nature of the scanning process is the subject of substantial dispute between Philips and the Staff on one side and Respondents on the other, and must be resolved by the Administrative Law Judge. Nevertheless, when one examines the plain language of claim 1 of the '209 patent, one learns that subsequent to the first five or so lines of the claim, all of the descriptive or limiting language, which concerns the scanning process, is provided so that one can understand how the follow-on track is, in the words of the claim, "being configured." Thus, claim 1 of the '209 patent is not a claim on a particular method of writing to or reading a disc, or of scanning a disc with a beam or spot of radiation to determine its position. Rather, independent claim 1 of the '209 patent is a claim on an object or product, namely a "disk-shaped record carrier body" with

certain limitations. One limitation placed on that “disk-shaped carrier” is a “follow-on track,” which must be “configured” so that it can be used in a particular way. The limitation is written in terms of the physical configuration of the follow-on track.

The same observation can be made of all the other asserted claims of the ‘209 and ‘493 patents. Asserted claims 5 and 6 of the ‘209 patent, depend from independent claim 1 and contain additional limitations pertaining to the follow-on track. Claim 5 provides that the “follow on track is a groove formed in said record carrier body.” *See Id.*, col. 5, lines 32-34. Claim 6 provides that the “follow on track contains prerecorded data capable of being read with a beam of radiation.” *Id.*, col. 5, lines 35-37. Claim 11 of the ‘493 patent is similar to claim 1 of the ‘209 patent in several respects, including the fact that most of the limiting language contained in the claim pertains to the configuration of the “follow-on track” to be used with a radiation scanning method. Claim 11 of the ‘493 patent is narrower than claim 1 of the ‘209 patent because it also incorporates the limitation that the track be “in the form of an elongated groove.” *See CX-13*, col. 6, lines 38-53. The questions raised about claim construction for the ‘209 and ‘493 patents are the same for each of the asserted claims, whether those questions concern the follow-on track or any other disputed limitation or aspect of the claims.

One of the fundamental questions raised in this investigation about the configuration of the follow-on track relates to its width on the disc. The question is not one of the mechanics of how a measurement could be taken or read. The question pertains to which parts of a disk-shaped record carrier body or disc are to be considered the follow-on track, and which are not. The claims and the specifications of the ‘209 and ‘493 patents provide limitations and descriptions of the track.

Independent claim 1 of the '209 patent requires a follow-on track "having a width which is smaller than the dimension of the spot [of radiation] in the width direction." Similarly, independent claim 11 of the '493 patent requires that the track "hav[e] a width which is smaller than the dimension of the spot in the width direction." In both cases, the claims state that the width of the track is limited so that the intensity distribution of the radiation coming from the record carrier body varies with movement of the spot relative to the center of the follow-on track, which may be a groove. Thus, the width of the follow-on track must be smaller than the spot of radiation. Indeed, the parties are in agreement that diffraction in this case occurs because a spot of radiation (i.e., light from the laser) is wider than the track.¹⁴ *See, e.g.,* Philips' Post-Hearing Patent Brief at 13; Respondents' Post-Hearing Patent Reply Brief at 4; OUII Post-Hearing Patent

¹⁴ There is also substantial agreement concerning the meaning of "diffraction," a basic term used in optics. *See* OUII Post-Hearing Patent Brief at 12. At the tutorial, Philips' expert, Dr. Hesselink, explained that at least by the 20th century, physicists understood diffraction to be "any deviation of light rays from rectilinear paths that cannot be interpreted as reflection or refraction." This may be caused by light leaving surfaces with certain structures, such as diffraction gratings. Dr. Hesselink illustrated diffraction by directing a beam of light from a laser pointer onto a CD, resulting in three beams coming off the disc (with three red spots of light visible on a wall near the disc), a center beam and two diffracting or "first order" beams. *See* Hesselink (Tutorial) Tr. 45-49. Similarly, Respondents' expert, Dr. Mansuripur, discussed a surface with nonuniform properties such that there are areas of higher and lower reflectivity, and light from which a single beam would come back as multiple beams due to diffraction. Dr. Mansuripur also directed a laser beam onto a CD and showed that multiple beams appeared on a wall. Mansuripur (Tutorial) Tr. 85. He explained that:

Now, if light shines on the edge of a groove, so that some of the light shines on the land and some of the light shines on the groove, there is going to be a delay between the light reflected from the land surface and the light that is reflected from the groove surface, because the light has to travel a longer distance to reach the groove, so this causes a disturbance in the phase of the light. When the light returns from this structure, it will be diffracted into multiple beams. So this is another case where diffraction can occur.

Mansuripur (Tutorial) Tr. 85-86.

Brief at 12.

Furthermore, the claims contemplate space between the tracks, a point which is especially clear in the case of the limitation added by dependent claim 5 of the '209 patent and by independent claim 11 of the '493 patent. Reference to claim 5 of the '209 patent and claim 11 of the '493 patent shows, respectively, that the claims explicitly state that the follow-on track "*is a groove formed in said record carrier body*" and is "*in the form of an elongated groove.*" By limiting the follow-on track to a groove, these claims necessarily indicate a differentiation on the disc between areas that consist of a groove (and thus a follow-on track) and areas that are not grooved (thus not a follow-on track). Consequently, according to the plain claim language, when a groove is used for the follow-on track, the follow-on track is the groove, and does not extend to the land region to either side of it. Although Respondents argue that their proposed claim construction is based on the claim language, their proposal, which requires the follow-on track to extend beyond the groove is incompatible with the claims.

Furthermore, the specifications of the '209 and '493 patent provide several descriptions of follow-on tracks. The specifications illustrate that a follow-on track may take a variety of forms, and in accordance with the claims, each configuration disclosed in the specification excludes the adjacent land regions. In each example, the track is differentiated from the surface of the disc. For example, the specifications provide:

The opto-electronic device,¹⁵ which in the read apparatus is used for determining the position of the read beam relative to the track to be read during reading, may also be used to ensure that during

¹⁵ In addition to the asserted claims, the '209 and '493 patents include non-asserted claims, such as independent claim 7 of the '209 patent and independent claim 10 of the '493 patent, which cover an apparatus that writes on specified record carrier bodies or discs.

information writing, the write beam accurately follows the track provided on the record carrier body, hereinafter referred to as a "follow-on track" for the sake of brevity. *The follow-on track can be optically discriminated from the rest of the record carrier body by making said track V-shaped and pressing it in the surface of the record carrier body, as described in German Patent Application No. 2,038,874. The V-shaped groove causes a beam of radiation to be split into two sub-beams, the intensities of the sub-beams being defined by the degree of centering of the radiation beam relative to the groove.*

It is an object of the invention to indicate other possibilities of optically discriminating the follow-on track. The record carrier body according to the invention is characterized in that the follow-on track is a flat track, and that the follow-on track influences the direction of a radiation beam in the same way as, but the radiation distribution over a beam section in a different way, than the rest of the surface of the record carrier body on which the information is to be written.

* * *

The follow-on track may be provided at the surface of the record carrier body in different forms. For example, the reflection coefficient or the absorption coefficient of the follow-on track may differ from its surrounding, so that the intensity of a beam which emerges from the record carrier body differs according to whether the beam has or has not interacted with the track. However, it is also possible to make the follow-on track interact with the polarization condition of the beam in a different way than with the area surrounding the track. Changes in the direction of polarization of the beam can then be converted into intensity differences with the aid of a polarization sensitive element. It is also possible to employ a follow-on track which under the influence of an incident beam starts to emit radiation in a manner which differs from its surrounding area. The emission of radiation by the follow-on track may be based on a fluorescence mechanism.

The follow-on track can be provided on the record carrier body in accordance with different methods, depending on the nature of information storage in the final record carrier. For example, *a photo-resist may be coated onto the disk-shaped record carrier body.* This coating may be exposed to continuous radiation, the carrier body, for example, being also subjected to a radial displacement in

addition to a rotation relative to the radiation source. *Thus, a spiral track is exposed. Depending on the type of photo-resist, either the exposed or the non-exposed parts will disappear upon development, so that the substrate, for example a reflecting layer, appears which layer can be etched away or can be rendered absorbent.*

For the provision of the follow-on track use can also be made of different information storage techniques. For example, a layer of a magneto-optical or photochromic material can be spirally and continuously exposed with a high-power radiation beam, so that the polarizing properties or the color properties of the layer are changed.

CX12/RX-58 ('209 Patent), col. 36 through col. 2, line 54; CX-13 ('493 Patent), col. 1, line 39 through col. 2, line 56 (emphasis added).

Thus, the specifications of the '209 and '493 patents illustrate that the claimed follow-on track is distinct from its surrounding areas, even to the point of being optically discriminated from the rest of the record carrier body. The follow-on track may consist of a V-shaped groove that is pressed into the surface of the disc and causes radiation to be split into sub-beams, or (with the use of photoresist) the follow-on track may be formed by part of the disc surface being "etched away." In any case, the follow-on track is distinct from its surrounding areas or the rest of the disc, and further consists only of the V-shaped groove, the etched away layer, or such other "spiral" or "generally circular" track covered by the claims. By contrast, there is no indication in the claims or in disclosures of the '209 and '493 patent specifications that a follow-on track includes any area outside the groove or layer which has been placed in the record carrier body. Furthermore, there is enough separation between portions of the follow-on track so that it is clearly discerned from the rest of the record carrier body. From the standpoint of optics, diffraction or in the words of the patent specification "*caus[ing] a beam of radiation to be split into two sub-beams*" occurs because the groove is different from the rest of the record carrier

body.

This understanding of the claimed follow-on track is contrary to the Respondents' proposed interpretation. Respondents' differing proposed construction of the follow-on track is closely related to their reading of the asserted claims to cover a record carrier body suitable for only one method of scanning, i.e., the "push-pull" method, also known as the "baseball pattern" method. Respondents' proposed construction is also dependent upon their particular understanding of how the push-pull method works and the type of track that is necessary to practice it. Respondents' proposed construction excludes all other methods, including the three-beam method which, it is agreed by all parties, is detailed in the '209 and '493 patent specifications.¹⁶ Respondents must, and do, therefore argue that the claims of the '209 and '493 patents are disassociated from the specification.¹⁷ Respondents argue that, in fact, "a diffractive follow-on track is simply not disclosed in the specifications." Respondents' Post-Hearing Patent Brief at 10. Respondents support their proposed construction primarily on two grounds: the particular type of intensity distribution supposedly necessary for use in the push-pull or baseball method; and the supposed plain meaning of the claim language, particularly their argument that in this case track width on a disc is the same as track pitch. *See Id.* at 11.

¹⁶ The Orange Book (*see infra* at for a description) which contains standards applicable to CD-Rs and CD-RWs, is not restricted to a single beam "push-pull" or baseball pattern method of scanning. The Orange Book provides that "several tracking methods can be used," and in particular, the Orange Book lists and details the push-pull method, the three-beam method, and the differential phase detection (or "DPD") method. *See* RX-407C, Attachment B13 (Bates No. PH 015776); McLaughlin Tr. 1537-1538.

¹⁷ The argument that the '209 and '493 patent claims are not supported by their specifications is crucial to Respondents' position, potentially affects patent validity, and is serious as a question of law. The question of whether the claims are supported by the specifications is discussed immediately below in the next subsection.

With respect to intensity distribution, Respondents argue that the claim limitation of a “diffractive follow-on track,” “permit[s] the spot relative to the track to be determined and requires that the scanning spot impinge on the groove and a *substantial* amount of the surrounding lands.” *Id.* (emphasis added). Having disavowed any connection between the embodiments disclosed in the patent specifications and the claims, Respondents argue that “[t]o determine how much of the adjacent land regions is required, resort is had to the claim language itself and the understanding of persons skilled in the art.” *Id.* It is further argued that “[t]he intensity distribution recited in the claims refers to a diffraction pattern formed by the overlap between the +1 and –1 diffraction orders with the zero diffraction order, and is often referred to as the ‘baseball pattern’ because of the pattern’s resemblance to a baseball. In order that the system be capable of determining the position of the scanning spot, a diffraction pattern of *suitable* strength must be formed. This requires that the scanning spot overlap the land regions surrounding the groove by a *significant amount* during scanning such that the overlapped radiation in the baseball pattern is of sufficient intensity to be accurately detected.” *Id.* (emphasis added).

As seen from the plain language of the claims, they do not explicitly refer to a diffraction pattern formed by the overlap between the +1 and –1 diffraction orders with the zero diffraction order. For the conclusion that the asserted claims pertain exclusively to the push-pull or baseball pattern method of scanning, Respondents rely primarily upon the hearing testimony of their expert. *See Id.* As discussed below, a limited interpretation of the asserted claims, which has the effect of nullifying the patent specifications, must be rejected. However, even if one were to accept the testimony of Respondents’ expert, and conclude that the claims are limited to a disc

only for use with the push-pull or baseball pattern method, a question would remain as to how much of the surrounding land regions must be included in the track in order to be “substantial,” “significant” or to provide “suitable strength” or “sufficient intensity.” Respondents do not provide a precise answer to the question they raise about how much of the land should be included with the groove in order to practice the push-pull or baseball method, as they understand it, and to have suitable strength or sufficient intensity. It appears, however, that Respondents concede that the push-pull method does not require use of the entire track pitch, from midpoint of a land region across a groove to the midpoint of an adjacent land region. *See Id.* Yet, Respondents define the diffractive follow-on track of the patents as necessarily encompassing the entire track pitch.

Respondents turn again primarily to the testimony of their expert to argue that “[p]ersons having ordinary skill in the art understand a ‘track’ on an optical disc to refer to either a groove or an area on a disc from the midpoint of a land region across a groove to the midpoint of an adjacent land region.” *Id.* (citations omitted). Respondents further argue that any definition of the track other than the groove or the entire track pitch would be considered arbitrary to persons of ordinary skill in the art. According to Respondents, a track must be defined as either the groove alone or the entire track pitch with no definition possible that delineates an area in between. Therefore, in order to use the push-pull or baseball pattern method of scanning, according to Respondents, the track would be understood to be the track pitch. *Id.*

Respondents’ proposed interpretation of the follow-on track, such that its width is to equal track pitch and nothing less, must be rejected on several grounds.

Respondents appear to argue that because the track is “diffractive” it must encompass the

entire surface on which the beam of radiation (such as laser light) is directed (and possibly more). However, as required by the independent claims, a claimed follow-on track (such as a groove) is diffractive precisely because it is smaller than a spot of radiation. As pointed out by Philips' expert at the hearing, as a matter of optics – and thus known to a person of ordinary skill – the width of the track is not what makes the track diffractive. Rather, as indicated in the claims of the '209 and '493 patents, diffraction occurs because the follow-on track is not as wide as a spot of radiation. This difference in size causes interaction between light and a structure, such as a groove, on an otherwise relatively smooth surface. Diffraction occurs because of the presence of the groove. Thus, a follow-on track in the form of a groove, which is smaller than a spot of radiation, is an example of a diffractive follow-on track. Hesselink Tr. 508-509, 2545.

Moreover, Respondents' interpretation is inconsistent with the proper construction of "follow-on track" based on the claims in view of the specification. Respondents' proposed interpretation of the follow-on track would seem to allow nothing on the disc surface to stand between one portion of the circular track and another.¹⁸ Further, Respondents' proposal is, for example, impossible to reconcile with the plain language of claim 5 of the '209 patent and claim 11 of the '493 patent, in which the follow-on track is explicitly defined as a groove. Even if one discounts the embodiments and teachings of the '209 and '493 patent specifications, as Respondents argue one should do, one cannot read the claim language and say that a track *is a groove* (for example, see the language of claim 5 of the '209 patent) and at the same time say that a track is a groove plus half of the adjacent land regions.

¹⁸ During the tutorial, Respondents provided several illustrations of track pitch. *See, e.g.*, RDX-100.20, 100.32, 100.36, 100.40-44.

The plain claim language, especially when read in light of the specifications, demonstrates that the follow-on track of the claims at issue is smaller than the spot of radiation used to write on a disc, and in the case of a grooved track, consists of the groove.

Whether the Claims Read Only on a Disc Used with a One-Beam, Push-Pull Scanning System

As discussed above, a key dispute is raised by Respondents' argument that the asserted claims of the '209 and '493 patents claim a "record carrier body" or disc for use with only a one-beam method of scanning known as the "push-pull" method or baseball pattern method, and that the patent specifications, which disclose a three-beam method, do not support the claims. Respondents' Post-Hearing Patent Brief at 9-10; Respondents' Post-Hearing Patent Reply Brief at 2-4. Philips argues that while the claim language is broad enough to cover a one-beam system, there is no basis for limiting the claims to a one-beam system of any sort, including a baseball pattern system. *See* Philips' Post-Hearing Patent Brief at 15 n.20; Philips' Post-Hearing Patent Reply Brief at 1-3. The Commission Investigative Staff argues that both a one-beam and a three-beam system use diffraction for tracking, and that the claims should be construed to cover a one-beam or three-beam system. *See* OUII Post-Hearing Patent Brief at 13; OUII Post-Hearing Reply Brief at 1-4.

Allegations such as those raised by Respondents, to the effect that a preferred embodiment disclosed in the specification is not within the scope of the claims, are rarely found to be correct. For example, in the *Vitronics* case, cited above for its guidance on the proper way to construe a claim, the Federal Circuit was confronted with a dispute concerning the term "solder reflow temperature," as it was used in a claim asserted against an accused infringer. The

court observed:

Indeed, if “solder reflow temperature” were defined to mean liquidus temperature, a preferred (and indeed only) embodiment in the specification would not fall within the scope of the patent claim. *Such an interpretation is rarely, if ever, correct and would require highly persuasive evidentiary support*, which is wholly absent in this case. *See Modine Mfg. Co. v. United States Int’l Trade Comm’n*, 75 F.3d 1545, 1550, 37 USPQ2d 1609, 1612 (Fed.Cir.1996); *see also Hoechst*, 78 F.3d at 1581, 38 USPQ2d at 1130 (“We share the district court’s view that it is unlikely that an inventor would define the invention in a way that excluded the preferred embodiment, or that persons of skill in this field would read the specification in such a way.”).

93 F.3d at 1383-84 (emphasis added).

Similarly, Respondents’ argument that the embodiments of the ‘209 and ‘493 patents are not covered by the asserted patent claims must be the subject of highly persuasive evidentiary support.

According to Respondents, the discrepancy between the claims and the specifications of the ‘209 and ‘493 patents came about in May of 1984, when, in response to an Office Action, Philips amended the claims of the application that would lead to the ‘209 patent, so as to require for the first time scanning a diffractive follow-on track with a single spot of radiation, the creation of an intensity distribution due to diffraction of the single spot, and the use of that intensity distribution to determine the position of the scanning spot relative to the track – without amending the specification to provide for the newly claimed invention. *See, e.g.*, Respondents’ Post-Hearing Patent Brief at 16. A record of the May 1984 Amendment, as well as the Examiner’s rejection of the new claims and the subsequent appeal to the Board of Appeals and Patent Interferences (“PTO Board” or “Board”) comprises a large portion of the ‘209

prosecution history,¹⁹ and a review of the relevant portions of the prosecution history is appropriate.

In December 1983, the Examiner rejected all claims of the pending application on several bases.²⁰ See CX-37 (209 Patent Prosecution History), Paper No. 3. In May 1984, Philips (on behalf of the Applicants) amended the claims of the pending application to virtually the same form in which they issued as the '209 patent, and made Remarks concerning the amendment and the Examiner's grounds for rejection. See CX-37 ('209 Patent Prosecution History), Paper No. 5.²¹

Following the amendment, in October 1984, the Examiner issued a final rejection of the claims on numerous grounds, including 35 U.S.C. § 112 and § 103. See CX-37 ('209 Patent Prosecution History), Paper No. 6. In February 1985, Philips filed minor amendments concerning dependency of the claims, and in its Remarks stated its objections to some of the Examiner's statements. Philips also filed an appeal (Appeal No. 663-48) with the PTO Board from the Examiner's October 1984 rejection. CX-37 (209 Patent Prosecution History), Paper

¹⁹ As explained, *supra*, the '493 patent issued as a continuation of the '209 patent's application, and the '493 and '209 patents have almost identical patent specifications.

²⁰No party has attempted to interpret the claims of the '571 application as they existed before they were amended, and the Administrative Law Judge does not find it useful to do so at this juncture. However, in view of Respondents' argument that the May 1984 amendment radically shifted the claims to cover only a one-beam system that is unsupported by the specification, it is worthwhile to examine the pre-amendment application to note that the claims never did explicitly recite the use of three beams or any specific number of beams. See CX-37/RX-92 ('209 Prosecution History), Paper 1.

²¹ The grounds for the Examiner's December 1983 rejection included 35 U.S.C. § 103 and a prior art patent to Olson (RX-68), which was raised in a prior application, Serial No. 902,713. As discussed below in connection with the question of patent validity, the Olson patent is raised again by Respondents in this investigation.

No. 8, Paper No. 9.

In its appeal brief, Philips argued that the circular follow-on track is “configured to diffract radiation incident thereon when scanned with a spot of radiation which is larger than the width of the follow-on track.” Philips described the claimed invention in terms of a single beam of radiation used with the follow-on track, and explained to the PTO Board that “[b]ecause the incident radiation is diffracted by the follow-on track, less of the radiation will be captured and projected by a lens on a photodetector when the spot is centered on the follow-on track than would be the case when the spot impinges on an adjacent area of the disc. As a result, the intensity distribution of the radiation coming from the disc will vary with the radial movement of the spot relative to the center of the follow-on track thereby enabling the radial position of the spot to be accurately determined.” CX-37 (‘209 Patent Prosecution History), Paper No. 12, Appeal Brief at 6.

In June 1985, the Examiner’s Answer addressed several issues, including a one-beam versus a three-beam system. The Examiner argued that U.S. Patent No. 3,956,582, cited in the pending application (and the ‘209 patent and ‘493 patent, as issued), uses a spot with a width greater than “non-follow on information areas,” and would not be enabling to one of ordinary skill in the art. Further, the Examiner argued that the major embodiment and the only depicted embodiment of the pending application uses a grating that “splits the beam into three beams (a, b, and c).” The Examiner explained his understanding of the specification’s three-beam system, and his understanding of the referenced ‘582 patent’s one-beam system. Commenting on the ‘582 patent’s system, the Examiner emphasized to the PTO Board that the beam used in the ‘582 patent is not a tracking beam, and: “It has only one beam.” CX-37 (‘209 Patent Prosecution

History), Paper No. 13, Examiner's Answer at 6-8 (emphasis in original). The Examiner argued that if the '582 patent system were used for tracking, a "major portion of figure 1 would be useless," and referred specifically to the three photodetectors used for the three-beam method. The Examiner argued that a one-beam system and a three-beam system were incompatible, and asked rhetorically: "Which system is intended to be used?" *Id.*

The final briefing to the PTO Board occurred in November 1985, when Philips filed its Reply Brief. Philips argued, among other things, that the specification of the pending application and its predecessors disclosed a continuous, optically detectable follow-on track for guiding a write beam during the recording of information, and that the application provides several examples, including a follow-on track in the form of a groove which is configured to diffract light in the manner described in the '582 patent. Philips argued that the follow-on track is described in the then-pending application, and that the '582 patent was not referenced for its supposed disclosure of a follow-on track. Rather, according to Philips, "[t]he '582 patent was cited for its teaching of how a follow-on track in the form of a groove is to be optically detected by taking advantage of the diffraction phenomenon."²² CX-37 ('209 Patent Prosecution History),

²² United States Patent No. 3,956,582, entitled "Apparatus for Reading a Record Carrier on Which Information Is Recorded in at Least One Track," issued on May 11, 1976 to Gijsbertus Bouwhuis of the Netherlands, and was assigned to U.S. Philips Corp. RX-1960 ('582 Patent). The '582 patent, as argued by the Examiner and admitted by the Applicants, does not claim or teach a tracking method or the use of radiation to monitor and correct the position of a beam on a track. The '582 patent concerns the use of light to read information stored on a "record carrier." The '582 patent does, however, contain pertinent teachings about the effects of diffraction on a beam of light when the beam is used to illuminate tracks or portions of tracks on a record carrier. For example, the '582 specification contains the following:

When illuminating an object V_2 with a beam the cross section of which is greater than the dimensions of the object, the radiation of the beam will be diffracted.

(continued...)

Paper No. 16, Reply Brief at 3-4. With respect to the Examiner's argument that the optical system of the '582 patent is fundamentally different or incompatible with the system in the pending application's Figure 1, Philips asked what relevance that should have to the appeal, and stated: "The mere fact that two optical systems are different or incompatible with each other does not make them unsuited for use with the claimed record carrier."²³ Philips explained how a

²² (...continued)

Besides a zero-order beam also two first order beams (+1), (-1) (B' in FIG. 1), two second order beams (+2), (-2) etc. will occur. The zero order beam per se does not carry information about the object, this information is distributed over the beams of higher order. If the pupil of the lens L_2 would be great enough, the beams of all diffraction orders will pass through the lens and by superposition of the beams in the image plane a faithful image of the object V_2 would be formed. If, however, the pupil of the lens is smaller the beams of some of the diffraction orders no longer will pass through the lens. In the image plane then not all diffraction orders are superposed, and a faithful image of the object V_2 is no longer formed.

The angles of diffraction are determined by the dimensions of the object; the smaller the object the greater are the angles of diffraction. If the object and the numerical aperture of the lens are small enough, only the zero-order beam will pass through the lens. In FIG. 1 the size of the light spot V_1 is greater than that of the object V_2 and the lenses L_1 and L_2 have the same numerical aperture. So each diffracted beam will fall outside the lens aperture and only the zero-order beam will reach a detector D, arranged in the image plane of the lens L_2 . The intensity of the zero-order beam is considerably smaller than the intensity of a beam with the cross section of V_1 that would not be diffracted by the object V_2 . So, by determining the intensity of the radiation onto the detector, it can be ascertained whether or not the spot V_1 is projected onto an object V_2 .

According to the invention an arrangement as shown in FIG. 1 may be used for reading a record carrier in transmission. For this purpose the record carrier is positioned so that the track to be read lies in the plane of the detail V_2 . The record carrier is moved so that the successive parts of the track sequentially appear at the location of V_2 .

RX-1960 ('582 Patent), col. 1, lines 1-41.

²³ This reference to the "claimed record carrier," highlights the fact that some of the '209 (continued...)

one-beam or “single beam system” could be used with the follow-on track, and also argued that “contrary to the Examiner’s contention, there is no reason why the three beam arrangement of the apparatus shown in Fig. 1 of the present application cannot be used to track the groove,” providing details of how a three-beam system would work. It was argued that “it is evident the apparatus shown in Fig. 1 of the present application can be readily used to track or follow a diffractive follow-on track such as that recited in the claims.” *Id.*, Appeal Brief at 6-8.

Consequently, during the prosecution of the ‘209 patent (which is related to the ‘493 patent) Philips stated that it sought claims broad enough to cover a record carrier body for use with a one-beam or a three-beam tracking system, and that the specification was adequate to support such claims. The Examiner argued that the specification could not support both methods. A controversy about whether the claims had within their scope a one-beam and/or a three-beam system, and whether the specification could support a one-beam system, was placed squarely before the Board. The arguments and the statements made on behalf of the Applicants and the Examiner are part of the prosecution history of the ‘209 patent, as is the PTO Board’s resolution of the conflict.

On May 20, 1988, the PTO Board issued its opinion in *Ex Parte Pieter Kramer and Jan Roos*, in which the Board stated that it had not sustained the rejection of any of the claims on any of the grounds enumerated by the Examiner, and that the decision of the Examiner was reversed.

²³ (...continued)

patent claims cover an apparatus for writing on a disc (including the means necessary to perform the tracking), while other claims cover a disc for use in the writing apparatus. Thus, the discussion of tracking systems in both the lengthy prosecution history (including the appeal to the PTO Board) and the specification is broad enough to cover both sets of claims. As noted, *supra*, the only claims asserted in this investigation claim a record carrier body or disc.

CX-37 ('209 Patent Prosecution History), Paper No. 17, PTO Board Decision. A Notice of Allowability issued in response to the Board's opinion. CX-37 ('209 Patent Prosecution History), Paper No. 18.

The PTO Board addressed the several objections that the Examiner had to the claims, including, in the words of the PTO Board, "the examiner's problem . . . with the diffractive follow-on track and the adequacy of its disclosure." CX-37 ('209 Patent Prosecution History), Paper No. 17, PTO Board Decision at 6.

The Board stated that in its view the Examiner had not met his initial burden of establishing a reasonable basis for questioning the adequacy of the specification's disclosure, and that "[i]t is clear to us that one of ordinary skill in the art would be enabled from the instant disclosure to make and use the claimed invention." *Id.* The Board noted that the specification provides an adequate description of a process in which "beams reflected from the record carrier body are reflected by mirrors to detectors," as well as a reference to the '582 patent, as an example of how the technique may be applied to a follow-on track that is a molded groove.²⁴ The Board stated that inasmuch as the Examiner failed to meet even his initial burden, the Board was not required to reach the question of whether the application was sufficient at the time of its filing. Yet, the Board in its opinion continued: "However, in view of the extensive arguments made by appellants and the examiner with regard to these two documents [i.e., the '582 patent and an affidavit concerning enablement], we feel constrained to make the following observations." *Id.*, Decision at 6-7.

²⁴ It is noteworthy with respect to the preceding discussion of the width of the follow-on track, that the PTO Board also appears to have understood the track to consist of the groove, with no mention of the track pitch or any similar parameters.

The PTO Board continued by acknowledging the Examiner's complaint that the '582 patent does not disclose diffraction using the grating (element 11) and the three detectors (elements 17, 18, and 19) as used in the specification's embodiment, and further that the '582 patent "has only one beam," does not disclose a follow-on track, and uses a single detector. *Id.* at 7 (quoting the Examiner's Answer)(emphasis in original). The Board surmised that in essence the Examiner's objection was based on the fact that the '582 patent did not support the whole of the claimed invention, and that such an objection could not provide a basis for rejection of the application. *Id.* at 7-8. Later in the opinion (in a discussion of prior art), the Board indicated that it understood the arguments made on behalf of the Applicants to the effect that the claims cover a three-beam and a one-beam method, and also understood the claims to cover both systems. The Board explained the invention in terms associated with a one-beam approach, and the use of intensity distribution for tracking, as follows:

The instant claimed invention uses a spot of radiation of predetermined size in combination with the claimed follow-on track so that the intensity distribution on the track will vary with the position of the spot and said position of the spot relative to the track will be determined by measuring the intensity of radiation reflected back from the track.

CX-37 ('209 Patent Prosecution History), Paper No 17, PTO Board Decision at 9-10.

It is clear from the prosecution history that when the claims were amended in 1984, the Examiner immediately raised the issue of claims that cover a one-beam method and a specification embodiment that uses a three-beam method. The Applicants (Philips) consistently and explicitly took the position that the claims covered record carrier bodies or discs for use with either a one-beam or a three-beam system. It is also clear that the Board found "[t]he mere fact

that two optical systems are different or incompatible with each other does not make them unsuited for use with the claimed record carrier,” and that totality of the disclosures in the specification and specification’s references to other patents, particularly the ‘582 patent, supported claims for record carriers or discs that could be used with either system.

In this investigation, Respondents revisit the question of whether the asserted claims cover a one-beam system – indeed whether they are restricted to a one-beam system – and whether the claims, so limited, are supported by the specification. Again, the evidence supports a finding that the claims cover discs for use in a one-beam system yet are not restricted to such a system, and further that the embodiment detailed in the specification is not outside the scope of the claims. The record lacks the type of highly persuasive evidence, required by the Federal Circuit’s holding in *Vitronics* and similar cases, needed to find that the three-beam embodiment of the specification is outside the scope of the claims.

The claims of the ‘209 and ‘493 pertain to an invention that may in certain circumstances use one beam of radiation for tracking purposes. Philips in this investigation, and on behalf of the Applicants during prosecution, has never denied that fact, and, as amply illustrated above, has consistently argued that a one-beam system is part of the overall claimed invention of the patents. Philips has not, however, taken the position that the claims pertain to the particular one-beam push-pull or baseball pattern system proposed by Respondents. Nor could the Administrative Law Judge construe the claims in the manner proposed by Respondents, if for no other reason than Respondents’ proposal is based on a faulty reading of the asserted claims that requires the follow-on track to encompass the track pitch. There is no evidence that such a supposed follow-on track is required for the push-pull or baseball pattern system, and no basis for

construing the claims in such a manner. Indeed, this proposal discounts the plain language of certain asserted claims that expressly limits the follow-on tack to a groove.²⁵

The pertinent question is whether the claims can be properly understood to cover a disc for use with three-beam tracking such as disclosed as the preferred embodiment in the specification. A fair reading of the claims demonstrates that they do pertain to a three-beam system.

Respondents' arguments limiting the asserted claims to a single beam system are based in large part on the fact that the independent claims refer to "a" spot or "the" spot of radiation. Respondents also argue that "the" radiation coming from the record carrier due to the "said" diffraction refers to the diffraction pattern formed due to diffraction of the single scanning spot, and that the "intensity distribution" is created by diffracted radiation of the scanning spot and is used to determine the position of the scanning spot relative to the track. The evidence shows that the claim language relied on by Respondents applies at least as well to the three-beam system described in the specification.

As a matter of semantics, it is uncontested by the parties, and confirmed by the Federal Circuit in more than one of its opinions, that use of an article such as "a" in a patent claim is generally understood to refer to one or more than one of the particular item in question, and will receive an exclusively singular interpretation in only those rare circumstances in which there is clear evidence that the article should be limited. *See Tate Access Floors, Inc., v. Interface*

²⁵ Respondents' proposal is also completely inconsistent with the specification's teaching about the follow-on track. Respondents in effect discard the specification. However, it further illustrates that Respondents' proposed claim construction is inconsistent with the plain language of the claims.

Architectural Resources, Inc., 279 F.3d 1357, 1370 (Fed. Cir. 2002); *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000). There are no indications of exclusivity in this instance, especially if one starts from the presumption mandated by law that the patent is valid and that the specification belongs with the claims. The asserted independent claims mention both a “write beam of radiation” and, in a subsequent clause, “a spot of radiation” (or “the spot”) used for tracking, indicating that although the write beam and a scanning spot of radiation may be considered the same beam, they may also be different.²⁶ The three-beam embodiment disclosed in the specification employs a diffractive track and measures the varying intensity distribution of the diffracted radiation for the purpose of tracking. Hesselink Tr. 526-528, 2535-44.

The intrinsic evidence shows that the claims are not limited to one-beam, phase-change diffraction.²⁷ CX-12/RX-58 (‘209 Patent), col. 3, lines 13-29; CX-13 (‘493 Patent), col. 3, lines 16-33. *See also* Hesselink Tr. 2539-2540. The ‘209 and ‘582 (RX-1960) patents clearly describe three or four ways in which one can use diffraction for tracking. *See* Hesselink Tr. 2542. Yet,

²⁶ Certain of the claims of the ‘209 patent read on an apparatus for writing information on a disc. Although they are not asserted in this investigation, they are the product of the same amendment and are supported by the same specification. These apparatus claims refer to a “write beam of radiation” and to “said write and further beams.” The “further beam” is “diffracted by said follow-on track so that due to said diffraction by said follow-on track, the intensity of the radiation projected onto said detector and said electrical signal varies in dependence on movement of said further spot relative to said follow-on track in a direction transverse thereto” *See* CX-12/RX-58 (‘209 Patent), Claim 7, col. 5, line 38 through col. 6, line 24. Thus, in the case of claims for an apparatus that actually performs the tracking and adjustment to the laser, and must have the means to do so, the Applicants provided more express language indicating that the claimed invention need not be restricted to a single beam system, and that diffraction and intensity of radiation are important aspects of the claimed invention when a write beam and a “further beam” are used.

²⁷ *See, supra*, at 17.

even if the claims were limited to one-beam, phase-change diffraction for tracking, the preferred tracking system embodiment described in the specifications uses a three-beam system for diffractive radial tracking along a groove. *See* Hesselink Tr. 525; CX-12/RX-58 ('209 Patent), Fig. 1; CX-13 ('493 Patent), Fig. 1.

In the embodiment disclosed in the specification, a write laser 5 “forms three secondary beams ... one zero-order beam, beam a, and two first order beams, beams b and c.” CX-12/RX-58 ('209 Patent), col. 3, lines 10-13; CX-13 ('493 Patent), col. 3, lines 13-15. “The beam a is then a write beam.” CX-12/RX-58 ('209 Patent), col. 3, line 19; CX-13 ('493 Patent), col. 3, line 22. “The two radiation spots produced by the first-order beams b and c are projected onto the edges of the follow-on track during writing. . . .” CX-12/RX-58 ('209 Patent), col. 3, lines 23-27; CX-13 ('493 Patent), col. 3, lines 26-30.

The follow-on track is configured in the preferred embodiment so that it will diffract radiation that is incident upon it. The width of the track, which in this case is a groove, is smaller than each spot of radiation. Light hitting the track will be reflected off it, not because the track is a flat mirror that reflects light in the ordinary sense – because the track is a groove, a structure that differs from the area around it, and provides a sharp edge. Thus, the groove will diffract light. Light incident upon the groove travels toward the detectors due to the diffraction that occurs when it is incident upon the groove. The diffraction provides signals used to position the laser beam on the track during the recording process. Hesselink Tr. 510-515.²⁸

²⁸ Philips' expert also provided the following testimony concerning the use of diffraction in the three-beam tracking system:

So in the next slide, the three-beam tracking system uses diffraction for the very
(continued...)

The specifications disclose that by comparing the signals supplied by the detectors for beams b and c, an indication can be obtained as to the positions of the radiation spots, and therefore also the write beam relative to the follow-on track. The signals supplied by the detectors can be electronically processed into a control signal by means of which said positions can be corrected. CX-12/RX-58 ('209 Patent), col. 3, lines 39-47; CX-13 ('493 Patent), col. 3, lines 43-51. Thus, in the three-spot system of the specification, the preferred embodiment uses intensity distribution by comparing the intensity distributed between the two detectors. *See* Hesselink Tr. 513. ("There is in this case more light on the right-hand side than there is on the

²⁸ (...continued)

simple reason that there is a central spot, which is the zero[] order on diffraction [.] coming back from the disc. As you recall, this is figure 1 of the '209 patent, and it describes that a structure of three beams are incident on the record carrier. The central beam is located at the center of the track. The two outrigger beams straddle the track with each one of them being located roughly at the edge of the track.

Because there is overlap of the first order diffracted beam, the yellow and the blue beam, there is diffraction. Because there is diffraction, there is redistribution of light, and because there is redistribution of light, you can actually make a measurement that takes the intensity of this beam, compares it with the intensity of that beam, using two different detectors, blue and yellow, and the difference between that produces a tracking error signal, or a push/pull signal. So therefore, this three-beam system uses diffraction.

Now, there is a dispute that Dr. Mansuripur says there is no diffraction here that is used for tracking, because we make a measurement of the total intensity of this beam with this detector, say for yellow and for blue. But that really is not significant. The issue is that the reason that the intensity of the yellow beam and the blue beam is different is because of diffraction.

If there was no diffraction, there would be no difference in the signal strengths of the green and the blue beam, and therefore, we could not use it for tracking. So the underlying physical mechanism in both the one-beam and three-beam system is based on diffraction.

Hesselink Tr. 2535-2536.

left-hand side, and the patent says that you need to essentially use that intensity distribution in some way as is described in the patent in order to then be able to use the signal that can be derived from that intensity distribution to maintain that spot on the center of the track. So if we go in the opposite direction, we just get the opposite light intensity pattern.”).

In the case of the ‘209 and ‘493 patents, the claim language, especially in view of the specifications and consistent with the prosecution history, has within its scope a record carrier body configured for use with a three-beam tracking system, such as that disclosed in the specification. The claims of the ‘209 and ‘493 patents are not limited to a one-beam tracking system.

Whether the Claims Read Only on a Disc Scanned in a Recorder

Respondents argue that the asserted claims require a recording device in which the record carrier is operated. *See* Respondents’ Post-Hearing Patent Brief at 12; Respondents’ Post-Hearing Patent Reply Brief at 11. They argue that inasmuch as the claims require that the track have a width smaller than a spot of radiation, and since the radiation is generated by a recording device, such a device is needed to determine infringement. It is argued that three parameters must be known: the wavelength of the light used to form the radiation spot, the numerical aperture of a lens through which the incident radiation passes, and the distribution of the radiation as it impinges on the lens. Further, Respondents, argue, it is impossible to determine whether the system maintains the scanning spot in proper alignment without operating a recording device.

Philips argues that Respondents’ own expert has admitted that the size of a spot of

radiation can be calculated without the use of a device.²⁹ *See* Philips' Post-Hearing Patent Reply Brief at 4 & n.4.

The Commission Investigative Staff argues that Respondents' proposed interpretation ignores the claim language, which indicates that a follow-on track needs only to be "configured" to diffract radiation when scanned with a spot of radiation. The Staff argues that the spot of radiation is not required, only a disc configured in such a way that when a radiation spot with certain characteristics scans a track, the intensity distribution of the returning light will vary with the movement of the spot. The Staff also notes that there are clear divisions in the '209 and '493 patents between those claims which are direct to discs and those directed to a machine that records information on a disc. OUII Post-Hearing Patent Brief at 17-18 & n.21.

Indeed, Respondents' argument is without foundation in the claim language, and in fact is contrary to limitations contained in the asserted claims. As indicated throughout this discussion, the asserted claims read on a "(disk-shaped) record carrier body" that is limited to have a follow-on track with a particular configuration. Other, non-asserted claims read on a recording apparatus or device.

A track is covered by the claims due to its configuration, without actually diffracting a beam of radiation. If one wants to test a track to determine if it is configured in an infringing manner, one can use a recorder or player, or one can take measurements in a laboratory without using a recorder or player. In either case, one can measure the track and the spot of radiation, and

²⁹ Philips also addresses the ultimate issue, which is whether Respondents, as disc manufacturers and distributors, infringe either directly or through contributory infringement. *See* Philips' Post-Hearing Patent Reply Brief at 4.

observe the effect of the track on the spot of radiation.³⁰ See Hesselink Tr. 528-529. *see also* Mansuripur Tr. 1106-1111 (in theory at least, measurements could be taken without a CD player).

The claims do not require that a disc be placed in an operating recording device in order for there to be infringement.

B. Infringement Determination

Philips argues that the accused products literally infringe the patent claims asserted in this investigation, including the asserted claims of the '209 and '493 patents. See, Philips' Post-Hearing Patent Brief at 15 & n.21; Philips' Post-Hearing Patent Reply Brief at 4-5. Literal infringement of a claim occurs when every limitation recited in the claim appears in the accused device, i.e., when "the properly construed claim reads on the accused device exactly." *Amhil Enters., Ltd. v. Wawa, Inc.*, 81 F.3d 1554, 1562 (Fed. Cir.1996); *Southwall Tech. v. Cardinal IG Co.*, 54 F.3d 1570, 1575 (Fed Cir. 1995). Philips has not argued that the accused products infringe the asserted claims of the '209 and '493 patents, or any of the patents at issue, under the doctrine of equivalents.

With respect to the '209 and '493 patents, Respondents argue that if the claims are interpreted to construe the track width as track pitch, the accused discs do not have a diffractive follow-on track with a width smaller than the dimension of a scanning spot. Respondents also

³⁰ Respondents argue that Philips' technical expert operated the accused discs in a CD player in order to determine whether the discs infringe the asserted claims of the '209 and '493 patents. Respondents' Post-Hearing Patent Brief at 12. As explained, *supra*, a determination of whether discs are configured in an infringing manner can be made by placing the discs in an operating device or by performing other laboratory measurements. Consequently, this argument is not persuasive.

argue that asserted claims cannot be directly infringed because the claims require the use of a recording device (which Respondents do not use), and further there can be no indirect infringement because an end user who purchases a licensed CD recording/reproduction device is licensed to use the device. It is argued that because the end user cannot commit an act of direct infringement, there can be no indirect infringement.³¹ Additionally, Respondents argue that if the claims are construed to read on only a single-spot push-pull method, there will also be instances in which an end user will have a device that uses a three-spot tracking method, thus providing substantial non-infringing uses.³² See Respondents' Post-Hearing Patent Brief at 13-14;

³¹ This argument concerning allegedly licensed end users is contained in Respondents' Post-Hearing Patent Brief at 13-14. The case cited by Respondents in support of this argument is *Joy Technologies, Inc. v. Flakt*, 6 F.3d 770, 774 (Fed. Cir. 1993). In that case, it was found that the seller of equipment that could be used to perform a patented desulfurization process could not be deemed a contributory infringer because direct infringement was first required, and it had been established that equipment would not be used in a manner so as to infringe the patent. While the *Joy Technologies* opinion supports a general argument that indirect infringement requires an act of direct infringement, Respondents' reliance upon this case does not make it clear upon what sort of license Respondents would rely with respect to recorders or players. Philips provides a rebuttal to Respondents' argument based on the assumption that Respondents rely on an implied license based on devices that have "no non-infringing use." See Philips' Post-Hearing Reply Brief at 4-5. Philips is correct that, if that is that sort of license upon which Respondents rely, Respondents have nonetheless failed to provide the evidence necessary to sustain such a defense to allegations of infringement. Even if Philips has misapprehended Respondents' license argument, the fact is that the record of this investigation contains very little about the manufacturers, terms of sale, intended use, actual use, technical specifications or any other information pertinent to the devices in which the accused CD-Rs and CD-RWs are used.

In any event, as detailed, *supra*, Respondents' accused products practice the asserted claims of the '209 and '493 patents as properly construed, and thus indirect infringement arguments are not material to the question of whether Respondents violate section 337.

Furthermore, the same general arguments concerning indirect or contributory infringement are relied upon by Philips and Respondents with respect to the '401, '856, '825 and '764 patents. The same considerations, and lack of materiality, also obtain with respect to those patents.

³² As explained, *supra* in the previous note, the record contains scant information about the devices in which the accused products are used. It is not clear which tracking system or systems
(continued...)

Respondents' Post-Hearing Patent Reply Brief at 12.

The Commission Investigative Staff argues that accused products infringe the asserted claims of the '209 and '493 patents. It is argued that the accused products are configured to use a spot of radiation that is wider than the track on the disk, and the asserted claims do not require the use of a recorder or player. OUII Post-Hearing Patent Brief at 16-18.

Respondents' arguments of non-infringement are based on proposed claim constructions that are rejected as inconsistent with the asserted claims. The follow-on track cannot be construed to encompass the track pitch. The claims cover the configuration of a disc, and in order for infringement to occur they do not require that the disc be used in a recorder or player. Finally, the claims are not restricted to a single-beam push-pull method. Rather, an infringing disc may be configured for use with a one-beam system or a three-beam system, as discussed in the patent specifications.³³

Furthermore, Philips' expert provided testimony, based on his tests, showing that the

³² (...continued)

are used or mostly used in modern recorders or players. In any event, the asserted claims when properly construed read on discs, and do not require the use of a player or recorder for infringement to occur.

³³ Respondents have never made clear precisely how a disc configured for exclusive use with a one-beam push-pull tracking system would differ from a disc for use with a three-beam system, if at all. It appears that in fact there would be no difference, inasmuch as the Orange Book allows for methods that use one and three beams. *See* RX-407C, Attachment B13 (Bates No. PH 015776); McLaughlin Tr. 1537-1538.

As part of their argument concerning indirect infringement (or the lack thereof), Respondents raise the possibility that an end user could have a device that uses either a one-beam tracking system or a three-beam tracking system, and they admit that an accused disc would work in either device. Philips argues that by admitting that their discs comply with the Orange Book, Respondents effectively admit to infringement of the properly construed claims. *See* Philips' Post-Hearing Patent Brief at 15.

accused discs contain each limitation of the asserted claims, when they are properly construed, including the limitation that the width of the follow-on track must be smaller than a spot of radiation. Philips also presented evidence that Princo and Gigastorage designed their discs so that the width of the groove is smaller than the laser spot expected to be used. *See* Hesselink Tr. 530-532;³⁴ Philips' Post-Hearing Patent Brief at 15 (citing CPFF 249-320).

³⁴ Dr. Hesselink summarized his testing, as follows:

Q And can you go through that analysis with Judge Harris, please?

A Yes. The first thing I did is I tracked a beam of light over the follow-on grooves of the disc, the empty unrecorded discs, and then I determined that the disc-shaped record carrier body has a continuous, generally circular, diffractive follow-on track. It extends about the center of the disc-shaped record carrier body, and guides the write beam during recording of the information, and this is some of the measurement that I have made.

Q Why did you note the pitch?

A Sorry?

Q Why is the pitch noted in this slide?

A This is the measured pitch for the CD-Rs and CD-RWs that I measured. It is 1.5, 1.6 microns, and this uses the definition, the standard definition of pitch.

Q And what did you conclude?

A Well, I concluded that -- maybe it would be better if I would go to all the elements and decide after that. The other element is when you look at the follow-on track, that it has a certain shape, in the cartoon form as indicated here. On the next slide I showed the measurements. These are measurements of the groove, a cross-section on the top here. The groove cross-section is indicated in black. There's a vertical height halfway up the groove that I used to measure the track width, and these measurements were carried out by advanced surface microscopy.

And as a result of these ASM measurements, I concluded that the width in the horizontal direction is 410 nanometers. The next slide does a comparison of the track

(continued...)

Consequently, Philips has carried its burden of demonstrating that the accused products directly infringe the asserted claims of the '209 and '493 patents.

C. Validity

A patent is presumed to be valid. 35 U.S.C. § 282; *DMI Inc. v. Deere & Co.*, 802 F.2d 421 (Fed. Cir. 1986). Although a complainant has the burden of proving a violation of Section 337, it can rely upon the presumption of validity, which a respondent must overcome by clear and convincing evidence. *Checkpoint Systems, Inc. v. United States Int'l Trade Comm'n*, 54 F.3d 756, 761 (Fed. Cir. 1995).

Respondents argue that the asserted claims of the '209 and '493 patents are invalid, under 35 U.S.C. ¶ 112, because their specifications fail to enable one of ordinary skill in the art to

³⁴ (...continued)

and spot widths. And so the track has a width of roughly 0.5 microns, in some cases a little bit smaller, in other cases similar to this. The spot on the -- not completely to the edges but at a reasonable distance away from it is around 1.3 microns, and if you took the full width half maximum, that is, around 740 nanometers, and so 740 nanometers or 1300 nanometers are larger than the groove width which is required for achieving diffraction.

The next slide, I then made measurements of the signal that would result if I place a beam of light on top of this track and I follow the track, and this is in order to determine the intensity distribution of the radiation coming from the record carrier body, and it varies with movement of the spot relative to the center of the follow-on track due to diffraction. So if you use either the one- or the three-beam tracking system, what you find is that when you're on track, you have a balanced signal. It is zero. If you go off track, you get one direction, the signal goes up. If you go in the opposite direction, the signal goes down, and this type of tracking error signal can be used to maintain the spot of light on the center of the track.

So on the basis of the interpretation of the claims and on the basis of the measurements that I made, I concluded that the disc from Princo and Gigastor[ag]e met all of the limitations from the claim.

Hesselink Tr. 530-532.

practice the inventions without undue experimentation, and do not reasonably convey to a person of ordinary skill that the inventors were in possession of the subject matter in the amended claims. They also argue that the asserted claims are invalid under 35 U.S.C. § 103 due to obviousness. *See* Respondents' Post-Hearing Patent Brief at 13-19.

Enablement

Section 112 of the Patent Act provides, in part, that “[t]he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as *to enable any person skilled in the art to which it pertains, or with which it is most clearly connected, to make and use the same*, and shall set forth the best mode contemplated by the inventor of carrying out his invention.” 35 U.S.C. § 112, ¶ 1 (emphasis added). “Whether a claim is enabled under 35 U.S.C. § 112, first paragraph is a question of law, although based upon underlying factual findings.” *Crown Operations Int’l, Ltd. v. Solutia Inc.*, 289 F.3d 1367, 1376 (Fed. Cir. 2002). The purpose of the “enablement” requirement is to assure that the inventor provides sufficient information about the claimed invention so that a person of ordinary skill in the art can make and use the invention without undue experimentation. *PPG Indus., Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1563-65 (Fed. Cir. 1996). A specification is to enable a person of ordinary skill at the time the application was filed. Later discoveries in the art are not relevant to a determination of enablement. *In re Wright*, 999 F.2d 1557, 1562-63 (Fed. Cir. 1993). The enablement requirement is met if the specification enables any mode of making or using the invention. *Engel Indus., Inc. v.*

Lockformer Co., 946 F.2d 1528, 1533 (Fed. Cir. 1991).³⁵

Respondents argue that the single-spot push-pull tracking method was not publicly known in 1973 when the application underlying the '209 and '493 patents was filed, and that the specifications of those patents would not have enabled one of ordinary skill in the art to practice that tracking method. *See* Respondents' Post-Hearing Patent Brief at 7, 16-18; Respondents' Post-Hearing Patent Reply Brief at 12-15.

Philips argues that the PTO Board has already found that the claims of the '209 patent (which patent, as detailed above, is related to the '493 patent) are enabled, especially in view of the specification's reference to the '582 patent (which, as detailed above, contains information relating to single-beam optics). In addition, it is argued, Philips' expert demonstrated that one-spot diffractive radial tracking does not require the particular system proposed by Respondents. Philips' Post-Hearing Patent Brief at 18-19.

The Commission Investigative Staff argues the enablement requirement is satisfied if a patent's claims enable at least one embodiment of the claimed invention. It is argued that inasmuch as the asserted claims are properly construed to cover the three-beam method, Respondents' lack of enablement defense should fail, regardless of whether or not a one-beam system is also enabled. OUII Post-Hearing Patent Brief at 39; OUII Post-Hearing Patent Brief at 2.

The asserted claims of the '209 and '493 patent are properly construed to have within

³⁵ *See also Spectra-Physics v. Coherent, Inc.* 827 F.2d 1524, 1533 (Fed. Cir. 1987) ("Thus, it is sufficient here with respect to enablement that the patents disclose at least one attachment means which would enable a person of ordinary skill in the art to make and use the claimed inventions. . . failure to also disclose [another alternative] is not fatal to enablement under § 112.").

their scope a record carrier body or disc for use with a three-beam tracking system such as that disclosed in detail in the patent specifications. It appears that no party has contested the fact that the specifications would have enabled such a three-beam method. Indeed, there is no evidence that the specifications would have failed to enable a three-beam method. The law requires that one mode or embodiment of a claimed invention be enabled by a patent specification. At least one mode, the three-beam tracking system, is enabled by the specifications. Consequently, it has not been established by clear and convincing evidence that the asserted claims of the '209 and '493 patent are invalid for failing to comply with the enablement requirement of 35 U.S.C. § 112.

Written Description

The first paragraph of section 112 requires that a patent specification contain a “written description of the invention.” The Federal Circuit explained in *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555 (Fed. Cir. 1991), that “[t]he purpose of the “written description” requirement is broader than to merely explain how to ‘make and use’; the applicant must also convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention. The invention is, for purposes of the ‘written description’ inquiry, whatever is now claimed.” 935 at 1563-64 (emphasis in original). The written description inquiry is factual. *Crown*, 289 F.3d at 1376. “If a person of ordinary skill in the art would have understood the inventor to have been in possession of the claimed invention at the time of filing, even if every nuance of the claims is not explicitly described in the specification, then the adequate written description requirement is met.” *In re Alton*, 76 F.3d 1168, 1175 (Fed. Cir. 1996). “Precisely how close the original description must come to comply with the written description requirement must be determined on a case-by-case basis.” *Eiselstein v. Frank*, 52

F.3d 1035, 1039 (Fed. Cir. 1995).

As observed by the Federal Circuit, “the ‘written description’ requirement most often comes into play where claims not presented in the application when filed are presented thereafter” *Vas-Cath*, 935 at 1560. Indeed, Respondents argue in this investigation that in May, 1984, Philips amended the claims to recite a record carrier having a diffractive follow-on track and a system that maintains a write beam in alignment with the follow-on track based on intensity distribution caused by diffraction of the write beam.

In particular, Respondents argue that Philips amended the claims to recite the push-pull tracking system, which was not publically known in 1973 when the application for the ‘209 and ‘493 patent was filed. Thus, Respondents argue, by amending the claims in 1984, Philips attempted to claim subject matter that could not have been contemplated or described by the application when filed. In fact, Respondents argue, the deposition testimony of Dr. Pieter Kramer (an inventor listed on the ‘209 and ‘493 patents) and Mr. Marino Carasso (an inventor listed on other Philips patents) confirmed that work on the push-pull method did not begin until after the application was filed. Respondents are also critical of Philips’ reference in its briefing to U.S. Patent No. 4,491,940 (CX-604), issued to Claude Tinnet, to help show that the inventors were in possession of a single-spot method. It is argued that the method described in the ‘940 Tinnet patent is not the push-pull or baseball pattern method, and there is no evidence that the method described in Tinnet would have been known to those of ordinary skill in the art or known to Philips when the application leading to the ‘209 and ‘493 patent was filed in 1973. *See* Respondents’ Post-Hearing Patent Brief at 14-15, 18-19; Respondents Post-Hearing Patent Reply Brief at 12-15.

Philips argues that during prosecution, the PTO Board, reversing the Examiner's rejection of the amended claims, found that the specification adequately conveyed to the artisan that the inventors had in their possession at the time of filing the subject matter covered by the amended claims. It is also argued that Respondents are incorrect in asserting that one-spot diffractive tracking was not known in 1973 when the application was filed. Philips argues that the '940 patent to Tinet describes, without claiming, such a system, and further that Philips learned of this one-spot method in 1972 or 1973 from two companies, Thomson and Zenith. *See Philips' Post-Hearing Patent Brief at 19.*

The Commission Investigative Staff argues that although it is a close question, Respondents have failed to carry their burden of proving by clear and convincing evidence that the inventors were not in possession of a one-spot tracking system at the time that the parent applications were filed for the '209 and '493 patents. In particular, the Staff argues that Philips' technical expert demonstrated that the '940 Tinet patent did show a one-spot tracking system that uses light intensity to track a beam, although it is not the baseball pattern system relied on by Respondents. Furthermore, the Staff argues that the deposition testimony indicates that Philips was aware of the Tinet system as early as 1972 or 1973. *See OUII Post-Hearing Patent Brief at 36-38; OUII Post-Hearing Patent Reply Brief at 2-4.*

Inasmuch as the asserted claims, as properly construed, have within their scope a disc configured for use with a one-beam or a three-beam tracking system, it is necessary that the written description requirement be fulfilled for both systems. This requirement is undisputed. Nor have any questions been raised or evidence presented questioning the '209 and '493 patents' description of a three-beam system. The dispute centers around a one-beam system.

Respondents' argument concerning a one-beam (or single-beam) system is to a large extent based on the particular push-pull or baseball pattern tracking system (with a track width equal to track pitch) to which, they argue, the asserted claims must be limited. As explained at several points in this opinion, that proposed claim construction cannot be adopted. For that and other reasons, Respondents have failed to carry the burden of demonstrating by clear and convincing evidence that the asserted claims fail to satisfy the written description requirement.

The evidence does show that the "baseball pattern" system was not, and is not, the only way to track with a single beam. *See, e.g.*, Hesselink Tr. 2541-2543. Instead, general principles relevant to the use of an intensity distribution that can be used to provide a tracking signal were known at the time that the inventors filed the 1973 application. Hesselink Tr. 2539-2544, 2537, 2612-2614. This is confirmed by the '940 Tinet patent (CX-604), which has an August 1972 priority date. CX-604 ('940 Tinet Patent). The relevance of the '940 Tinet patent is not that Tinet or someone else invented the one-beam tracking system within the scope of the '209 patent. It is to show that the field of optical data storage had progressed to the point where the '209 specification (including its reference to the '582 patent) would convey with reasonable clarity to those skilled in the art that the inventors were in possession of the claimed invention, as it relates to a one-beam tracking system.

A one-spot tracking system is discussed in the '940 Tinet patent, which claims a system for reproducing pulse time modulated waveforms stored along a diffractive track. CX-604 ('940 Tinet Patent). Figure 1 of the '940 Tinet patent shows a one-spot tracking system that operates so that when the beam is off-center, one of the two sensors (12 or 13 in the Figures) will receive less light and therefore a tracking signal can be generated by comparing the amount of light

received by each.³⁶ Hesselink Tr. 2542-2543; CX-604 ('940 Tinet Patent), col. 4, lines 50-56.

In addition, while deposition testimony of present or former Philips inventors indicates that the push-pull or baseball pattern of tracking was not known to Philips in 1973, the deposition testimony of Dr. Jacques Heemskerk, who was integrally involved in the early years of CD development, indicates that as early as 1972 or 1973, Philips was aware that Thomson (the company to which the '940 Tinet patent was assigned) and Zenith had developed other one-spot tracking systems. *See* Heemskerk Dep. (RX-1477C/JX-1C) Tr. 78-79; CX-604 ('940 Tinet Patent).

It has not been established by clear and convincing evidence that the '209 and '493 patent specifications would have failed to convey to one skilled in the relevant art that the inventors were in possession of the invention as claimed in the asserted amended claims, especially as the invention relates to a one-beam tracking system. Consequently, it is not found that the asserted claims of the '209 and '493 patents are invalid for failure to provide a written description as required by 35 U.S.C. 112.

Obviousness

Respondents argue that the '209 and '493 patents are invalid as obvious over the prior art. Pursuant to 35 U.S.C. § 103, a patent may be found invalid if "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole

³⁶ Respondents, based on the opinion of their technical expert witness, seem to argue that such a one-beam system would not actually work. *See* Mansuripur Decl. ¶¶ 15, 16; Mansuripur Tr. 1130-1132. However, Philips has presented evidence to the contrary: (1) Dr. Hesselink's computer simulation, and his explanation as to how a non-phase diffraction tracking system would operate (Hesselink Tr. 2539-2541; CX-619); (2) the '940 Tinet patent (CX-604; Hesselink Tr. 2542-2543); and (3) deposition testimony that Zenith and Thomson had developed a one-spot system during the 1972 time-frame (Heemskerk Dep. (RX- 1477C/JX-1C) Tr. 78-79).

would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.”³⁷ 35 U.S.C. § 103.

The Federal Circuit has summarized the law relating to obviousness, as follows:

Obviousness is a legal conclusion based on underlying facts of four general types, all of which must be considered by the trier of fact: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) any objective indicia of nonobviousness. See *Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966); *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1270, 20 USPQ2d 1746, 1750-51 (Fed.Cir.1991); *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566-68, 1 USPQ2d 1593, 1594 (Fed.Cir.1987).

“Determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.” *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546, 48 USPQ2d 1321, 1329 (Fed.Cir.1998). There must be a teaching or suggestion within the prior art, within the nature of the problem to be solved, or within the general knowledge of a person of ordinary skill in the field of the invention, to look to particular sources, to select particular elements, and to combine them as combined by the inventor. See *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 665, 57 USPQ2d 1161, 1167 (Fed.Cir.2000); *ATD Corp.*, 159 F.3d at 546, 48 USPQ2d at 1329; *Heidelberger Druckmaschinen AG v. Hantscho Commercial Prods., Inc.*, 21 F.3d 1068, 1072, 30 USPQ2d 1377, 1379 (Fed.Cir.1994) (“When the patented invention is made by combining known components to achieve a new system, the prior art must provide a suggestion or motivation to make such a combination.”).

Crown, 289 F.3d at 1375-76.

Respondents argue that it would have been obvious to one of ordinary skill in the art in

³⁷ As stated, *supra*, with respect to the ‘209 patent, the ‘493 patent and all asserted patents in this investigation, the relevant art is that of optical data storage, and a person of ordinary skill would have a bachelor’s degree in electrical engineering, physics, optics or a similar science, with two to five years of work experience with optical data storage. See *Hesselink Tr.* 590; *Mansuripur Tr.* 1099.

1973 to use the optical recording system disclosed by U.S. Patent No. 3,673,412 (RX-68), issued to Olson, with the disc-shaped record carrier taught by U.S. Patent No. 3,287,563 (RX-67), issued to Clunis.³⁸ See Respondents' Post-Hearing Patent Brief at 6, 19-21.

Philips argues that the '209 patent issued over Olson, which was considered by the PTO; that Olson does not use diffraction for tracking; that Olson does not use or teach any form of diffraction for radial tracking; that Olson's detection method could not use diffraction for radial tracking; that Respondents' arguments about Olson are incorrect and irreconcilable with their proposed construction of the '209 and '493 patents; and finally that Olson and Clunis cannot be combined. Philips' Post-Hearing Patent Brief at 19-24.

The Commission Investigative Staff argues that Olson does not use diffraction to keep a laser on track, and further that the spot of radiation in Olson is not smaller than the track width as the '209 and '493 patents require. OUII Post-Hearing Patent Brief at 28-31; OUII Post-Hearing Patent Reply Brief at 4-6.³⁹

Olson was considered by the PTO Examiner during prosecution of the '209 patent. The Examiner had initially rejected the original claims of the application for, among other things, section 103 obviousness based on Olson. At the time the Applicants amended their claims, they

³⁸ There is no dispute that the Olson and Clunis patents are prior art to the '209 and '493 patents.

³⁹ Most of the post-hearing briefs lacked a discussion of the "objective indicia," sometimes referred to as "secondary considerations" or "*John Deere* factors" in most of their briefs. Philips did, however, include a section concerning the "*John Deere* factors" in its main post-hearing patent brief. See Philips' Post-Hearing Patent Brief at 45-48. A section of the Findings in this Initial Determination addresses this topic. In general, Philips' disc technology relating to tracking and other inventions covered by the asserted patents (including "wobble") has enjoyed commercial success, and has been copied by others. See FF III C.

also argued that Olson lacked a “diffractive follow-on track of the type defined by the claims.” CX-37 (“209 Patent Prosecution History), Paper No. 5, Amendment and Remarks at 11).⁴⁰ The Examiner subsequently did not include Olson in his final rejection, and Olson had been dropped as a reference when the PTO Board considered the Applicants’ appeal. *See* CX-37 (“209 Patent Prosecution History), Paper No. 6, Paper No. 17. It is noteworthy, however, that in allowing the ‘209 patent to issue over other obviousness rejections made by the Examiner, the PTO Board recognized that the use of diffraction from a follow-on track by a spot wider than the track is a critical limitation of the claimed invention. The Board did not find such a track disclosed in the prior art before it on appeal. CX-37 (‘209 Patent Prosecution History), Paper No. 17, PTO Board Decision at 10).

Whether Olson discloses the use of a diffractive track was addressed during patent prosecution before the Examiner, and it remains central to the question now raised by Respondents of whether the asserted claims of the ‘209 and ‘493 patents are invalid as obvious.

Olson discloses a tracking system in which data is recorded in a data track (for example, patent Fig. 108) located between two separated portions of a photographically recorded servo

⁴⁰ Respondents’ technical expert testified at the hearing that Philips argued to the Examiner that Olson’s tracks “because they are produced photographically, they cannot be diffractive.” Mansuripur Tr. 1122. However, Philips did not represent to the PTO that it was impossible for photographically produced tracks to be diffractive, or that Olson’s tracks were not diffractive merely because they are photographically produced. Rather, Philips explained that Olson’s “servo tracks are produced photographically *and tracking is effected by comparing the amount of light transmitted by each of two servo tracks* which are illuminated by a single light spot in the manner shown in Fig. 5 of Olson and described in columns 4 and 5.” CX-37 (‘209 Patent Prosecution History), Amendment Remarks at 11 (emphasis added). This view was essentially confirmed at the hearing by Philips’ expert. *See* Hesselink Tr. 2544-2545, 2549-50. There is no evidence that the Applicants or their attorney misrepresented Olson or prejudiced the Examiner’s consideration of Olson by stating that photographically produced tracks cannot be diffractive.

track (depicted in the specification as **36**, divided into **36A** and **36B**), each portion of which generates a signal of a different fixed frequency or “pilot tone” when light is transmitted through it and the tracks are spinning. In the example disclosed in Olson, 14 kHz and 16 kHz are used. CX-68 (Olson Patent), col. 4, lines 54-64, col. 5, lines 9-11, col. 8, lines 45-47; Hesselink Tr. 2546-2547. When the beam is centered on the track the frequencies of the two servo tracks have equal amplitudes. CX-68 (Olson Patent), col. 5 lines 29-34; Hesselink Tr. 2547. However, if the beam moves off to one side, the amplitudes of the frequencies become different, and the tracking system adjusts the beam until the amplitudes are equal again. CX-68 (Olson Patent), col. 5 lines 34-40; Hesselink Tr. 2547.

Several characteristics of the Olson servo tracks demonstrate that the system does not use diffraction for tracking. The difference in shading on a servo track (sometimes referred to as the “grating”) varies in the vertical direction (vertical in reference to Figure 5).⁴¹ Hesselink Tr. 2638; SX-10. Thus, assuming for the sake of argument that diffraction occurs, it must occur in the vertical direction, because any differences in amplitude or phase of the light caused by the reaction to the differences in shading of the photographic materials occur in the vertical direction (perpendicular to the grating). Hesselink Tr. 2550. The system, however, requires tracking in the horizontal direction and inasmuch as the material is uniform in the horizontal direction, any lateral movement of the beam will not result in a difference in light intensity such that diffraction could be used for tracking. *Id.* Further evidence that Olson does not use diffraction is that the tracking system in Olsen does not work unless the carrier moves in relation to the beam. *See*

⁴¹ As Respondents’ technical expert testified, the Olson servo tracks are uniform in the horizontal direction. Mansuripur Tr. 1365.

Mansuripur Tr. 1366. Yet, the occurrence of diffraction does not depend upon movement of the carrier in relation to the beam. Hesselink Tr. 2552; Mansuripur Tr. 1365.

Respondents argue that diffraction is disclosed in Olson because the servo tracks will overlap with the data track, so the scanning spot will diffract from the interaction with the pilot tones on the data track, and the scanning spot will be wider than the width of the data track. *See* Respondents' Post Hearing Patent Brief at 19-20.

The Olson specification does state that in the Figures, the "servo and data tracks . . . are shown to have distinct boundaries only for convenience of illustration and that the recorded signals which actually define these tracks will overlap." RX-68 (Olson Patent), col. 9, lines 23-27. However, the type of overlap that Respondent rely on was described at the hearing to mean that the three tracks are "subsumed" into one track, thus making their width smaller than the size of the spot.⁴² *See* Mansuripur Tr. 1119-1120, 1363-1364. While such an argument might be

⁴² Respondents' technical expert testified, as follow:

Q I guess my question is, is it possible that, for instance, 36A is completely subsumed in 108, or does it necessarily have to be that at least a portion of 36A is outside of the data track?

A What has to happen is that, for example, 36A can cover the left half of the data track 108, and 36B can cover the right half of the data track. And in that case, if the beam is centered on track, then the two signals coming from 36A and 36B now move inside, will be equal, and if the beam moves to the side, one will become stronger than the other.

Q Okay. So they could be completely subsumed?

A I believe they could be completely subsumed, yes.

JUDGE HARRIS: So it's really one track we're talking about, and the three tracks shown in figure 5 is just for illustration?

(continued...)

necessary to provide any basis for believing that Olson discloses a diffracting track, it is not convincing, and moreover appears to be impossible as a practical matter.⁴³ See Hesselink Tr. 2549. Even if Olson did teach merging the servo tracks with the data track to create a single diffractive follow-on track, which it does not, the overlapping of the servo tracks and the data track would result in an inoperable system. Hesselink Tr. 2553-2554 (“So the tracking system would be completely confused by the data that was stored on here because they completely overlap, and the net result is a very strong reaction. This cannot work. There’s absolutely no way that this system can work.”).

Inasmuch as Olson does not disclose the required diffractive track, the combination of Olson and Clunis proposed by Respondents cannot supply all the elements of the claimed invention. Nevertheless, assuming *arguendo* that a diffractive track were disclosed, and Clunis were relied upon because it is a disc-shaped carrier, the evidence does not show that Respondents would have carried their burden of showing the asserted claims to be obvious.

The Clunis patent, which issued in 1966, “relates to a transducing medium. More specifically, the invention relates to the recording and reproduction of information on a thermoplastic medium.” “The invention . . . incorporates means to control the tracking of light energy during reproduction.” CX-67 (Clunis Patent), col. 1, lines 9-11. col. 2, lines 6-7. Clunis

⁴² (...continued)

THE WITNESS: That’s correct, your Honor.

Mansuripur Tr. 1363-1364.

⁴³ It is also difficult to square this interpretation of Olson with Respondents’ proposed interpretation of the asserted claims of the ‘209 and ‘493 patents in which the claims are limited to a baseball pattern method in which track width is equal to track pitch.

discloses the rotation of a disc, and a type of groove, although it does not appear to have a pre-existing groove for guiding the beam during recording. *See* RX-67 (Clunis Patent), col. 2, lines 6-30, col. 4, line 56 through col. 5, line 19, col. 5, lines 28-44. Moreover, Respondents have identified no motivation to combine Clunis and Olson, other than the fact that it was well known to use round discs if one wanted the medium to move, as for example, in the case of phonograph records. *See* Respondents' Post-Hearing Patent Brief at 21-22; Mansuripur Tr. 1120-1121. In this case, more evidence would be needed in order to demonstrate that one would have been motivated to combine Olson and Clunis to have obtained the invention of the asserted claims.

In summary, Respondents have not established by clear and convincing evidence that the asserted claims of the '209 and '493 patents are invalid as obvious in view of the prior art.

IV. THE '401 PATENT

A. Claim Construction

The '209 and '493 patents discussed above in this Initial Determination, address the problem of determining whether radiation in the form of a spot or beam, such as a laser beam, is positioned correctly on a disc with respect to its radial position on a track, such as a groove. For example, one should be able to tell whether, due to imperfections in the spinning of a disc, a laser beam is skewed toward the center of the disc or toward the outer edge of the disc rather than in the center of the track where the information is to be recorded or read.

More information is, however, needed to read or write on a disc. For example, when writing on a recordable disc, it is important to synchronize the writing of the information with the rotation of the disc and the position of the laser beam along the length of the track. *See*

Hesselink Tr. 541-542. The four remaining patents at issue in this investigation, the '401, '856, '825 and '764 patents, address such concerns, and the discussions of each of these patents in the parties' briefs often overlap.

United States Patent No. 4,972,401, entitled "Optically Readable Record Carrier with Track Undulations for Producing a Synchronizing Clock Signal and Apparatus for Forming Such a Track" issued on November 20, 1990, to Marino G. Carasso and Johannes J. Verboom of the Netherlands.⁴⁴ CX-14/RX-60 ('401 Patent). The '401 patent is the first of the four remaining patents to issue, and is the patent with the earliest priority date. It discloses and claims "a radial 'wobble' in the groove-shaped track" or "periodic undulations" in the groove of a blank disc, with such modulation constituting a clock signal for synchronizing the recording and/or reproduction of information on the disc by controlling the velocity at which the disc is rotated. *See, e.g.*, CX-14/RX-60 ('401 Patent), col. 2, lines 29-37.

⁴⁴ The '401 patent issued upon Application No. 224,085, filed on January 17, 1989, based on a foreign application priority date of January 1, 1980 (Netherlands 8000121). The United States '085 application is a division of Serial No. 110,063, filed on October 8, 1987, which is a continuation of Serial No. 134,392, filed on March 26, 1980, and later abandoned. The '401 patent was assigned to U.S. Philips Corporation, the complainant in this investigation. CX-14/RX-60 ('401 Patent).

The Abstract of the '401 patent refers to:

A optically readable record carrier for storing digitally coded information having a power spectrum with a substantially zero level at a predetermined frequency. The information is recorded on and/or reproduced from substantially parallel elongated tracks on the record carrier which have a periodic undulation at the aforesaid predetermined frequency. Such undulation generates a clock signal for synchronizing the recording and/or reproduction of the digitally encoded information on the tracks, and does not interfere with the recording or reproduction of such information. Apparatus is disclosed for forming such tracks on the record carrier.

Id.

When scanned with the write laser, the track wobble generates a signal having a frequency corresponding to the shape of the wobble. This signal serves as a “clock” by which an apparatus can synchronize the recording or reading of information on the disc. Inasmuch as the wobble is part of the entire pre-groove before user data is encoded on the disc, the wobble is present and provides a clock signal everywhere on the track. Furthermore, independent claim 1 of the ‘401 patent provides that the frequency of the wobble clock should not interfere with the frequency of the digitally-encoded user information. Hesselink Tr. 544-545, 547; CX-14/RX-60 (‘401 Patent), col. 2, lines 47-57, col. 7, lines 41-46, Fig. 4.

The ‘856, ‘825 and ‘764 patents disclose and claim further modulation of the wobble, using frequency modulation,⁴⁵ to encode additional information in the pre-groove that does not interfere with the wobble clock. The ‘856 patent describes, among other things, an optical recording system that uses frequency modulation of the track undulations to encode position information signals, *i.e.*, signals that let the system know where along the track the laser is positioned. *See* CX-15/RX-61 (‘856 Patent), col. 2, lines 34-38. The ‘825 patent is a refinement of the ‘856 patent, and it provides a better means for synchronizing signals during the recording process. The inventions of the ‘856 and ‘825 patents are intended to be particularly useful when EFM-encoded information is recorded on the disc.⁴⁶ In those cases, it is important to have a continuous data stream without the interruptions caused by the use of bit structures at certain,

⁴⁵ Frequency modulation is the result of changing the frequency of one signal (often called the “carrier” signal) in an amount proportional to the instantaneous value of another (often called the “modulating” signal). *See* Hesselink Tr. 572-573, 579-580.

⁴⁶ “EFM” stands for “Eight-to-Fourteen Modulation.” EFM is a common format used to record digital user data. Hesselink (Tutorial) Tr. 37-38, 63; Hesselink Tr. 615-617.

intermittent locations on the disc to serve as headers, as in previous technologies. *See* Hesselink Tr. 541-542, 578, 587-588; CX-15/RX-61 ('856 Patent), col. 2, lines 14-33; CX-17 ('825 patent), col. 2, lines 6-21. Finally, the '764 patent involves the encoding of information into the track undulation other than position code information, such as the proper laser power to use when writing on a particular disc (unasserted claim 21) and the location of the table of contents on the disc (asserted claim 26). *See* Hesselink Tr. 644-645; CX-16/RX-57 ('764 Patent).

With respect to the '401 patent, Philips asserts independent claim 1 and dependent claims 2 and 3, which are, as follows:

1. A record carrier for storing digitally coded information having a fixed bit frequency and a power spectrum with a substantially zero level at a predetermined frequency, which information is recorded on and/or reproduced from the record carrier by scanning with a beam of radiation, said record carrier comprising:

a substrate provided with substantially parallel elongated tracks each having a periodic undulation in a direction transverse thereto at said predetermined frequency, so that during scanning of any portion of a track by said scanning beam to record and/or reproduce information thereon a beam of radiation is produced therefrom which is periodically modulated at said predetermined frequency, such modulation constituting a clock signal for synchronizing the recording and/or reproduction of said information on said track portion; and

a radiation-sensitive layer provided on said tracks, said layer being adapted to be modified by said scanning beam so as to record said digitally coded information on said tracks.

2. A record carrier according to claim 1, wherein said record carrier is disc-shaped and said tracks are substantially concentric about a center of rotation of said disc, the periodic undulation of said tracks being in the radial direction with respect to such center of rotation.

3. A record carrier according to claim 1, wherein said record carrier is disc-shaped and said tracks are successive turns of a continuous spiral about a center of rotation of said disc, the periodic undulation of said tracks being in the radial direction with respect to such center of rotation.

CX-14/RX-60 ('401 Patent), col. 17, line 8 through col. 18, line 3.

There are two disputes surrounding the construction of these asserted claims. First, there is a question as to the proper interpretation of the claim term "periodic." Second, a question is raised as to whether the asserted claims apply only to a "record carrier" (or disc) when it is operating in a recording device. Respondents propose an interpretation for the term "periodic," and further argue that the claims cover only a disc operating in a recording device. Respondents' proposed interpretations are opposed by Philips and by the Commission Investigative Staff.

The Claim Term "Periodic"

The term "periodic" is contained in independent claim 1 of the '401 patent, and also in one or more asserted claims of each of the '856, '825 and '764 patents.⁴⁷ The parties rely on claim language and specification text that is unique to the four individual patents, and also on similarities in the claims and specifications.⁴⁸ Indeed, the parties' post-hearing main and reply

⁴⁷ The text of the asserted claims of the '856, '825 and '864 patents is quoted in subsequent sections of this Initial Determination, which address issues particular to those patents.

⁴⁸ The parties also acknowledge cross-references among some of the patents at issue. The '825 patent specification states in its "Background of the Invention," that "[t]his type of record carrier including associated apparatus are known from German patent document Offenlegungsschrift No. 3100421." CX-17 ('825 Patent), col. 1, lines 51-53. Similarly, in its "Description of the Related Art," the specification of the '856 patent states: "Such a record carrier and apparatus are described in German Offenlegungsschrift No. 3100421, which corresponds to pending U.S. application Ser. No. 110,063, assigned to the present assignee." CX-15/RX-61 ('856 Patent), col. 1, lines 57-61. The '401 patent application is a division of

(continued...)

briefs often address the term “periodic” collectively for the four patents. Although Respondents’ proposed interpretation of the term “periodic” differs from that proposed by Philips and the Commission Investigative Staff, all the parties agree that the term should be construed consistently for the ‘401, ‘856, ‘825 and ‘764 patents. *See* Philips’ Post-Hearing Patent Brief at 4-8; Respondents’ Post-Hearing Patent Brief at 22-23, 31-32, 37, 44; Respondents’ Post-Hearing Patent Reply Brief at 5-8; OUII Post-Hearing Patent Brief at 13-15 (‘401, ‘856 and ‘835 patents), 23 (‘764 patent).⁴⁹ The Administrative Law Judge finds that such a consistent interpretation of the claim term “periodic” is supported by the claims, specifications and prosecution histories of those patents. It is therefore logical and efficient that in this Initial Determination, the discussion of the claim term “periodic” involves all four patents.

Respondents argue that the term “periodic” is properly construed for the ‘401, ‘856, ‘825 and ‘764 patents to mean “repeating itself identically at regular intervals, subject to acceptable tolerances from perfect periodicity due to noise or manufacturing imperfections.” *See, e.g.,* Respondents’ Post-Hearing Patent Brief at 44. Respondents argue that their proposal is supported by a technical dictionary definition of the term, and would be understood as the correct interpretation by one of ordinary skill in the art. Drawing on information contained in the patent specifications (especially the ‘856 patent specification), Respondents argue that the acceptable tolerance from perfect periodicity is 100 Hz, or +/- 50 Hz.

⁴⁸ (...continued)
application Serial No. 110,063. *See* CX-14/RX-60 (‘401 Patent).

⁴⁹ OUII argues that only one of the asserted claims of the ‘764 patent, a dependent claim, contains the term “periodic,” and thus the ultimate question of infringement of the remaining asserted ‘764 patent claims should not depend on the interpretation of the term “periodic.” OUII Post-Hearing Brief at 23.

Philips argues that Respondents' proposed interpretation of the term "periodic" must be rejected because it conflicts with the understanding of those skilled in the art, as well as with the purposes and teachings of the patent specifications, which depend upon and disclose frequency modulation outside the tolerances allowed by Respondents.

The Commission Investigative Staff argues that the term "periodic," as used in the asserted claims, should be understood to mean "regularly, though not necessarily identically repeating." *See* OUII Post-Hearing Brief at 14, 23. In particular, it is argued that the 100 Hz bandwidth relied upon by Respondents does not refer to the wobble signal, and further that a frequency modulation with a bandwidth of +/- 1kHz to +/- 1.5 kHz, as described in the '856, '825 and '764 patents should be understood to be within the claims. The Staff argues that to construe the claims in the manner proposed by Respondents would have the claims read on systems that would not work, and would render the claims nonsensical.

The question of whether Respondents' proposed claim construction would in fact render some or all of the asserted claims nonsensical is an important point to consider. *See, e.g., Modine Mfg.*, 75 F.3d 1545, 1557 ("When claims are amenable to more than one construction, they should when reasonably possible be interpreted so as to preserve their validity.").

Although Respondents argue that the '401, '865, '825 and '764 patents are invalid due to obviousness, anticipation, and failure to disclose the best mode, Respondents do not highlight in their briefs whether, under their proposed interpretation of the term "periodic," some or all of the asserted claims are nonsense. This question was, however, raised directly with Respondents' technical expert at the time he testified as to his understanding of the claims. Respondents' expert found that there was no way to reconcile his interpretation with the claims of the '856

patent and the '825 patent. The pertinent hearing testimony, elicited by Respondents' counsel on direct examination, is as follows:

Q Let's take a look at the claims of the '856 patent. Have you formed an opinion as to the proper interpretation of the claims of the '856 patent, Dr. Mansuripur?

A Yes, I have.

Q You've reproduced here claim 1 along with some text from the specification, looking at RX-2232.1, and you've highlighted the term "periodic." Can you explain your interpretation of that term?

A Yes. Well, as I have said before, periodic is a technical term and it has a proper interpretation, and I used the same interpretation in this case. And in fact, there is support for that interpretation in the first half of the claim, as I will explain.

So the claim language says "each of said tracks has a periodic modulation of its position in a direction transverse thereto." So this is a wobble or width modulation of the tracks, and it says it is periodic. "And which, without occupying any portion of the track," meaning that it leaves room for data to be stored in the same track that is wobbled. So that is what it means "without occupying any portion of the track." It generates a periodic clock signal. So this wobble is going to now generate a periodic clock signal. Sure, the clock signal is periodic, and as I have said and as the specification says, the reference frequency is approximately 22 kilohertz, and it says the signal bandwidth which should be about 100 hertz. So this tells me that periodic means 22 kilohertz, plus minus 50 hertz. That's the range of acceptability for the periodic clock signal. "Periodic clock signal in the radiation there from having a substantially constant frequency," which is consistent with this. It says 22 kilohertz, but it can vary within plus/minus 100 hertz.

So that's constant. It's periodic and substantially constant. I understand that. "Corresponding to the velocity of the scanning of said tracks, the frequency of said clock." This is the said clock. "Clock signal only," and this is an important word, only" – "varying in accordance with variations in said scanning velocity." So it says if the scanning velocity of the disc, if the rotation rate of the disc is constant, then the frequency of this clock should be constant because

it only varies when the velocity varies. So I understand it to be periodic as it should be. That's the proper definition of the term "periodic."

So the frequency of said clock signal, which was said to be periodic, "only varying in accordance with variations in said scanning velocity." So far, it's so good, it's consistent. But then it goes on and says "and in that the frequency of said clock," that's this clock which is supposed to be constant if the velocity is constant, "is modulated in accordance with a digital position signal."

Now, if this frequency is supposed to be constant, how could it be modulated with the 1 kil -- plus one kilohertz and the minus one kilohertz signal. It's only supposed to be plus minus 50 hertz, as it said. So the frequency of said clock signal is modulated in accordance with the digital position signal which identifies the position of said tracks. *So here is the dilemma. There is a contradiction here. On the one hand it says it should be periodic and only varying if the velocity changes, on the other hand, it says it should be modulated, so it should vary in frequency by a large amount.*

Q *Now, is there any way to make sense of the claim as it's written, Dr. Mansuripur?*

A *Well, if I were to cross out the word "periodic" from here or make it nonperiodic" and if I were to cross out -- instead of "said clock signal," say something else, like the wobble signal, then it would become consistent. Then it would make sense.*

Q You don't believe you have the authority to change the claim after it was issued; is that correct?

A That's my understanding of the law. You are not supposed to change the claim language.

Q You just interpret it as it is written; correct?

A That's correct.

JUDGE HARRIS: Is it your view -- is it your opinion that the person who wrote this claim did not understand the technology?

THE WITNESS: I really can't judge whether the person knew the technology or not, but I think it's a lack of understanding of how this frequency modulation is supposed to work. It seems like they think the frequency modulation somehow gets into the signal without changing the clock signal outside its allowed range.

Mansuripur Tr. 1179-1182 (emphasis added).

Shortly thereafter, with respect to the '825 patent, Respondents' technical expert again testified that the claims did not make sense, as follows:

Q Does the '825 patent specification make sense of this claim, Dr. Mansuripur?

A I think it's the same thing in the specification. Where the word "periodic" is used in conjunction with the modulation of the track, it is inconsistent with the fact of the modulation. So if you cross out the word "periodic" from the specific places in the spec, then it becomes consistent.

Q So the interpretation of "periodic" that you ascribe to the '825 and '856 patent is consistent with the interpretation that you described in the '401 patent; correct?

A The interpretation of the word "periodic" here is consistent across the board.

Mansuripur Tr. 1196-1197.⁵⁰

⁵⁰ Respondents' technical expert also testified on redirect that frequency modulation within the supposed 100 Hz bandwidth associated with the term "period" would not work, as follows:

Q Ms. Pfeiffer also asked you yesterday if a frequency-modulated waveform could be periodic if the variations from periodicity were within an acceptable range. Do you recall that?

A I think we were talking about an acceptable range of 100 hertz, plus/minus 50 hertz for a 22.05 kilohertz clock, and if I recall correctly, the question was can you FM modulate a waveform in that bandwidth, within plus/minus 50 hertz of the 22.05 kilohertz waveform.

(continued...)

Respondents' expert admitted at the hearing that given his understanding of the term "periodic," as used in the '401 and subsequent patents at issue, he could not make sense of at least some of the asserted patent claims. Yet, neither the asserted patent claims nor their specifications require or allow a construction that renders the claims nonsensical.⁵¹

As indicated above, the '401 patent discloses and claims "wobbling" of the groove, or "pre-groove" on the blank disc, and the specification and claims describe the groove as having physical "periodic undulations" molded into the blank disc. The '401 patent also describes the signal generated by the wobble when the disc is scanned by the laser for recording or writing as being "periodically modulated," and that "such modulation constituting a clock signal for

⁵⁰ (...continued)

Q Would it make sense for anyone to modulate a frequency-modulated signal with such a narrow bandwidth?

A Not if you want to use that signal. If you want to use the signal, for example, the address signal into that clock, then you have to modulate it outside the bandwidth of plus/minus 50 hertz. If you do modulate it into the bandwidth of plus/minus 50 hertz, what happens is that it will become mixed up with the noise and vibrations and other variations. So it's like deliberately adding noise to the system. That would not be helpful, and you cannot extract the information that you intended to extract in the first place.

Q So would a CD player system be able to use information that was frequency-modulated into a signal with a bandwidth of plus or minus 100 hertz?

A No, it would not be.

Mansuripur Tr. 1379-1380.

⁵¹The term "periodic" may have the meaning relied upon by Respondents, or it may have any of several meanings, including "occurring or recurring at regular intervals" or "being a function any value of which recurs at regular intervals." See Merriam-Webster Online, www.m-w.com (accessed September 9, 2003). There is no evidence that one of ordinary skill in the relevant art would be bound by any particular dictionary definition, especially in view of the claims and the teachings of the specifications at issue.

synchronizing the recording and/or reproduction” of information on the disc by controlling the velocity at which the disc is rotated. CX-14/RX-60 (‘401 Patent), col. 17, lines 20-24.

While the ‘401 patent provides that the clock signal aids in synchronization of data that are recorded on, or reproduced from a disc, there is no indication in the patent that in the relevant art such a clock signal is useful only if the undulations have the type of mathematical or identical periodicity proposed by Respondents.⁵²

It is also clear from the ‘401 patent’s prosecution history that “periodic undulation” as claimed in the patent need not identically repeat. For example, the Examiner cited “Bouwhuis et al. and Watson . . . to show other apparatus which teach utilizing optical information tracks with periodic undulations.” *See* CX-38/RX-95 (‘401 Patent Prosecution History), Paper No. 5, Rejection at 4 (citing U.S. Patent No. 4,223,347 to Gijsbertus Bouwhuis and Pieter Kramer, and U.S. Patent No. 3,931,460 to William Watson). However, the periodic undulations disclosed in the ‘347 patent to Bouwhuis et al. and the ‘460 patent to Watson are not identical. Those periodic undulations disclosed in the prior art vary, and are indeed intended to vary at different locations on the disc. *See* Hesselink Tr. 555-557 (explaining that in the cited ‘460 and ‘347 patents, as the radius across the surface of the disc increases, so do the wavelengths of the “periodic undulations”).

The ‘856, ‘825 and ‘764 patents disclose and claim frequency modulation to encode information in the shape of the pre-groove that is additional to (but not interfering with) the wobble clock. These patents describe frequency modulation of the wobble signal in conformity

⁵² Nor is there any discussion in the ‘401 patent of the supposed 100 Hz (+/- 50 Hz) tolerance that Respondents identify in other patent specifications.

with a digital signal representing either track position or “auxiliary” information, such that one frequency represents the logical value “1” and another frequency represents the logical value “0.” See Hesselink Tr. 2567. The result of frequency modulation in this case is that the wobble signal acquires two instantaneous values -- 21.05 kHz and 23.05 kHz -- with the mean frequency remaining that of the non-FM modulated wobble clock. See, e.g., Hesselink Tr. 2568-2570; Mansuripur Tr. 1277-1279.

Claim 1 of the ‘856 patent specifically states that the periodic clock signal has a “substantially constant” frequency, rather than a constant frequency. CX-15/RX-61 (‘856 Patent), col. 7, lines 1-2; Hesselink Tr. 578-579. The claim language plainly requires that the frequency of the clock signal must be modulated in accordance with a digital position signal that identifies the relative positions of the tracks on the record carrier. Thus, the claim is clear that the clock signal is frequency modulated to identify the relative locations on the track. Hesselink Tr. 571-572; CX-15, col. 7, lines 5-8; CX-593C, ‘856 Illustration Slides 5-7).

The prosecution history also addresses the term “substantially” as used in relation to the term “constant.” The prosecution history demonstrates that in this instance, the term “substantially” is used to indicate that the claim does not require an identically constant signal. Rather, as recited in the claim, it requires the frequency of the clock signal to be modulated. For example, Remarks made on behalf of Applicants include the following:

In the claimed record carrier and associated apparatus the clock signal has a frequency corresponding to the track scanning velocity, which is substantially constant. Consequently, the clock frequency is also substantially constant and only changes in accordance with variation in scanning velocity. However, such frequency is modulated by a digital position signal identifying track position. The clock signal is therefore the mean frequency of the resulting frequency modulated

signal. This is explained in the specification”

CX-39/RX-96 (‘856 Patent Prosecution History), Paper No. 23 at 2 (emphasis added).⁵³

Respondents assert that in the context of the ‘856, ‘825 and ‘764 patents, the acceptable tolerance is +/- 50Hz from the 22.05 kHz frequency of the wobble clock. *See, e.g.*, Respondents’ Post-Hearing Patent Brief at 31-32; Mansuripur Tr. 1180-1185, 1196-1197, 1226. Yet, such a tolerance is not a suitable bandwidth for the type of frequency modulation required by the claims.

The portion of the ‘856 specification that mentions 100 Hz (+/- 50 Hz) is the following:

Satisfactory results in recording EFM encoded signals in conformity with the compact disc standard have been obtained for an f_{ref} ⁵⁴ of approximately 22 kHz, a bit frequency of the position-information signal of approximately 3000 bits/second, and a velocity-control clock signal bandwidth of approximately 100 Hz.

CX-15/RX- 61(‘856 Patent), col. 5, lines 56-61.⁵⁵

⁵³ In the prosecution of the ‘825 patent, Philips stated that “[s]ince the clock signal for controlling scanning velocity is frequency modulated by a digital position-information signal, it is apparent that it is the mean value rather than the instantaneous value of the clock signal frequency which is employed for velocity control.” CX-40/RX-97 (‘825 Prosecution History), Paper No. 6, Amendment and Remarks at 11-12.

⁵⁴ The term “ f_{ref} ” means “reference frequency.” *See* CX-15/RX-61 (‘856 Patent), col 5, lines 34-38.

⁵⁵ Similarly, the ‘825 patent specification states:

The bandwidth of the phase-locked-loop velocity control system is small (generally of the order of magnitude of 100 Hz) in comparison with the bit rate 6300 Hz of the position-information signal. Moreover, the position-information signal with which the frequency of the track modulation has been modulated does not contain any low-frequency components, so that this FM modulation does not influence the velocity control, the scanning velocity thus being maintained constant at a value for which the average frequency of the frequency components produced in the detection signal V_d by the track modulation is maintained at 22.05 kHz, which means that the scanning velocity is maintained at a constant value between 1.2 and 1.4 meters per

(continued...)

As pointed out by the Commission Investigative Staff and as explained by Philips' technical expert at the hearing, the bandwidth of 100 Hz referred to in the patent specifications is related to the control by a motor in an apparatus, which because it is a physical device with inertia, cannot change speed quickly. These limitations translate into the velocity control frequency having a limited bandwidth of 100 Hz. In contrast, the wobble signal is modulated with a bandwidth of approximately +/- 1kHz. This is taught by the patent specifications. See Hesselink Tr. 2570-2574, CX-17 ('825 Patent), col. 18, lines 15-16 ("Further it is to be noted that the frequency swing is suitable of the order of magnitude of 1 kHz"); CX-15/RX-61 ('825 Patent), col. 4, line 64 though col. 5, line 3 ("a frequency excursion of 1.5 kHz proves to be adequate").⁵⁶ Indeed, the expert testimony in this investigations confirms that with an approximately +/- 1kHz modulation scheme in the wobble, the system works, yet if the bandwidth of the wobble frequency was limited to 100 Hz the system would simply not work. Hesselink Tr. 2570-2574; Mansuripur Tr. 1379-1380.

The patent specifications clearly distinguish between the velocity control signal that controls the motor and the frequency modulated wobble signal. For example, the '825 specification plainly states that "the center frequency" of the FM-modulated wobble can be used

⁵⁵ (...continued)
second.

CX-17 ('825 Patent), col. 5, lines 1-4. col. 9, lines 6-28.

⁵⁶ Philips argues that although no 100 Hz tolerance is required by any of the patents, it would not be an unreasonable approximation of the variances due to noise and similar phenomena if applied to the *mean* frequency of the wobble signal, which provides the clock that controls the velocity of the disc. However, it is argued, such a limitation cannot apply to the *instantaneous* frequency of the clock signal. See Philips' Post-Hearing Patent Brief at 5-6.

for “measuring the scanning velocity for the purpose of scanning velocity control.” CX-17 (‘825 Patent), col. 2, lines 57-60. Further, the ‘825 specification teaches that this center frequency is 22.05 kHz. CX-17 (‘825 Patent), col. 3, lines 37-56. The specification also refers to the frequency-modulated wobble signal having a 1 kHz “frequency swing” around the “average frequency of the FM-modulated signal” which “is exactly equal to” the 22.05 KHz of the clock signal used for velocity control. CX-17 (‘825 Patent), col. 18, lines 15-16, col. 17, line 65 through col. 18, lines 2 (“Moreover, it is to be noted that on account of the d.c. component of the position-information signal the average frequency of the FM-modulated signal is exactly equal to the 22.05 kHz, which means that the velocity control is influenced to a negligible extent by the FM modulation.”).

Although there are variations in language, the patent claims of the ‘856, ‘825 and ‘764 patents describe an FM-modulated signal, and the specifications of each patent contain clear, frequently extensive, language that describes the use of frequency modulation. The specifications explain that the resulting modulation of the pre-groove wobble exhibits two instantaneous frequencies -- one at 21.05 kHz and one at 23.05 kHz -- with the mean at the 22.05 kHz frequency wobble clock, such as that described in the ‘401 patent, that controls the velocity of disc rotation. *See* CX-15/RX-61 (‘856 Patent), col. 4, line 59 through col. 5, lines 3, col. 5, lines 25-55.

It is understood by those of skill in the art that the FM signals such as those described in the ‘856 and ‘825 patents are in fact “periodic.” *See* Hesselink Tr. 579, 2574; Kablau Dep. (JX-1C) Tr. 205. Such signals generally have well-defined, if not relatively small, frequency ranges. As already discussed, in the ‘856 patent, which details the use of FM modulation to encode

position information into the wobble, the instantaneous frequency is described as varying within a bandwidth of +/-1.5 kHz. Hesselink Tr. at 580-581; CX-15/RX-61 ('856 Patent), col. 4, line 65 though col. 5, line 3.

It is clear that Respondents' argument concerning the claim term "periodic" ignores the understanding of those in the art regarding frequency modulation, and the intrinsic evidence. As Respondents admit, frequency modulating the wobble with a +/- 50 Hz bandwidth, would produce an unusable signal. Yet, they would impose on the FM-modulated signal the same, very limited +/- 50 Hz tolerance they impose on the velocity clock. *See* Mansuripur Tr. 1180, 1380-1381. Respondents' proposed construction of the term "periodic" must be rejected.

There is no requirement that the "periodic" undulation or modulation of the asserted claims be limited in a manner so as to render any of the claims nonsensical. The term "periodic" as used in the '401, '856, '825 and '764 patents refers to undulation or modulation that occurs throughout the spiral track, and within the bandwidths (e.g., +/- 1 kHz or +/- 1.5 kHz) necessary for implementing the inventions as disclosed and claimed therein.

Whether the Claims Require the Use of a Recorder

Respondents argue that all asserted claims of the '401, '856, '825 and '764 patents require a record carrier operating in a recording device. With respect to the '401 patent, Respondents argue that the "predetermined frequency" recited in claim 1 represents a time frequency (measured in cycles per unit time), as opposed to a spatial frequency (measured in cycles per unit distance). It is argued that the track undulations themselves do not possess any time frequency characteristics – rather, it is the signal generated in the reflected radiation from a spinning disc that has time frequency characteristics. Further, Respondents argue, the claim

language “*during scanning* of any portion of the track by said scanning beam ... a beam of radiation is produced therefrom which is periodically modulated at said *predetermined frequency* ...” requires the operation of a recorder.⁵⁷ Respondents’ Post-Hearing Patent Brief at 24-24. Respondents’ Post-Hearing Patent Reply Brief at 11 (citing Carasso Dep. (JX-1C) Tr. 149-150).

Philips argues that the ‘401, as well as the ‘856, ‘825 and ‘764 patents, disclose and claim a recording medium having certain physical features, including the track on the disc whose wobbled shape has been altered through modulation to carry information that can be used by a device, yet which nonetheless exists regardless of whether it is used. It is further argued that even if Respondents were correct that the asserted claims include CD recorders, Respondents would nevertheless be liable for contributory infringement under 35 U.S.C. §§ 271(c), because their discs are knowingly designed for use in the combination that they contend is claimed (i.e., a CD recorder-disc “system”) and have no substantial non-infringing uses. Philips’ Post-Hearing Patent Brief at 8-10.

The Commission Investigative Staff argues that the term “predetermined frequency” as used in claim 1 of the ‘401 patent refers to a spatial frequency in terms of cycles per distance, and in accordance with the rest of the claim language concerning the physical characteristics of the record carrier, and the specification which provides that the invention is “based on the recognition that in the case of digital recording it is possible to *prerecord a frequency* ... on the

⁵⁷ Respondents also note that inventor Carasso testified in a deposition that the claims of the ‘401 patent are directed to a system, both to a record carrier and a recording or reproducing device. However, inventor testimony must often be accorded little or no weight, for example, when the testimony goes to the supposed intent that an inventor might have had at the time that patent claims were written. See *Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1379 (Fed. Cir. 2000); *Vitronics Corp.* at 1584. In any event, the deposition testimony of Mr. Carasso on this particular point is vague, and is not probative of the meaning of claim 1 of the ‘401 patent.

record carrier.” It is argued that there is a simple linear relationship between the undulations of the track and the 22.05 kHz signal that is derived when the disc rotates at its standard speed, accordingly, no recorder or player is required to meet this claim limitation. OUII Post-Haring Brief at 20.

The asserted claims of the ‘401 patent (i.e., independent claim 1 and dependent claims 2 and 3) are each written to cover “a record carrier,” and independent claim 1 recites “[a] *record carrier* for storing digitally coded information having a fixed bit frequency and a power spectrum with a substantially zero level at a predetermined frequency, which information is recorded on and/or reproduced from the record carrier by scanning with a beam of radiation comprising. . . .” CX-14/RX-60 (‘401 Patent), col. 17, line 8 through col. 18, lines 3. By their plain language, the asserted claims have within their scope only a record carrier having specified enumerated limitations. The claims describe how the claimed record carrier would act “during scanning,” yet the claims are not apparatus claims.⁵⁸

As indicated in the language of claim 1, the record carrier is for the storage of digitally coded information at a predetermined frequency. In support of the claims, the specification of the ‘401 patent states that “[t]he invention is based on the recognition that in the case of digital recording it is possible to prerecord a frequency which is in synchronism with the bit frequency of the data signal to be recorded *on the record carrier*” CX-14/RX-60 (‘401 Patent), col. 2, lines 38-47 (emphasis added). Thus, the specification recognizes that the configuration of a

⁵⁸ Other claims of the ‘401 patent, which are not asserted in this investigation, are written to cover “an apparatus for forming an optically detectable track in an optical record carrier blank.” See CX-14/RX-60 (‘401 Patent), col. 18, lines 4-35 (independent claim 4 and dependent claims 5 and 6).

record carrier, such as a disc, can in fact record or “prerecord” information at a predetermined frequency.

As explained during the hearing by Philips’ technical expert, there is a simple linear relationship between the undulations of the track and the signal that is derived when the disc rotates at its standard speed. Thus, in order for a predetermined temporal frequency to be generated, the track wobble must have a predetermined spatial frequency. However, no recorder or player is required to meet this claim limitation. *See* Hesselink Tr. 549-550, 560-561. Contrary to the arguments made by Respondents, the asserted claims of the ‘401 patent do not require the use of a recorder.

B. Infringement Determination

Philips argues that Respondents’ accused discs directly infringe the asserted claims of the ‘401 patent, as confirmed by tests performed by Philips and Respondents which show that the instantaneous frequency of the wobble signal is +/- 1 kHz due to the address and auxiliary codes that are the subject of the ‘856, ‘825 and ‘764 patents. Philips argues that infringement is also confirmed by Respondents’ admission that the accused discs comply with Orange Book standards. Indeed, it is argued, Respondents’ accused disks work in a player, and thus there must be a wobble clock that remains periodic. Philips’ Post-Hearing Patent Brief at 25.

Respondents argue that their accused discs do not infringe the asserted claims of the ‘401 patent because the discs do not exhibit “periodic” undulations, given their proposed interpretation of the term “periodic.” It is argued that rather than a “predetermined frequency,” the tracks in the accused discs exhibit a deliberate modulation (due to the inclusion of address and control information) of 22.05 kHz +/- 1 kHz, which is 20 times greater than the +/- 50 Hz

tolerance that they argue should be allowed from perfect periodicity. Respondents also argue that due to the allegedly non-periodic nature of the radiation reflected from a spinning accused disc, the signal cannot be used as a clock signal to synchronize the rate at which digital bits of information are recorded onto or read from an optical disc. Finally, Respondents argue that inasmuch as the asserted claims require a record carrier and a recording or reproduction device, there can be no infringement. *See* Respondents' Post-Hearing Patent Brief at 25-27; Respondents' Post-Hearing Patent Reply Brief at 12.

The Commission Investigative Staff argues that Respondents' accused discs directly infringe the asserted claims of the '401 patent, when the claims are properly construed. OUII Post-Hearing Patent Brief at 18. The Staff argues the +/- 1 kHz frequency modulation from a carrier frequency of 22.05 kHz is a small deviation that does not change the fact that the accused discs have a wobble in the track with regularly repeating (i.e., "periodic") frequencies. *Id.* at 19. It is further argued that the undulation in the accused products do in fact constitute a clock signal because a clock frequency can be obtained from the undulations in Respondents' discs. *Id.* at 19 (citing Hesselink Tr. 561). Finally, the Staff argues that the accused products have undulations at "said predetermined frequency," inasmuch as that term refers to the physical characteristics of the disc, given the simple linear relationship between the undulations of the track and the signal that is derived when the disc rotates at its standard speed. *Id.* at 20.

As shown by the parties' arguments, there is no dispute concerning the physical characteristics of the undulations or wobble in Respondents' products. Nor is there any dispute concerning the frequency generated by the wobble at a standard speed, including its variation (i.e., 22.05 kHz +/- 1 kHz). The question of whether there is direct infringement of the asserted

claims by the accused discs pertains only to the correct construction of the asserted claims, particularly with respect to the term “periodic,” and the issue of whether the claims require the use of a recorder or player for there to be infringement.⁵⁹ Respondents’ proposed interpretation of the asserted claims has been rejected with respect to both the proper understanding of the term “periodic,” including the nature of the wobble clock, and the issue of whether the claims require that the claimed record carrier or disc be operating in a device.

It has been demonstrated in this investigation, by at least a preponderance of the evidence, that Respondents’ discs directly infringe the asserted claims of the ‘401 patent.

C. Validity

Respondents argue that the asserted claims of the ‘401 patent are invalid because (1) they are obvious in view of the prior art, and (2) the best mode of practicing the claimed invention is not disclosed in the ‘401 patent specification. *See* Respondents’ Post-Hearing Patent Brief at 27-31; Respondents’ Post-Hearing Patent Reply Brief at 18-19. Respondents’ arguments are opposed by Philips and by the Commission Investigative Staff. *See* Philips’ Post-Hearing Brief at 25-29; Philips’ Post-Hearing Patent Reply Brief at 5-9, 14-19; OUII Post-Hearing Patent Brief at 31-33, 39-41; OUII Post-Hearing Patent Reply Brief at 6-8.

⁵⁹ With respect to the ‘401, ‘856, ‘825 and ‘764 patents, Respondents also allege that there is no infringement because the asserted claims are invalid. The invalidity defenses are discussed separately from the question of whether the accused products practice the asserted claims. As detailed in subsequent portions of this Initial Determination, in no instance do Respondents’ invalidity defenses prevent a finding of infringement.

*Obviousness*⁶⁰

As presented in their main post-hearing brief, Respondents' obviousness argument is grounded in Philips' Digital Optical Recorder system (or "DOR system"), which apparently grew out of Philips' desire in the mid-1970s to implement a digital recordable optical disc system as an innovation over Philips' analog video long play (often referred to as "VLP") already in existence for recording audio and video.⁶¹ The DOR system was described in a paper entitled "Ten Billion Bits on a Disk," by Bulthuis et al.,⁶² published in the *IEEE Spectrum* in August 1979 (RX-63).

Respondents argue that the Bulthuis article discloses an optical disc having a spiral pregroove on which digital bits of information may be recorded by scanning the groove with a modulated laser beam and melting holes, or pits, in a tellurium-based recording layer. Respondents further argue that by the time the application for the '401 patent was filed, it was recognized by persons skilled in the art that clock, synchronization, and other control information was necessary for an optical recording system to record and play back data, and that one could manipulate the position of a track on a disc in order to encode such information. Respondents

⁶⁰ A discussion of the law of obviousness is contained, *supra*, in the section pertaining to the '209 and '493 patents.

⁶¹ There was controversy before the hearing and in portions of the post-hearing briefs concerning discovery into the DOR system. Nevertheless, there is no claim by Respondents that they are uninformed as to any material aspect of the DOR system's technological characteristics, and Philips does not contest that the DOR system is prior art (albeit in Philips' view, not invalidating). *See, e.g.* Respondents' Post-Hearing Patent Brief at 27-28; Philips' Post-Hearing Patent Reply Brief at 14-15.

⁶² The authors of the DOR system article are listed as Kees Bulthuis, Marino G. Carasso, Jacques P.J. Heemskerk, Peter J. Kivits, Wilhelm J. Kleuters and Pieter Zalm. *See* RX-63. Marino G. Carasso is one of the two inventors listed on the '401 patent at issue. Furthermore, the names of almost all these authors are recognizable from other patents and prior art at issue in this investigation.

cite U.S. Patent No. 4,363,116 to Kleuters et al. (RX-65), as disclosing modulation of the depth of a track with a synchronizing clock and modulating the radial position of the track undulations with a signal that is used for controlling the position of a scanning spot relative to the track. Respondents argue that likewise U.S. Patent No. 4,223,187 to Yonezawa (RX-73, U.S. Patent No. 4,392,219 to Yokozawa (RX-71) and U.S. Patent No. 4,067,044 to Maeda et al. (RX-78) disclose modulating the radial position of track undulations with a signal that is used for controlling the position of a scanning spot relative to the track.⁶³ Thus, Respondents argue, it was well known by 1980 to modulate the depth or radial position of a track on an optical disc with synchronization and control information needed for recording or reproducing information.

Respondents argue that one of ordinary skill in 1980 would not read Bulthuis to be limited to the example provided in the article. The Bulthuis article contains the following statement: “The pregroove concept also allows storing synchronization information on the disk.” RX-63 at 27. It is argued that one of ordinary skill would read this statement in light of what was known in the art about modulating the depth and radial position of a track to represent synchronization and control information.

Further, Respondents argue that while the Bulthuis article does not expressly disclose that the frequency of the clock signal modulated into the pregroove is chosen so as not to interfere with the content of data to be recorded on the disc, this is an inherent feature of any data recording system, as evidenced in the prior art by the Kleuters, Yokozawa and Yonezawa patents.

Philips argues that wobbling the pregroove in the ‘401 patent provided an elegant and

⁶³ As pointed out by Philips, there is scant information in the record or the parties’ briefs and proposed findings about the Maeda patent. *See* Philips’ Post-Hearing Patent Reply Brief at 17; RPF 1594 and Philips’ reply thereto.

novel solution to ensuring that a clock signal is always available to synchronize recording and reading of information on the disc. Philips argues that the prior art cited by Respondents (some of which was considered by the PTO during prosecution of the '401 patent) depends on clocking data written as pits or embossed data written directly into the data track at discrete locations on the disc, often in the form of a "header." It is argued that the prior art systems provided only intermittent clocks.

The Commission Investigative Staff argues that Respondents have not met their burden of establishing by clear and convincing evidence that there was any suggestion to combine the prior art relied upon, and that even if the various items of prior art were combined, they would not render the asserted claims of the '401 patent obvious.

The DOR system as described in the Bulthuis article puts its synchronization or clocking information into the track headers, in the form of pits or a pre-recorded relief pattern. *See, e.g.,* Hesselink Tr. 2562. A pregroove wobble is not used for those purposes, and the Bulthuis system has a straight pregroove that does not disclose a wobble of any sort.⁶⁴ Hesselink Tr. 2563-2565. Although the article states that the pregroove concept also allows for storing synchronization information on the disk, there is no evidence that one of ordinary skill in the art would have

⁶⁴ The testimony of Respondents' technical expert concerning the possible disclosure of a wobble by Bulthuis is not presented in terms of one of ordinary skill in the art. *See* Mansuripur, Tr. 1168-1170. Mr. Carasso, an author of the article, confirmed what appears to be plain from the illustrations in the article, which is that the DOR disc had a straight pregroove. Carasso Dep. (JX-1C) Tr.155-156. Furthermore, Respondents' suggestion that the DOR system may have contained a wobbled track is also based on a misreading of Dr. Heemskerk's deposition in which he stated that he was unsure at the time of his testimony about certain features of the system at particular points of its development. *See* OUII Reply Brief at 6-7 (citing Heemskerk Dep. (RX-1477) Tr. 206, 230-231).

understood such a statement to mean that one could modulate the depth or radial position of the pregroove with synchronizing clock information.

Respondents turn to the prior art to argue that it was known in 1980 the one could manipulate the position of the track on the disc to encode clock information. Yet, it has not been established that one of ordinary skill would look to other prior art in the manner argued by Respondents or that the prior art disclosed the elements missing from the DOR system that would be required in order to render the '401 patent obvious.

The specification of the '401 patent specifically refers to the Kleuters patent, a central item relied upon by Respondents. The '401 specification refers to Kleuters (U.S. patent application Ser. No. 140,409) as containing information areas that alternate with synchronization areas. With respect to Kleuters, the '401 specification states that "the clock signal generation is intricate and sometimes not very reliable." Indeed, the clock signal in Kleuters cannot be continuous inasmuch as it is interspersed with other data. *See* CX-14/RX-60 ('401 Patent), col. 1, line 44 through col. 2, line 17; Hesselink Tr. 2559. Kleuters provides that when the distance between the headers containing clock data appears too great, clock information can be pre-recorded in additional "synchronization areas," of the pregroove or track, to correct the clock signal. RX-65, col. 9, lines 26-63, Figs. 6a, 6b; Hesselink Tr. 2560-2561. This approach provides clocking, with many reference positions for synchronizing the clock, possibly 128 different clock locations. Hesselink Tr. 2559-2560. However, there is a cost associated with the Kleuters invention, that of occupying additional track space and still not providing a continuous clock like that of the '401 patent, which is generated by scanning "any portion of the track."

The disclosure of the Kleuters patent represents the difficulty that the '401 patent tried to

solve. Hesselink Tr. 2558. The '401 specification identifies the Kleuters system as complex, unreliable and wasteful use of disc space. CX-14, col. 1, line 66 through col. 2, lines 17. The '401 specification states that "it is the object of the invention to provide a record carrier . . . which does not present the . . . problems" of the Kleuters patent. CX-14, col. 1, lines 50 through col. 2, line 23; Hesselink Tr. 2557-2561.

Moreover, although Kleuters exhibits a wobbled track, it uses the wobble solely for radial tracking. *See* RX-65, col. 9, lines 26-63. Respondents contend that using a wobble for tracking makes it obvious to use a wobble for clocking. However, Kleuters demonstrates the opposite inasmuch as Kleuters addressed the same problem as in the '401 patent, i.e., the need for an improved clock, yet chose the conventional approach of writing clock data into the data track as pits albeit more closely and with more data. *See* Hesselink Tr. 2561. Kleuters both perceived the need for an improved clock and taught servo track undulation for other purposes. Yet, Kleuters did not choose to solve the clock problem with a pregroove wobble. This is strong evidence against Respondents' argument that one of ordinary skill with Kleuters (or similar art) and Bulthuis would have chosen to implement a clock by configuring a disc in the way claimed in the '401 patent.

The Yonezawa (RX-73) and Yokozawa (RX-71) patents similarly teach away from the '401 patent. They disclose a technique for writing a data track in a wobbled form, yet they use the wobble only for radial tracking during read out. Neither discloses a pregroove or a wobbled pregroove. *See* RX-73, col. 5, lines 47-68, col. 7, lines 35-40; RX-71, col. 3, lines 28-41.

Respondents ignore the fact that the prior art that discloses wobbles invariably use them for tracking rather than for clocking. For clocking, the prior art uses only pits and headers. The

prior art taught away from the '401 patent. *See* Hesselink Tr. 2599, 2561, 2565. Respondents fail to offer even an explanation, much less a showing, that “there is a reason, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the references, and that would also suggest a reasonable likelihood of success.” *Smiths Indus. Med. Sys., Inc. v. Vital Signs, Inc.*, 183 F.3d 1347, 1356 (Fed. Cir. 1999). The prior art cited by Respondents cannot render the asserted claims of the '401 patent obvious.

Some of these same considerations were taken into account during the prosecution of the '401 patent. As explained above, the '401 patent explicitly identified the teachings of the prior art and the problem that the '401 patent application solved. Further, the Examiner originally rejected the claims of the '401 patent over Kleuters and Yokozawa, finding that “[i]t would have been obvious to one of ordinary skill in the art to further modify Kleuters . . . and utilize a wobbling optical information track, i.e. with ‘periodic undulations,’” given the “obvious benefit” of such a combination for “more precise tracking in the optical system as is taught by Yokozawa” CX-38 (‘401 Prosecution History), Paper No. 5 at 4.

In response to the Examiner’s rejection, Philips amended the claims “to clearly specify that during recording and/or reproducing of information on any portion of a track the clock signal is produced from the same portion of the track [that] such information is being recorded and/or reproduced,” and distinguished the claimed invention over Kleuters on the same grounds, while pointing out that Yokozawa used the wobble only for tracking, not clocking. CX-38, Paper No. 6 at 3-4. The '401 patent subsequently issued over Kleuters and Yokozawa. *See* CX-38, Paper No. 10.

In addition to overarching failure of the prior art to disclose or suggest wobbling the

pregroove for a continuous clock signal, there is a lack of evidence with respect to Respondents' argument that one of ordinary skill in view of the Bulthuis article would have chosen a clock signal frequency "so as not to interfere with the content of data to be recorded on the disc." *See* Respondents' Post-Hearing Patent Brief at 29. Respondents rely on general statements, and to a certain extent speculation, made by their technical expert during the hearing. The testimony fails to identify particular art or specific knowledge relevant to the field of optics in which one of ordinary skill would have been working during the critical time frame. Conclusory expert opinion alone does not meet the burden placed on a party challenging a patent claim. *See In re Sang-Su Lee*, 277 F.3d 1338, 1343 (Fed. Cir. 2002); *Ecolochem, Inc. v. Southern California Edison Co.*, 227 F.3d 1361, 1375 (Fed. Cir. 2000).

The inferences and hindsight offered by Respondents, when combined with the disclosures of the prior art that teach away from the '401 invention, do not demonstrate by clear and convincing evidence that the asserted claims are invalid due to obviousness.

Best Mode

Respondents argue that the asserted claims of the '401 patent are invalid due to the specification's alleged failure to disclose the best mode.

Section 112 of the Patent Act provides in pertinent part:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most clearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention."

35 U.S.C. § 112, ¶ 1 (emphasis added).

The Court of Appeals for the Federal Circuit has held that “[t]he purpose of the best mode requirement is to ensure that the public, in exchange for the rights given the inventor under the patent laws, obtains from the inventor a full disclosure of the preferred embodiment of the invention.” *Dana Corp. v. IPC Ltd. Partnership*, 860 F.2d 415, 418 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1067 (1989).

The Federal Circuit has explained the application of best mode requirement, as follows:

In short, a proper best mode analysis has two components. The first is whether, at the time the inventor filed his patent application, he knew of a mode of practicing his claimed invention that he considered to be better than any other. This part of the inquiry is wholly subjective, and resolves whether the inventor must disclose any facts in addition to those sufficient for enablement. If the inventor in fact contemplated such a preferred mode, the second part of the analysis compares what he knew with what he disclosed -- is the disclosure adequate to enable one skilled in the art to practice the best mode or, in other words, has the inventor “concealed” his preferred mode from the “public?” Assessing the *adequacy* of the disclosure, as opposed to its *necessity*, is largely an objective inquiry that depends upon the scope of the claimed invention and the level of skill in the art.

Chemcast Corp. v. Arco Indus. Corp., 913 F.2d 923, 927-28 (Fed. Cir. 1990) (emphasis in original).

The extent of information that an inventor must disclose depends on the scope of the claimed invention. *Engel Indus. v. Lockformer Co.*, 946 F.2d 1528, 1531 (Fed. Cir.1991); *see Chemcast*, 913 F.2d at 927, 16 U.S.P.Q.2d at 1037 (an “objective limitation on the extent of the disclosure required to comply with the best mode requirement is, of course, the scope of the claimed invention”); *Randomex, Inc. v. Scopus Corp.*, 849 F.2d 585, 588, 7 U.S.P.Q.2d 1050, 1053 (Fed. Cir.1988) (“It is concealment of the best mode of practicing the claimed invention

that section 112 ¶ 1 is designed to prohibit”). Accordingly, an inventor need not disclose a mode for obtaining unclaimed subject matter unless the subject matter is novel and essential for carrying out the best mode of the invention. *Applied Med. Resources Corp. v. United States Surgical Corp.*, 147 F.3d 1374, 1377, 47 U.S.P.Q.2d 1289, 1291 (Fed. Cir.1998). When a best mode relates directly to a claimed invention, it must be disclosed. *See Northern Telecom Ltd. v. Samsung Electronics*, 215 F.3d 1281 at 1289 (Fed. Cir. 2000). As summarized by the Federal Circuit: “In short, we have held that the best mode of making or using the invention need be disclosed if it materially affects the properties of the claimed invention itself.” *Bayer AG v. Schein Pharmaceuticals, Inc.*, 301 F.3d 1306, 1319-20 (Fed. Cir. 2002). The Federal Circuit further held that “because the existence of a best mode of carrying out the invention is by definition known only to the inventor, *section 112* demands actual disclosure regardless of whether, as an abstract matter, practicing that mode would be within the knowledge of one of ordinary skill in the art.” *Bayer*, 301 F.3d at 1314.

Respondents argue that the “predetermined frequency” disclosed in the ‘401 patent specification is $0.2f_0$, f_0 or $2f_0$, where f_0 is equal to 500 kHz.⁶⁵ Yet, Respondents argue, Marino Carasso, an inventor listed on the ‘401 patent, testified during his deposition that during his experimentation at the time that the ‘401 patent application was filed, he was successful in making the system work by placing the clock frequency in the range of $1.1f_0$ - $1.3f_0$ when using quadphase modulation (which is the modulation technique labeled “c” in Figure 4 of the ‘401

⁶⁵ The notations $0.2f_0$, f_0 and $2f_0$, as well as other f_0 notations used in the parties’ arguments and this Initial Determination, refer to the representation of frequency across a horizontal axis, such as in Figure 4 of the ‘401 patent. A detailed explanation of this concept was elicited during the cross-examination of Philips’ technical expert. *See Hesselink Tr. 759-761.*

patent), and that $1.1f_0 - 1.3f_0$ was the best range he knew at that time for the clock frequency.

Respondents' Post-Hearing Patent Brief at 30.

Respondents argue that despite the testimony of Philips' technical expert at the hearing aimed at deriving the best frequency range from the '401 specification, and despite the Commission Investigative Staff's argument about the content of the Carasso testimony, the fact is that Mr. Carasso did testify that $1.1f_0 - 1.3 f_0$ was the best range known to him at the time, and further, that neither this preferred frequency range nor any frequency within the range is disclosed explicitly or implicitly for any modulation technique in the '401 patent. *Id.* at 30-31; Respondents' Post-Hearing Patent Reply Brief at 18-19 (citing, *inter alia*, RPF 1446 and 1446.1).

Philips argues that the very testimony relied upon by Respondents to support their best mode argument demonstrates that Mr. Carasso denied that the $1.1 - 1.3 f_0$ was the "best range." It is further argued that while Mr. Carasso's testimony may indicate that $1.1 - 1.3 f_0$ was thought to be best for the DOR system, that would not make it the best mode for practicing the claimed invention, which is not the same as the DOR system. Philips' Post-Hearing Patent Brief at 5-9.

The Commission Investigative Staff argues that Respondents have not presented clear and convincing evidence of failure to disclose the best mode in the '401 patent. The Staff argues, among other things, that Mr. Carasso did not testify that $1.1 - 1.3 f_0$ was the best mode known to him of practicing the claimed invention at the time the application was filed. OUII Post-Hearing Brief at 39-40.

The portions of the Carasso deposition relied upon by Respondents, when read in context, show that the range of "1.1 fo until 1.3 maybe" to which the witness referred during deposition

pertained to the wobble track in a particular DOR system, and it is not clear that the system was the preferred embodiment for the claimed invention. Furthermore, the preference “[a]t that moment” that the experimenters at Philips had for quadphase modulation (as depicted in “modulation scheme c” of ‘401 patent Figure 4) was based on the particular work performed at a particular time, the precise date of which is somewhat unclear. There is no evidence that the inventors believed that the positive outcome of particular experiments constituted the best way of implementing the invention claimed in the ‘401 patent.⁶⁶ See Carasso Dep. (JX-1C) Tr. 145-147, 157-159.

For Respondents to prevail, as a threshold matter one would have to determine that the invention of the asserted patent claims is the same as the work referred to in the selected portion of the Carasso deposition, and that the inventors appreciated that fact. Yet, there is an insufficient basis upon which to make such a determination. Rather, it appears that Mr. Carasso objected to any attempt by Respondents’ counsel to equate the particular work discussed in that portion of his testimony with the ‘401 patent’s invention as whole, or the “best way” of implementing the invention. In the portion of the deposition testimony relied upon by

⁶⁶ In their reply brief, Respondents criticize the Commission Investigative Staff for referring to the characteristics of CD-Rs and CD-RWs currently on the market. Respondents reiterate that the question of best mode pertains only to what the inventors knew at the time the patent application was filed. See Respondents’ Post-Hearing Patent Reply Brief at 19. However, Respondents do not appreciate the significance of the Staff’s argument. The Staff points out that contrary to some of the arguments made by Respondents during the course of this investigation, a wobble placed in the range of 1.1 - 1.3 f_0 is not necessarily the best way of implementing the claimed invention inasmuch as the Respondents’ accused products infringe the asserted claims of the ‘401 patent and do not have a wobble frequency within the 1.1 - 1.3 f_0 range. This fact would seem, therefore, to confirm Mr. Carasso’s view at the time he filed the ‘401 patent application that the 1.1 - 1.3 f_0 range should not be thought of as the “best mode.” See OUII Post-Hearing Patent Brief at 40-41.

Respondents, Mr. Carasso testified in part:

Q. 1.1 fo to what?

A. 1.1 fo to 1.3 in those experiments at that time.

Q. You thought that was at that time when you did those experiments the best way – the best range to place it?

MS PFEIFFER: Objection to form.

A. No, but we said – we said that that was a range where we were successful in making the system with the electronics and with the know-how and especially electronics and know-how and phase locked loops at that moment.

Carasso Dep. (JX-1C) Tr. 146-147.

Overall, little evidence has been adduced on the question of best mode, and the evidence that has been relied upon by Respondents is either unclear or contrary to Respondents' arguments. Respondents have failed to prove by clear and convincing evidence that the asserted claims of the '401 patent are invalid for failure to disclose the best mode in the patent specification.

V. THE '856 PATENT

A. Claim Construction

United States Patent No. 5,023,856, entitled "Optically Readable Record Carrier for Recording Information, Apparatus for Manufacturing Such a Record Carrier, Apparatus for Recording Information on Such a Record Carrier, and Apparatus for Reading Information Recorded on Such a Record Carrier" issued on June 11, 1991, to Wilhelmus P.M. Raaymakers

and Franciscus L.J.M. Kuijpers of the Netherlands.⁶⁷ CX-15/RX-61 ('856 Patent).

Philips asserts independent claim 1, and dependent claims 3 and 4 of the '856 patent, which are, as follows:

1. An optical disc record carrier having a radiation-sensitive surface for recording information in a pattern of spiral or concentric tracks thereon, which information may be recorded or read by scanning such tracks with a radiation beam which produces radiation therefrom; characterized in that each of said tracks has a periodic modulation of its position in a direction transverse thereto and which, without occupying any portion of the track, generates a periodic clock signal in the radiation therefrom having a substantially constant frequency corresponding to the velocity of scanning of said tracks, the frequency of said clock signal only varying in accordance with variations in said scanning velocity; and in that the frequency of said clock signal is modulated in accordance with a digital position signal which identifies the relative positions of said tracks on said record carrier; whereby said scanning velocity and the relative positions of said tracks are both recorded without occupying any portion of said tracks.

⁶⁷ The '856 patent issued upon Application No. 501,342, filed on March 28, 1990, based on a foreign application priority date of October 6, 1986 (Netherlands 8602504). The United States '342 application is a continuation of Serial No. 301,129, filed on January 24, 1989, abandoned, which is a continuation of Serial No. 15,454, filed on February 17, 1987, abandoned. The '856 patent was assigned to the complainant in this investigation, U.S. Philips Corporation. CX-15/RX-61 ('856 Patent).

The Abstract of the '856 patent refers to:

An optical disc record carrier having a radiation-sensitive surface and a spiral or concentric pattern of information tracks thereon. The radial displacement of each track is modulated to produce a periodic radial wobble, the frequency of such periodic displacement being modulated by a position-information signal identifying the relative positions of the tracks. During recording or reading of information on the tracks the track modulation is read by a scanning beam. A clock signal for controlling scanning velocity is recovered from the track displacement modulation, and an FM demodulator recovers the position-information signal from the frequency modulation of such displacement.

Id.

* * *

3. A record carrier as claimed in either of claims 1 and 2,^[68] wherein the digital position signal which is generated at any position in said track pattern indicates the time from the beginning of said track pattern to such track position when scanning is effected at a velocity corresponding to the frequency of said clock signal.

4. A record carrier as claimed in either of claims 1 and 2, wherein said track modulation is in the form of a periodic wobble in the radial displacement of each of said tracks, the frequency of such wobble being modulated by said digital position signal.

CX-15/RX-61 ('856 Patent), col. 6, line 60 through col. 7, line 10, and col. 7, lines 17-27.

The '856 patent builds on the foundation of the '401 patent to provide reliable address or position information used to determine the location of the laser on the disc. The invention claimed in the '856 patent involves a further modulation of the wobbled pre-groove with a digital "position" signal identifying every location along the pre-groove. *See* CX-15/RX-61 ('856 Patent), col. 1, lines 57-61; Hesselink Tr. 568-573. This further modulation, which is disclosed in the specification as employing the technique of frequency modulation, provides position information throughout the disc while leaving open all of the area intended for recording user data. CX-15/RX-61 ('856 Patent), col. 2, lines 40-43, col. 5, lines 25-38, 62-64; Hesselink Tr. 568-578. This approach is particularly valuable where the EFM data encoding scheme is used.

⁶⁸ Claim 2 of the '856 patent is not asserted by Philips in this investigation. Claim 2, a dependent claim, is as follows:

2. A record carrier as claimed in claim 1, wherein the frequency components of the modulation of said clock signal which are produced by the digital position signal are substantially outside the frequency band of the variations in the frequency of said clock signal caused by variations in said scanning velocity.

CX-15/RX-61 ('856 Patent), col. 7, lines 11-16.

Claim 3, which depends from claim 1, claims a record carrier that indicates the position signal “which is generated at any position” of the pre-groove, often referred to as “ATIP” (for “absolute time in pre-groove”) because it is expressed in terms of the time required to scan from the beginning of the track to that position, when the track is scanned at the velocity which produces the periodic clock signal. Claim 4, also depends from claim 1, and further specifies that the modulation that is frequency modulated is in the form of a “periodic wobble.” *See* Hesselink Tr. 568, 576-577, 585-586.

The claim construction issues raised in connection with the asserted claims of the ‘856 patent, as in the case of the ‘401 patent, are the correct interpretation of the term “periodic,” and whether the claims require a record carrier to be in an operating recording device. *See* Respondents’ Post-Hearing Patent Reply Brief at 31-32; Respondents’ Post-Hearing Patent Reply Brief at 5-8, 11; Philips’ Post-Hearing Patent Brief at 30-32; OUII Post-Hearing Patent Brief at 5-7.

As previously discussed in connection with the ‘401 patent, Respondents and the other parties agree that the term “periodic” should be construed consistently for the ‘401, ‘856, ‘825 and ‘764 patents, and a consistent interpretation is supported by the claims, specifications and prosecutions histories of those patents. Respondents’ proposal to limit the claim term “periodic” to identical repetition (subject to a 100 Hz tolerance) was not found to be supported by any of the evidence of record, including the evidence intrinsic to the patents.

Respondents’ argument that the asserted claims of the ‘856 patent require a carrier operating in a recording device are similar to those advanced in connection with the ‘401 patent, to the effect that a recording or reproduction device is necessary in order to generate a clock

signal suitable for use in recording or reproducing information. However, in a manner similar to that of the '401 patent, the asserted claims of the '856 patent are directed to “[a]n optical disc record carrier,” and not to an apparatus or a method. The asserted claims read on a record carrier that is configured in the specified manner, and indeed the evidence shows that it is well known in the art that the signal derived from a record carrier will result from the physical configuration of the disc features, such as “periodic modulation” or “periodic wobble.” *See Hesselink Tr.* 549-550, 560-561, 583. There is no requirement in the asserted claims of the '856 patent that the record carrier be placed in a recording device.

B. Infringement Determination

Philips argues that Respondents' non-infringement arguments are based on their discredited player and periodic claim interpretation arguments, while the tests of Respondents' products show that the discs contain every limitation of claims 1, 3 and 4 of the '856 patent. Philips argues that Respondents' own documents, corporate designee testimony and other admissions indicate that their discs are Orange Book compliant, and that is further evidence that the accused discs have a wobble that contains both a clock and ATIP information. Philips' Post-Hearing Brief at 32.

Respondents argue that the accused discs do not infringe the asserted claims of the '856 patent because they do not have tracks that exhibit “periodic modulation,” in accordance with their proposed claim construction, and because the claims require a record carrier operating in a recording or reproduction device. Respondents' Post-Hearing Patent Brief at 32-34; Respondents' Post-Hearing Patent Brief at 12.

The Commission Investigative Staff argues that under the proper claim construction, the

accused products have tracks with periodic modulation as required by the asserted claims of the '856 patent, noting that the +/- 1 kHz bandwidth found in the accused discs is within the frequency modulation of +/- 1.5 kHz suggested in the '856 specification. The Staff also argues that no recorder or player is needed for infringement of the asserted claims, inasmuch as they require a disc with track undulation containing a frequency such that, when scanned with a spot of radiation, the undulation will generate a periodic track signal. *See* OUII Post-Hearing Reply Brief at 20-21.

There is no dispute concerning the characteristics of Respondents' discs. Respondents' technical defense to Philips' infringement allegations is based on claim construction arguments which are unsound.

It has been demonstrated by at least a preponderance of the evidence that Respondents' accused products directly infringe the asserted claims of the '856 patent.

C. Validity

Respondents allege that the asserted claims of the '856 patent are invalid because (1) they are obvious in view of the prior art, and (2) the best mode of practicing the invention is not disclosed in the '856 patent specification. *See* Respondents' Post-Hearing Patent Brief at 34-36; Respondents' Post-Hearing Patent Reply Brief at 17-20. Respondents' arguments are opposed by Philips and by the Commission Investigative Staff. *See* Philips' Post-Hearing Patent Brief at 32-25; Philips' Post-Hearing Patent Reply Brief at 9; OUII Post-Hearing Patent Brief at 33-35, 41; OUII Post-Hearing Patent Reply Brief at 8-11.

*Obviousness*⁶⁹

Respondents argue that although the '401 patent discloses many features claimed in the '856 patent, it does not disclose modulating the frequency of the track undulations in accordance with a digital track position signal. Nevertheless, Respondents argue, the asserted claims of the '856 patent would have been obvious to one of ordinary skill in the art because at the time that the '856 patent application was filed in 1986, it was known that addressable track locations were necessary for recording information on optical discs (for example, in the Bulhuis article), and it was "known to modulate the position of a track with track address information." For the latter element, Respondents rely on U.S. Patent No. 4,716,560 to Itonaga (originally filed in Japan in 1984)(RX-74).

Respondents argue that the Itonaga patent discloses a recordable optical disc with concentric recording tracks, the widths of which are modulated with digital track address signals. It is argued that by 1986, it would have been obvious to modulate the frequency of the track address undulations taught by the '401 patent with digital track addresses taught by Itonaga, especially in light of the fact that for decades frequency modulation was known to a person skilled in the art. It is further argued that the time from the beginning of a track to a current track position can be determined from the sector number modulated into the track width, and the clock frequency obtained from the track modulation. Respondents thus argue that if the Itonaga reference is combined with the teachings of the '401 patent, the digital track address signal modulated into the frequency of the track undulations will represent the time from the beginning

⁶⁹ A discussion of the law of obviousness is contained, *supra*, in the section pertaining to the '209 and '493 patents.

of a track to the location on the track where a particular track address signal is located.

Philips argues that as recognized in the '856 patent specification, a key feature of the asserted claims of the '856 patent is modulation of the pregroove to provide both (1) a clock for controlling the velocity of disc rotation and (2) a position signal that identifies the relative positions on the disc, and also doing so in such a manner that the critical information does not occupy any portion of the track, and the track is left entirely available and uninterrupted for recording user data. It is argued that no prior art, or combination of art, provided the solution offered by the '856 patent. Philips argues that inasmuch as the Itonaga patent and the '401 patent (specifically mentioned in the '856 patent)⁷⁰ were considered during prosecution of the '856 patent, Respondents bear an especially heavy burden in their attempt to show obviousness.

Philips argues that width modulation is an undeveloped concept in Itonaga. It is argued that Itonaga does not use frequency modulation, and further that the technique used by Itonaga is incompatible with the '401 patent. Philips argues that the '401 patent teaches storing position information in a header written into the data track, while Itonaga shows a method for directly altering the width of the track to indicate address and to provide a tracking control signal. Philips argues that Itonaga makes no mention of a clock function or the frequency modulation of a clock to provide address information. According to Philips, a person of ordinary skill in the art would have had no motivation to combine the '401 patent and Itonaga, and such a combination would not produce the claimed invention.

The Commission Investigative Staff argues that the track in Itonaga does not encode "0"s

⁷⁰ The '856 patent specification refers to "pending U.S. application Ser. No. 110,063, assigned to the present assignee." CX-15/RX61, col. 1, lines 60-61. The '401 patent application is a division of application Serial No. 110,063. See CX-14/RX-60 ('401 Patent).

and “1”s to represent position information, and does not encode position information in the track shape itself, as is done in the ‘856 patent. The Staff likens Itonaga’s width modulation to “bookmarks” or synchronization signals in that a change in width denotes the beginning or ending of a position information signal within the data track. Moreover, it is argued, Itonaga is not a frequency modulated system, and would not work with the ‘401 patent because the width modulation of Itonaga could not be superimposed on the track undulations of the ‘401 patent. The Staff further argues that there would have been no motivation to combine the Itonaga patent and the ‘401 patent, and even assuming that one would have combined them, they would not have rendered obvious the asserted claims of the ‘856 patent.

The ‘401 patent teaches the storing of position information in a header written into the data track, separate from the clock signal. Thus, the ‘401 patent did not disclose all the elements of the asserted claims of the ‘856 patent. The Itonaga patent, to which Respondents look for the additional disclosures, teaches directly altering the width of the track to indicate address and to provide a tracking control signal without any mention of a clock function or the use of frequency modulation. *See, e.g.,* RX-74 (Itonaga Patent), col. 1, lines 33-43. While it is undisputed that frequency modulation, in general, was known for decades before the ‘856 patent’s priority date, there remains a serious question as to how one of ordinary skill in the art would have been motivated to combine the ‘401 patent with the Itonaga patent, and whether one could have refined or supplemented the combination so as to obtain the wobble disclosed in the ‘856 patent.

The evidence presented at the hearing shows that simply attempting to combine the Itonaga patent and the ‘401 patent would present a number of problems, and would fail to satisfy all elements of the asserted ‘856 patent claims. While Itonaga purports to show width

modulation to encode address information into the shape of the track, the patent does not disclose how to do it. Calculations made by Philips' technical expert show that Itonaga does not use frequency modulation. *See* Hesselink Tr. 2574-2575; Mansuripur Tr. 1337-1338. Nevertheless, if address information were encoded using width modulation rather than frequency modulation, the width would vary so as to cause severe consequences for the system. If width modulation could somehow be combined with the '401 patent's wobble, there would likely be a signal that would be unsuitable for velocity control. Hesselink Tr. 2575-2577. There is no evidence that the knowledge of frequency modulation available to one of ordinary skill in the art would have motivated and further enabled one to combine some of Itonaga's teachings with the '401 patent, and thus to obtain the claimed invention of the '856 patent.

This case is an example of why the law recognizes that one cannot selectively cull components from the prior art through hindsight to fit the parameters of a patented invention. There must be a teaching or suggestion within the prior art, or within the general knowledge of a person of ordinary skill in the field of the invention, to look to particular sources of information, to select particular elements, and to combine them in the way they were combined by the inventor. *ATD Corp. v. Lydall, Inc.* 159 F.3d 534, 546 (Fed. Cir. 1998). In this case, even if the components were selected from the prior art, it is unclear how one of ordinary skill could have assembled them in order to make them work.⁷¹

⁷¹ The innovation of the '856 patent was recognized by the PTO in allowing the '856 patent claims over the Itonaga patent. During prosecution of the '856 patent, the applicants successfully traversed a section 103 obviousness rejection by the Examiner, which was based on the Itonaga patent and other prior art. The Applicants argued that the prior art required interruption of the recording or reading of information on the disc in order to provide a track position identification signal, and that such a problem is avoided only in the claimed record carrier of the '856 patent.

(continued...)

Respondents have not demonstrated by clear and convincing evidence that the asserted claims of the '856 patent are invalid due to obviousness.

*Best Mode*⁷²

Respondents' best mode argument is based on independent claim 1, which requires a clock signal frequency "modulated in accordance with a digital position signal which identifies the relative positions of said tracks on said record carrier," and the deposition testimony of one of the inventors listed on the '856 patent, Wilhelmus Raaymakers.⁷³ Respondents argue that Mr. Raaymakers testified that the invention claimed in the '856 patent and the invention claimed in the '825 patent arose from the same work in 1986, before the October 6, 1986 filing of the '856 patent's foreign priority application in the Netherlands. It is argued that Mr. Raaymakers testified that in order to implement the '856 patent's claimed feature of digital position signals which identify the relative position of said tracks on said record carrier, it is necessary to use

⁷¹ (...continued)

See CX-39 ('856 Patent Prosecution History), Paper No. 9 at 6, Paper No. 14 at 6. The Applicants further argued with respect to the clock signal disclosed in the '401 patent that "it was not previously recognized that by modulating the frequency of such traverse modulation of track position it is possible to further include the track position information, thereby entirely freeing all positions of the track for recording of information." CX-39 ('856 Patent Prosecution History), Paper No. 18 at 6.

⁷² A discussion of the law of best mode is contained, *supra*, in the section pertaining to the '401 patent.

⁷³ In some filings in this investigation, Mr. Raaymakers' name is spelled "Raaijmakers." See, e.g., Philips' Post-Hearing Patent Reply Brief at 10; JX-1C ("Deposition of: Wim Raaijmakers"). The name is, however, spelled "Raaymakers" on the '856 and '825 patents. See CX-15/RX-61 ('856 Patent); CX-17 ('825 Patent).

ATIP synchronization signals so that track portions can be readily located.⁷⁴ According to Respondents, Mr. Raaymakers testified that the use of ATIP synchronization signals was the best way he knew of for recovering the track position on a disc. Respondents argue that inasmuch as ATIP synchronization signals are not disclosed in the '856 patent, the asserted independent and dependent claims of the '856 patent are invalid for failure to disclose the best mode of practicing the claimed invention.

Philips argues that the deposition testimony relied upon by Respondents was not properly designated by them, and in any event bears only a scant resemblance to what the deponent actually said. Philips argues that the best mode questions relied upon by Respondents pertain to testimony about the '825 patent, not the '856 patent, and the use of ATIP synchronization codes is in fact a major difference between the two patents. Philips also disputes that Mr. Raaymakers testified that at the time in question he thought that the use ATIP synchronization signals was the best way to recover track position on a disc.

The Commission Investigative Staff argues that it is unclear from the deposition testimony of Mr. Raaymakers whether the development of the special ATIP synchronization signals described in the '825 patent occurred prior to the time that the '856 patent application was filed. The Staff also notes that some ATIP information is contained in the '856 patent, and that while it is not the same as the detailed system claimed by the '825 patent, it might be sufficient for one of ordinary skill to realize that synchronization codes should be employed in

⁷⁴ ATIP stands for "absolute time in groove," and is a concept discussed, *supra*, at 100, in connection with the construction of the asserted claims of the '856 patent.

practicing the '856 patent.⁷⁵

As framed by the parties' briefs, the threshold question is whether the evidence demonstrates that the '856 patent inventors knew of the use of ATIP synchronization signals, similar to those disclosed in the '825 patent, before the Netherlands foreign priority application was made on October 6, 1986. Respondents' arguments are based only on the deposition testimony of Mr. Raaymakers.

There are certain difficulties presented by the fact that the testimony at issue is presented only in the form of a deposition transcript. For example, many technical points must remain somewhat obscure because the Administrative Law Judge is not able to request clarification or elucidation from Mr. Raaymakers or from the parties' technical experts. Nevertheless, it does appear that, as argued by Respondents, Mr. Raaymakers testified that he had at least two significant breakthroughs within approximately one week. One pertained to encoding information into the wobbled track, and the other pertained to synchronization signals. Further, it appears that he thought that the particular type of synchronization signals he chose to use in the ATIP system were the best way to provide a synchronization signal for recovering a position information signal, and that in the weeks following his discoveries, he was able to confirm that fact. *See Raaijmakers Dep. (JX-1C) Tr. 34-37, 80-82.*

A question is raised as to when the initial discoveries and the subsequent testing occurred. When Respondents' counsel attempted to find out when these discoveries occurred, and when the work on this project took place, the witness could confirm only that it must have been in 1986.

⁷⁵ The Commission Investigative Staff's argument concerning the discussion of ATIP in the '856 is disputed by Respondents. *See Respondents' Post-Hearing Patent Reply Brief at 20.*

Mr. Raaymakers testified that he could not remember the month or the season in which these events commenced and developed. He did testify that there would have been written records. *See Raaijmakers Dep. (JX-1C) Tr. at 45-48.* Respondents' arguments are not based on such records.

Furthermore, a close examination of the deposition testimony at issue shows, as Philips points out, that the '856 patent was not specifically raised with Mr. Raaymakers during this line of questioning. Rather, the questioning took place in general terms, or when a patent was raised with Mr. Raaymakers during the pertinent portion of his deposition, it was the '825 patent, not the '856 patent. *See Raaijmakers Dep. (JX-1C) Tr. 62, 74.* Inasmuch as the '825 patent is in many ways a refinement of the '856 patent, it seems logical that one could deduce some facts about the '856 patent from testimony in which the '825 patent was mentioned. Yet, as pointed out by the Staff, Mr. Raaymakers never testified that the ATIP synchronization signals described in the '825 patent were known to him at the time that his application for the '856 patent was filed, and the '856 patent relies on a simpler synchronization scheme. *See OUII Post-Hearing Reply Brief at 13-15.* One cannot know how Mr. Raaymakers would have testified if he had been examined directly about the best mode of the '856 patent during his deposition, or if he had testified about the '856 patent at the hearing.

As Philips admits, the timeline that emerges from Mr. Raaymakers' deposition testimony does not eliminate the possibility that he learned of the importance of synchronization signals before October 6, 1986. Nevertheless, the testimony is at best equivocal on this point, especially when one takes into account the fact that Mr. Raaymakers did not testify that the inventors had full knowledge of the '856 and '825 patent inventions at the same time. *See Philips'*

Post-Hearing Patent Reply Brief at 14; Raaijmakers Dep. (JX-1C) Tr. 115-116.

The evidence of record does not demonstrate clearly and convincingly that the asserted claims of the '856 patent are invalid due to a failure of the specification to set forth the best mode.

VI. THE '825 PATENT

A. Claim Construction

United States Patent No. 4,999,825, entitled "Recording/Reading Apparatus for Inscrutable Record Carrier and Its Manufacture," issued on March 12, 1991 to Wilhelmus Raaymakers Franciscus L.J.M. Kuijpers of the Netherlands.⁷⁶ CX-17 ('825 Patent).

Philips asserts claims 1, 2,4, 5 and 6 of the '825 patent, which are, as follows:

1. An optically readable and inscribable record carrier comprising: a recording layer for recording an information pattern of optically

⁷⁶ The '825 patent issued upon Application No. 265,649, which was filed on November 1, 1988, based on a foreign application priority date of January 22, 1988 (Netherlands 8800152). The '825 application was assigned to the complainant in this investigation, U.S. Philips Corporation. CX-17.

The '825 patent Abstract refers to:

A record carrier (1) in the form of a disc-shaped carrier provided with a radiation-sensitive layer (6) having a servo track (4). The servo track produces track modulation by having a radial wobble, or lateral periodic deviation whose frequency is modulated with a position-information signal (FIG. 2). Apparatus (FIG. 8) is presented which forms the track pattern during manufacture of the record carrier (1). When an information signal (Vi) is recorded on the record carrier (1) and the recorded signal is read by recording and/or read apparatus (FIG. 4), the position-information signal (FIG. 2) is recovered by an FM demodulator device (60) from variations in the scanning beam (55) which are [produced] by the track modulation. Moreover, a clock signal for the purpose of scanning-velocity control is recovered from this variation in the scanning beam. Furthermore, embodiments of the record carrier highly suitable for recording EFM-modulated signals are described.

Id.

detectable recording marks, the record carrier having a servo track wherein a portion for information recording includes a periodic track modulation different from the information pattern, the periodic track modulation having a modulation frequency indicative of a position-information signal comprising position-code signals alternating with position-synchronization signals.

2. An optically readable inscribable record carrier as claimed in claim 1, characterized in that the position-code signals are biphasemark-modulated signals and the position-synchronization signals have signal waveforms different from the biphasemark-modulated signal.

* * *

4. A record carrier as in either claim 1 or claim 2, characterized in that the periodic track modulation has a period between 54×10^{-6} meters, and 64×10^{-6} meters and a distance between starting positions of the track portions includes the position-synchronization signal corresponding to 294 times an average of the period of the track modulation.

5. A record carrier as claimed in any of the claims 1 or 2, characterized in that the position-code signal is indicative of elapsed time at a nominal scanning velocity to cover a distance between a beginning of the track and a position where the track provides track modulation corresponding to the position where the track provides track modulation corresponding to the position-code signal.

6. A record carrier as claimed in claim 5, characterized in that the position-code signal is modulated in conformity with a position-information code which comprises at least a portion similar to an absolute-time code contained in an EFM-modulated signal in conformity with the CD-standard.

CX-17 ('825 Patent), col. 18, lines 42-57; col. 18, line 64 through col. 19, line 16.

The '825 patent addresses some of the same problems as the '856 patent, and lists the same inventors. The '825 patent provides a better means for synchronizing signals during the recording process. Hesselink Tr. 587-588. An improvement described in the '825 patent relates

to correction of the phase difference between the EFM position code signals and absolute time codes that may result from flaws, such as scratches on the carrier surface during recording.⁷⁷ See CX-17 ('825 Patent), col. 10, lines 1-5. The record carrier of claim 1 is configured for a system in which scanning velocity is corrected depending upon the phase difference between the two signals. See CX-17 ('825 Patent), col. 10, lines 6-11; Hesselink Tr. 587, 590; Mansuripur Tr. 1195. Claim 2, which depends from claim 1, specifies that the position-code signals are "biphase mark modulated signals," which represent a particular digital data encoding scheme. These position-code signals contrast with the position-synchronization signals, which violate the rules

⁷⁷ During the recording process, position code signals are written in the data track as the ATIP signals encoded into the wobble. CX-17 ('825 Patent), col. 9, line 62 through col. 10, line 17. Respondents' technical expert explained that recording the position information in the data track is required, *inter alia*, because some conventional CD players cannot read the wobble signal and need to have the position information in the data track in order to work. He testified:

Q Turning now to the '825 patent, is the reason that the address code is both in the wobble as well as written in the data track, is that because when a conventional CD player reads that disc, that it's incapable of taking the address code off of the wobble and needs to have it in the data track?

A Yeah, I believe that's part of the reason. The standard format for EFM has this address code in the data track, and there's some CD players that are not equipped with wobble signal detection electronics, can only extract the address from the data. But in other cases, there is a degree of flexibility that is provided by the presence of address in both the wobble grooves and the data track. So the system can get the address from either one, and for some reason, if one of them is not giving the correct address, if there is a dust particle or something that eliminates the address signal from one region, then it can always be extracted from the other source of address.

Mansuripur Tr. 1372-1373.

It appears that it was not until after the application for the '856 patent was filed that Philips determined that a "drift" could occur between the two address schemes on the disc. See Raaijmakers Dep. (JX-1C) Tr. 115-116.

of biphase-mark encoding.⁷⁸ Hesselink Tr. 593-594. While there are many areas of agreement among the parties as to the claimed invention of the '825 patent, three issues have been raised with respect to proper construction.

First, Respondents argue that the claim term "period," as in "period track modulation" must conform to the proposed interpretation offered for the other asserted patents that use the term. *See* Respondents' Post-Hearing Patent Brief at 37; Respondents' Post-Hearing Reply Brief at 5. That issue has already been analyzed, in detail in connection with the '401 patent, and Respondents' proposed interpretation has been rejected.

Second, Respondents argue that Philips improperly reads analog frequency modulation to the asserted claims of the '825 patent, and thus does not allow for the frequency key shift method specifically mentioned in the specification.⁷⁹ By "analog," Respondents appear to be referring to the modulation of a carrier frequency. *See* Respondents' Post-Hearing Patent Brief at 37-38. A review of the parties' brief shows that while Philips does argue that the '825 patent relies on

⁷⁸ In bi-phase mark modulation, two bits are needed to represent each "1" or "0." If the two bits are either both high or low they will represent a "0," if there is a transition either from high to low or low to high, the bits represent a "1." Under such an encoding scheme, there will never be three consecutive highs or lows. The synchronization signals contain two sets of bits with three consecutive bits of the same value and are thereby differentiated from the position information signals by violating the bi-phase rules. Hesselink Tr. 593-594.

⁷⁹ The specification of the '825 patent states, in part:

Moreover, it is to be noted that for the FM modulator other FM modulators can be used than the modulator 119 shown in FIG. 9, for example a conventional CPFSK modulator (CPFSK=Continuous Phase Frequency Shift Keying). Such CPFSK modulators are described inter alia in A. Bruce Carlson: "Communication Systems", McGraw Hill, page 519 ff.

analog frequency modulation, it does not deny that continuous phase frequency shift keying or “CPFSK” is a form of frequency modulation.⁸⁰ The issue is whether other (non-CPFSK) prior art that does not use a carrier frequency discloses frequency modulation, and alone or in combination with other art renders invalid the asserted claims of the ‘825 patent. *See, e.g.*, Respondents’ Post-Hearing Patent Brief at 19. The specific art in question is discussed in detail below with respect to the validity issue. In any event, it is clear from the plain language of independent claim 1 that the claimed invention has a periodic track modulation with a *modulation frequency* indicative of a position-information signal, and that no part of that limitation can be avoided. *See* CX-17 (‘825 Patent), col. 18, lines 42-51.

Third and finally, Respondents argue that the asserted claims of the ‘825 patent require a record carrier operating in a recording device. It is argued that the position-code signals specify information that is only meaningful and accurate when the record carrier spins at a certain velocity in a recording or reproduction device. *See* Respondents’ Post-Hearing Patent Brief at 39. Philips and the Commission Investigative Staff oppose Respondents’ proposed interpretations. *See* Philips’ Post-Hearing Brief at 35-36; OUII Post-Hearing Brief at 22.

As in the case of many other claims previously discussed in this Initial Determination, the asserted claims of the ‘825 patent plainly recite a “record carrier,” and not the device in which a record carrier is placed for recording or reading, or the placing of the record carrier in such a device. The claims cover a record carrier that is configured in such a way (for example, to be made with a particular periodic track modulation) so as to exhibit certain characteristics if and

⁸⁰ Philips argues that its technical expert testified, and the ‘825 patent states, that CPFSK is a frequency modulation techniques that can be used with the claimed invention. *See* Philips’ Post-Hearing Patent Reply Brief at 19.

when it is used. *See* Hesselink Tr. 2596-2597. The claims of the '825 patent do not, however, require that the record carrier be placed in an operating recorder or player.

B. Infringement Determination

Philips argues that Respondents' accused discs directly infringe the asserted claims of the '825 patent, as confirmed by tests performed by experts for Philips and Respondents. It is also argued that Respondents have admitted that their discs include position and synchronization signals in the wobble track,⁸¹ and that their discs are Orange Book compliant, thus providing additional evidence of infringement. Philips' Post-Hearing Patent Reply Brief at 36.

Respondents argue that their discs do not infringe the asserted claims of the '825 patent, under their proposed claim interpretation. Respondents' arguments concerning the characteristics of frequency modulation and the existence of frequency modulation in the prior art do not relate to the question of whether Respondents actually practice the asserted claims of the '825 patent. Rather, Respondents argue that the accused discs do not exhibit "periodic modulation" required by the claims because of the deliberate modulation of the radial track position with varying address and control information, and with deviation from perfect periodicity larger than +/- 50 Hz. Respondents also argue that the asserted claims of the '825 patent require a recording/reproduction device. Respondents' Post-Hearing Patent Brief at 39-40; Respondents' Post-Hearing Patent Reply Brief at 12.

The Commission Investigative Staff argues that Respondents' accused discs infringe the

⁸¹ Philips argues that a foreign subsidiary of Princo has admitted in foreign litigation that Princo Taiwan's CD-Rs contain all the limitations of claim 1 of the '825 patent. Philips' Post-Hearing Patent Reply Brief at 36. That claim does appear to be accurate. *See* CX-620. The foreign litigation is discussed further, *infra*, at notes 84 and 85.

asserted claims of the '825 patent. It is argued that given the proper interpretation of the term "periodic," the accused products have tracks with the required periodic modulation, noting that the +/- 1 kHz bandwidth found in the accused products is expressly within the frequency modulation of +/- 1 kHz suggested in the specification of the '825 patent for EFM signals. The Staff further argues that with respect to the question of whether or not the asserted '825 patent claims require a device, Respondents do not give a fair reading to the '825 patent claims. With respect to claim 5, for example, it is argued that all that is required is a disc containing position codes such that if the disc is spun at a certain velocity, the position codes will correspond to elapsed time at that velocity. OUII Post-Hearing Patent Brief at 21-22 (citing, *inter alia*, Hesselink Tr. 2596).

As in the case of other patents discussed in this Initial Determination, there is no dispute concerning the configuration of the accused discs. Respondents' technical infringement defense is based on matters of claim construction. Respondents' proposed interpretations have been rejected. It has been established by at least a preponderance of the evidence that Respondents' accused products directly infringe the asserted claims of the '825 patent.

C. Validity

Respondents argue that the asserted claims of the '825 patent are invalid in view of (1) U.S. Patent No. 4,942,565 which issued to Roger Lagadec and was assigned to Sony Corporation of Japan (RX-177),⁸² and (2) United States Patent No. 4,907,216 which issued to Johan M. Rijnsburger and was assigned to U.S. Philips Corp. (RX-66/RX-175). Respondents'

⁸² Respondents admit that the United States '565 Lagadec patent "is virtually identical to" the disclosure of the European Lagadec patent 0 265 695 B1 (RX-80). Respondents' Post-Hearing Patent Brief at 47.

Post Hearing Patent Brief at 40-43; Respondents' Post-Hearing Patent Reply Brief at 15-16.

Respondents argue that the Lagadec patent discloses all elements of asserted claims 1, 3, 4, 5 and 6 of the '825 patent, and therefore renders those claims invalid due to anticipation.⁸³

With respect to asserted claim 2 of the '825 patent, Respondents argue that the Lagadec patent does not disclose that the time signal codes are "biphase-mark-modulated signals." Nevertheless, Respondents argue that it would have been obvious to modulate the time code signals shown by Lagadec using biphase-mark modulation, and to use a different modulation scheme to encode the preamble (synchronization) signals. It is argued that "[s]uch a scheme is shown in the Rijnsburger '216 patent." See Respondents' Post Hearing Patent Brief at 41; see also Respondents' Post-Hearing Patent Reply Brief at 15-16 (discussing anticipation, and omitting claim 2). Thus, it appears that Respondents argue that claim 2 is also invalid for obviousness.⁸⁴ Respondents argue that although the frequency of the Rijnsburger track may not be an example of frequency modulation, "it would have been obvious to a person skilled in the

⁸³Anticipation is a question of fact which must be proven by clear and convincing evidence. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir.), cert. denied, 516 U.S. 988 (1995); *Scripps Clinic & Research Found. v. Genentech Inc.*, 927 F.2d 1565, 1576 (Fed. Cir. 1991). A claim is anticipated, and therefore invalid pursuant to 35 U.S.C. § 102, if a single prior art reference discloses each and every limitation of the claim. *Helifix Ltd. v. Blok-Lok, Ltd.*, 208 F.3d 1339, 1346 (Fed. Cir. 2000); *Bard v. M3 Systems*, 157 F.3d 1340, 1349 (Fed. Cir. 2000); *Glaxo*, 52 F.3d at 1047.

In order to be considered prior art under 35 U.S.C. § 102, a reference must have been sufficiently accessible to the public interested in the art before the critical date. *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1568 (Fed. Cir. 1988). The disclosure need not be express, but may anticipate by inherency where such inherency would be appreciated by one of ordinary skill in the art. *Glaxo*, 52 F.3d at 1047; *Standard Havens Prod., Inc. v. Gencor Indus., Inc.*, 953 F.2d 1360, 1369 (Fed. Cir. 1991); *Continental Can Co. USA Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991).

⁸⁴A discussion of the law of obviousness is contained, *supra*, in the section pertaining to the '209 and '493 patents.

art in 1988 to use some form of frequency modulation in the system disclosed in the Rijnsburger patent.” Respondents’ Post-Hearing Patent Reply Brief at 42-43.

Both Philips and the Commission Investigative Staff dispute Respondents’ arguments. Philips and the Staff argue that Respondents have not demonstrated that any asserted claim of the ‘825 patent is rendered anticipated or rendered obvious by any of the art cited by Respondents. *See* Philips’ Post-Hearing Patent Brief at 36-40; Philips’ Post-Hearing Patent Reply Brief at 19-24; OUII Post-Hearing Patent Brief at 24-26, 35; OUII Post-Hearing Patent Reply Brief at 15.

Frequency modulation (FM) is central to the claimed invention of the ‘825 patent because it allows continuous clocking, address and synchronization information to be encoded into the pregroove wobble, without interrupting user data in the pregroove or the loss of track space for storing user data on the disc. *See, e.g.,* Mons Tr. 375, 385-387, 394-410. Yet, the Lagadec and Rijnsburger patents relied upon by Respondents do not use frequency modulation. The prior art techniques used instead by Lagadec and Rijnsburger are susceptible to numerous problems that the ‘825 patent seeks to avoid, and indeed these prior art patents teach away from the solution disclosed and claimed in the ‘825 patent. *See* Hesselink Tr. 2580-2585.

Respondents attempt to overcome the fact that their cited prior art does not teach frequency modulation by arguing that the ‘825 patent does not require frequency modulation as that term is ordinarily understood. Respondents propose instead that any change in frequency in accordance with a position information signal will satisfy the requirement of claim 1, regardless of whether there is modulation of a carrier frequency. *See, e.g.,* Respondents’ Post-Hearing Patent Reply Brief at 43; Mansuripur Tr. 1206; Mansuripur Decl. ¶¶ 11-12 (“Any changing of the frequency of the track position in accordance with a position-information signal will satisfy the

claim language.”).

If frequency modulation were not needed in the invention of the ‘825 patent, or if the nature of frequency modulation were defined in an overly broad manner, then obviously the prior art would be more likely to render the asserted ‘825 patent claims invalid. This is essentially how Respondents propose that the ‘825 patent be interpreted and how the prior art should be analyzed.

However, the Administrative Law Judge must reject Respondents’ proposal. The relevant limitation in claim 1 of the ‘825 patent plainly requires a track “having a *modulation* frequency indicative of a position-information signal.” CX-17 (‘825 Patent), col. 18, lines 48-49 (emphasis added). Respondents’ construction wrongly reads the word “modulation ” out of the phrase “having a modulation frequency.”⁸⁵ Yet, it is axiomatic that meaning must be given to every

⁸⁵ A similar rejection of this argument occurred when Philips sued Princo Taiwan’s wholly-owned German subsidiary, Princo Digital Disc GmbH, in the United Kingdom. The Princo subsidiary was accused of infringing European Patent (UK) 0 325 330, which is related to the ‘825 patent. The Princo subsidiary’s defenses were based on alleged invalidity in view of other European patents, including the Lagadec and Rijnsburger patents that are related, at least in subject matter, to the Lagadec and Rijnsburger patents at issue in this investigation. While the patents involved in the UK litigation do not have identical claims and specifications, it is noteworthy that the questions presented concerning the nature and definition of frequency modulation are similar to those raised here. The High Court of Justice recently issued a Judgment (dated July 7, 2003) in which the Princo subsidiary’s unconventional definition of frequency modulation was rejected, and the Lagadec and Rijnsburger patents were not found to render the suit patent invalid. *See, e.g.*, CX-620, ¶¶ 56-59, 68, 72-73 (attached to a Notice filed by Philips on July 11, 2003). In the UK case, the presiding Justice of the Chancery Division of the High Court of Justice stated that “[t]he word ‘modulation’ must be considered first.” *Id.*, ¶ 26. Mr. Justice Pumfrey found, *inter alia*, that a carrier signal is required for frequency modulation, stating:

In its basic, or classical, meaning, frequency modulation is one of the three methods of modulating a carrier signal, a sinusoidal waveform, to carry information. The other two are amplitude modulation (AM) and phase modulation. Phase modulation

(continued...)

word in a claim. *See Bell Communications Research, Inc.*, 113 F. Supp. 2d at 653.

It is also axiomatic that the claims must be construed in light of the specification. *Vitronics*, 90 F.3d at 1582. The specification of the '852 patent clearly and repeatedly calls for frequency modulation. *See, e.g.*, CX-17 ('825 Patent), col. 4, lines 20-24, col. 5, lines 66-68, col. 14, line 25 though 18, lines 16; *see also* Hesselink Tr. 2579.

Lagadec does not employ analog frequency modulation or any means that can be described as frequency modulation in any conventional way.⁸⁶ Hesselink Tr. 2580-2584, 2599. The Lagadec patent's disclosure in fact exhibits several problems that the analog frequency modulation method disclosed in the '825 patent was designed to solve.⁸⁷ Hesselink

⁸⁵ (...continued)

is related to frequency modulation but need not be further considered. AM is irrelevant. Frequency modulation is a method of transmission in which the frequency of a carrier wave is modulated by the message signal. The deviation of the frequency of the modulated wave from the so-called centre frequency is proportional to the amplitude of the message signal.

Id., ¶ 27.

⁸⁶ The High Court Justice in the United Kingdom observed that “[a] reductionist approach can justify the identification of any signal in which different instantaneous signal frequencies appear depending upon a data value (past, present or future) as ‘frequency modulated’ in a suitable context. After all, their frequency is indeed modulated. But that is not enough. In context in the specification, the purpose of the frequency modulation as set out in the objects of the invention I have identified above is precisely to position the frequency spectrum of the . . . message signal in the right place so as not to interfere either with the baseband recorded EFM signal or with the spectrum of the control signals.” CX-620, ¶ 56.

⁸⁷ In addition to expert testimony, the record also contains evidence of actual industry concerns about the prior art methods. Philips and Sony considered, and rejected, the digital method as disclosed in Lagadec because it requires a high bandwidth signal that interferes with the low frequency servo signal from the pregroove as well as the information later recorded on the disc. Mons Tr. 396-397, 407-409. It is possible to filter out these interfering frequency components completely because the low frequencies also carry the position information.

(continued...)

Tr. 2583-2585. According to Respondents, the Lagadec patent discloses a wobbled pregroove whose shape is varied at frequencies indicative of alternating address signals and synchronization signals (or preambles), with the address and synchronization signals encoded as binary 0s and 1s. Respondents argue that the “track shape will vary in accordance with specific patterns of 0s and 1s being represented in the preamble and time codes.” Respondents’ Post-Hearing Patent Reply Brief at 15-16. Respondents argue that Lagadec discloses frequency modulation because Lagadec discloses frequency key shifting, “which is precisely contemplated by the ‘825 patent for modulating the track shape. *See, e.g., Id.* at 16.

However, continuous phase frequency shift keying uses a carrier signal, at least as it is referenced in the ‘825 patent. Hesselink Tr. 2567. In the case of the ‘825 patent, it would be the 22.05 kHz wobble signal. CPFSK produces an analog sinusoidal waveform having two instantaneous frequencies, one corresponding to the high value of the digital modulating signal (“1”) and one corresponding to the low value of the digital modulating signal (“0”). By using biphasic modulation, there is always an equal number of 1s and 0s in the code, so that the average value of the signal, i.e., the frequency, will always be equal to the carrier signal. Such a system is important for reliable velocity control. Hesselink Tr. 2566-2570, 2578-2579.⁸⁸ This is not the

⁸⁷ (...continued)

Hesselink Tr. 2584. Lagadec’s digital method has the additional shortcoming that it leaves no room for “error detection encoding” in the system and, as a result, is “very prone to errors.” Hesselink Tr. 2581-82; *see also* CX-619C, ‘825 Slide 4; RX-177.

⁸⁸ CX-619C, ‘825 Slide 3 (defining “Frequency Modulation” as “Modulation, in which the instantaneous frequency of the modulated wave differs from the carrier frequency by an amount proportional to the instantaneous value of the modulating wave,” and illustrating the frequency modulation of the 22.05 kHz wobble signal with a digital, bi-phase “modulating signal,” and specifically identifying a CPFSK signal as a frequency modulated signal, and giving an example
(continued...)

same as the pattern of digital 0s and 1s taught in the Lagadec patent, in which the average value of the frequency changes as the address changes. *See, e.g.*, Hesselink Tr. 2580, 2583 (For example, “if you get more 1s in your address code, you’re going to get more low-frequency components in your average signal.”).

Similarly, the Rijnsburger patent does not use frequency modulation or appear to be compatible with frequency modulation. Rijnsburger does not use the biphasemark-modulated signals missing from Lagadec, which are needed to render obvious claim 2 of the ‘825 patent (assuming that Lagadec supplied the other elements). Hesselink Tr. 2583-2584. Instead, Rijnsburger uses three major frequencies for encoding position information on the disc. Hesselink Tr. 2582, 2599; RX-66. The ‘825 patent, like the ‘856 patent, uses an FM-modulated wobble with a precise, periodic 22.05 kHz average frequency. In contrast, the Rijnsburger patent is not well-suited for use with the wobble clock because in Rijnsburger, “[t]he average frequency changes,” and “[l]ow-frequency information interferes with velocity control, and there is no room for error.” Hesselink Tr. 2582; *see* CX-619C, ‘825 Slide 5; RX-66.

Even if the Rijnsburger signal is filtered to change the waveform, Rijnsburger would not look like, or have the same results as, a frequency modulated signal would have for “controlling the speed and finding its position.” Still, there would be interference. Hesselink Tr. 2583. Furthermore, filtering out the low- and high- frequency components in Rijnsburger would risk filtering out the data the signal is supposed to be carrying. Hesselink Tr. 2583-2585 (ability to provide information without interference and other problems presented by Lagadec and

⁸⁸ (...continued)
of the waveform).

Rijnsburger “is the beauty of frequency modulation.”); *see* CX-619C, '825 Slide 7.

In addition to the deficiencies of the Lagadec and Rijnsburger patents when it comes to the elements of the '825 patent claims, Respondents' approach to combining references is legally improper and does not satisfy their burden of proof by clear and convincing evidence. Respondents' arguments concerning Lagadec and Rijnsburger are based on the type of impermissible analysis that is available only through hindsight, and is presented without a convincing explanation of the teaching or motivation required to combine the prior art references. *Ecolochem*, 227 F.3d at 1371-72. It does not suffice to offer an unsupported opinion that one of ordinary skill in the art would have known about the prior art, or even about frequency modulation in general. The fact that Lagadec and Rijnsburger existed does not explain how one of ordinary skill in the art would know how to combine them to modulate the time code signals shown by Lagadec using biphase-mark modulation, and to use a different modulation scheme to encode other signals. Rather, there must be a “convincing discussion of the specific sources of the motivation to combine the prior art references.” *Id.* at 1373.

Respondents have not demonstrated by clear and convincing evidence that the asserted claims of the '825 patent are invalid due to anticipation or obviousness.

VII. THE '764 PATENT

A. Claim Construction

United States Patent No. 5,418,764, entitled “Recording Device, a Record Carrier Having Preformatted Address Codes and Auxiliary Codes Providing Control Data for Use by the Recording Device, and an Information Recording System Including Both the Recording Device and the Record Carrier,” issued on May 23, 1995, to Rudolf Roth and Paulus C.M. van der Zande

of the Netherlands.⁸⁹ CX-16/RX-567 ('764 Patent).

Philips asserts independent claim 20 and dependent claims 23-34 of the '764 patent, which are, as follows:

20. A record carrier having a preformed recording track which is transversely modulated in accordance with an auxiliary signal, said auxiliary signal comprising:

successive address codes specifying addresses of successive track portions at which said address codes are located; and

auxiliary codes, arranged among said address codes, specifying control data for use by a recording device in recording an information signal on said track, said auxiliary codes having identifying indicia which distinguishes them from said address codes.

⁸⁹ The '764 patent issued upon Application No. 41,141, filed on March 31, 1993, based on a foreign priority application date of May 8, 1989 (Netherlands 8901145). The United States '141 application is a continuation of Serial No. 518,883, filed on May 4, 1990, abandoned, which is a continuation-in-part of Serial No. 287,941, filed on Dec. 19, 1988 (and issued as U.S. Patent No. 5,060,219) and application Serial No. 453,545, filed on December 20, 1989, abandoned, which is a continuation-in-part of application Serial No. 265,638, filed on November 1, 1988 (and issued as U.S. Patent No. 4,901,300). The '764 patent was assigned to the complainant in this investigation, U.S. Philips Corporation. CX-16/RX-57 ('764 Patent). The online version of the '764 patent provides clarification of application history under "Cross Reference to Related Applications. See <http://patft.uspto.gov> (accessed Aug. 5, 2003).

The Abstract of the '764 patent refers to:

A recording device, record carrier, and information recording system including both. The recording device is adapted to read an auxiliary signal from the record carrier. The record carrier has a track which is transversely modulated in accordance with the auxiliary signal. The auxiliary signal includes address codes which specify addresses at which those codes are located on the track, and auxiliary codes which specify control data for use by the recording device when recording an information signal on the track. The address codes and auxiliary codes are distinguishable from each other and can be extracted by the recording device.

Id.

* * *

23. The record carrier as claimed in claim 22 ^[90], wherein said address codes include absolute time codes specifying said distances as playing time of said record carrier from said reference position.

24. The record carrier as claimed in claim 20, wherein said track is transversely modulated such that there is a periodic excursion of said track transverse to the track direction, said excursion having a frequency in conformity with said auxiliary signal.

25. The record carrier as claimed in claim 20, wherein said track portions are substantially concentric about a common center of rotation, and said address codes indicate the addresses of said track portions in relation to a reference position which is at a predetermined radial distance from said center of rotation.

26. The record carrier as claimed in claim 25, wherein said auxiliary codes specify a track portion at a radial distance from said reference position at which a table of contents should be recorded on said record carrier.

27. The record carrier as claimed in claim 26, wherein the track portion at which the table of contents should be recorded is closer to said center of rotation than is said reference position.

28. The record carrier as claimed in claim 25, wherein said auxiliary codes specify a track portion at a radial distance from said reference position at which a lead-out signal indicating the end of said information signal must commence in order to be completed before the end of said track.

⁹⁰ Claim 22, which is not asserted in this investigation, is, as follows:

22. The record carrier as claimed in claim 20, wherein said address codes and said auxiliary codes are arranged in said auxiliary signal such that there are codes at equidistant locations on said track, said address codes indicating distances, as measured in the track direction, between locations at which they are located and a specific reference position, whereby a clock signal can be derived from said auxiliary signal which is in synchronism with the codes at equidistant locations on said track.

29. The record carrier as claimed in claim **20**, wherein said auxiliary codes specify the location of the track portion at which a table of contents should be recorded on said record carrier.

30. The record carrier as claimed in claim **29**, wherein said auxiliary codes also specify the location of the track portion at which a lead-out signal indicating the end of said information signal must commence in order to be completed before the end of said track.

31. The record carrier as claimed in claim **20**, wherein said auxiliary codes specify the location of the track portion at which a lead-out signal indicating the end of said information signal must commence in order to be completed before the end of said track.

32. The record carrier as claimed in claim **20**, wherein said address codes and said auxiliary codes have the same data format.

33. The record carrier as claimed in claim **32**, wherein said auxiliary codes are distinguished from said address codes in that said auxiliary codes comprise bit combinations which do not occur in said address codes.

34. The record carrier as claimed in claim **20**, wherein said auxiliary codes are distinguished from said address codes in that said auxiliary codes comprise bit combinations which do not occur in said address codes.

CX-16/RX-57 ('764 Patent), col. 14, line 34 through col. 16, line 14.

The '764 patent describes a way of providing a recorder certain data that it needs to operate. This is done by frequency modulating the pre-groove wobble to provide an "auxiliary signal" that includes address codes and also "auxiliary codes which can be distinguished from the address codes" and which "comprise control data for controlling the recording process"

CX-16/RX-57, col. 1, line 67 through col. 2, line 12. The auxiliary codes are distinguished from the address codes in the auxiliary signal, for example, by using certain unique bit combinations not used in the address codes. *See* Hesselink Tr. 617-618; CX-16/RX-57 ('764 Patent), col. 7,

lines 7-10) ; *see also* CX-16/RX-57 ('764 Patent), col. 1, lines 23-34 (referring to the '856 patent's general disclosure of FM-modulating address information into the pre-groove wobble), col. 3, lines 40-44 (referring to the '825 patent as disclosing an example of an inscribable record carrier that may be used with the claimed invention). The control information provided via frequency modulation of the pre-groove wobble includes, for example, identifying the type of disc, the starting point of the program area or lead-in area of the disc, and the recommended laser power for writing on the particular disc. Hesselink Tr. 629;CX-16/RX-57 ('764 Patent), col. 5, line 61 though col. 7, line 62. This information is especially useful for recording in a format that is readable by standard CD players. CX-16/RX-57 ('764 Patent), col. 1, lines 41-64. The '764 patent describes the auxiliary codes as providing information needed to control specific aspects of the recording process and as having a specific format. *See* Hesselink Tr. 628-645; CX-16/RX-57 ('764 Patent), col. 2, lines 7-12, col. 6, line 64 through col. 7, line 1, Fig. 2, Fig. 6, Fig. 7.

There are three areas of dispute concerning construction of the asserted claims, with Respondents' proposed interpretations opposed by both Philips and the Commission Investigative Staff.

The Claim Term "Periodic"

Respondents argue that the term "period" as used in claim 24 of the '764 patent is properly construed to be consistent with its proposed interpretation for the '401, '856 and '825 patents., i.e., "repeating itself identically at regular intervals, subject to acceptable tolerances from perfect periodicity due to noise or manufacturing imperfections." Respondents rely on the arguments set forth in connection with the other patents. *See* Respondents' Post-Hearing Patent

Reply Brief at 44.

As discussed at length in connection with the '401 and other patents, Respondents' proposed construction must be rejected in view of the patent claims and other evidence. Respondents have not demonstrated that the '764 patent claims and specification, or other evidence, require Respondents' proposed interpretation. Furthermore, the Administrative Law Judge does not find any indication in the claims or other intrinsic evidence that the term "periodic," as used in the '764 patent, should be limited in the manner proposed by Respondents.

Whether the Claims Require a Record Carrier Operating in a Recording Device

Respondents argue that the asserted claims of the '764 patent require a record carrier operating in a recording device because the address codes specify information that is only meaningful and accurate when the record carrier is spinning at a certain velocity in a recording or reproduction device. Respondents make no arguments that differ materially from those advanced in connection with the '401, '856 and '825 patents. *See* Respondents' Post-Hearing Patent Brief at 44. As in the case of the '401, '856 and '825 patents, there is no reason to adopt Respondents' proposed interpretation, especially in view of the fact that the asserted claims of the '764 patent read on a "record carrier" and its properties, not a recording device or a method of using a recording device.

"Auxiliary Codes"

Respondents argue that in accordance with the language of independent claim 20 of the '764 patent, the "auxiliary codes" are used to "specify[] control data for use by a recording device in recording an information signal on said track." Respondents' Post-Hearing Patent Brief at 43. Respondents further argue that the auxiliary codes claimed in the '764 patent cover

synchronization codes, such as those disclosed in the '856 and '825 patents. They argue that synchronization codes provide the information necessary to record information onto a record carrier, and that Figure 2 of the '764 patent shows alternating synchronization signals and address codes as an "auxiliary signal." *See* Respondents' Post-Hearing Patent Reply Brief at 10-11.

Philips argues that Respondents impermissibly attempt to equate "auxiliary codes" with synchronization signals in order to cite prior art that otherwise lacks relevancy and could not render the asserted claims of the '764 patent invalid. *See* Philips' Post-Hearing Patent Brief at 41. It is argued that Respondents' proposed interpretation of the term "auxiliary codes" cannot be reconciled with the plain language of the claims, the specification or the prosecution history, in which the operation and structure of auxiliary codes are clearly defined and differentiated from synchronization signals. *See Id.* at 42-43.

The Commission Investigative Staff provides a detailed explanation of how auxiliary codes are used on a disc, and argues that the specification of the '764 patent clearly specifies that auxiliary codes do not include synchronization signals, which signals the system that an address code or auxiliary code is about to begin or end. *See* OUII Post-Hearing Brief at 8-10, 26-28.

The '764 patent defines the operation and structure of the claimed auxiliary codes. *See, e.g.,* Hesselink Tr. 642-45; CX-16/RX-57 ('764 Patent), col. 4, line 44 through col. 5, line 31. Auxiliary codes are described in the specification as containing specific information that the recording device can extract from the record carrier, or disc, and use for controlling the recording process. CX-16/RX-57 ('764 Patent), col. 2, lines 7-12; Hesselink Tr. 2588-2589. The specification describes how the control information tells the recorder, *inter alia*, where a table of

contents should be recorded, the address at which the lead-out area starts, the optimum write energy for recording on the disc, the type of record carrier and the write strategy. *See* CX-16/RX-57 ('764 Patent), col. 5, line 61 through 7, line 62.

As recited in claim 20, the “auxiliary signal” used to modulate the wobbled pre-groove of the disc comprises (1) address codes and (2) auxiliary codes, the latter characterized as “specifying control data for use by a recording device in recording an information signal on said track.” CX-16/RX-57 ('764 Patent), col. 14, lines 21-29. By contrast, synchronization codes violate the rules used by the information-carrying codes. Philips’ technical expert analogized them to punctuation marks, which do not provide information in the way that text does. Hesselink Tr. 2591-2592, 2595.

The specification explicitly distinguishes auxiliary codes from synchronization signals. Contrary to Respondents’ characterization of Figure 2, the ‘764 patent specification explains that Figure 2 provides “an example of a suitable auxiliary signal comprising code signals **12** which alternate with synchronized signals **11**,” and discloses that address codes and auxiliary codes can be placed in the code signals **12**, not in the synchronization signals **11**. The specification then describes how the auxiliary codes are distinguished from address codes by specific bit combinations. CX-16/RX-57 ('764 Patent), col. 4, line 44 through line col. 5, line 11; Hesselink Tr. 2586-2593. The specification also discloses that the address and auxiliary codes may be distinguished by being “preceded by different synchronization signals **11**,” which is a further recognition of the fundamental difference between auxiliary codes and synchronization signals. CX-16/RX-57 ('764 Patent), col. 6, line 64 through col. 7, line 6.

In addition, it appears that the PTO recognized the distinction between synchronization

signals and the '764 patent's auxiliary signals and the auxiliary codes. During prosecution, the Examiner cited U.S. Patent No. 4,375,088 to de Haan et al. (RX-77) as disclosing the "invention substantially as claimed." The Examiner noted that de Haan disclosed many features, including a "sync area," a "clock signal" and a "modulation process clock signal." Nevertheless, the Examiner noted that de Haan "does not disclose the use of an auxiliary signal." In order to find auxiliary signals and auxiliary codes in the prior art, the Examiner had to look at other art, beyond de Haan, with its "sync area." The Examiner stated that in order for the optimal laser power level to be specified, de Haan would have to be modified to include "test words, i.e. auxiliary codes" disclosed in U.S. Patent No. 4,631,713 to Romeas et al. *See* CX-41, CX-42/RX-93 ('764 Patent Prosecution History), Paper No. 5 at 3-4, Notice of References Cited (with a copy of the Romeas patent included therewith).

In subsequent Remarks to an Amendment, the Applicants stated that while de Haan disclosed a record carrier with synchronization areas and a track was transversely modulated by a clock and tracking signals, the Examiner was correct in discerning that de Haan nevertheless did not disclose auxiliary signals in the form of address codes and auxiliary codes. The Applicants disagreed, however, that the missing elements could be supplied by the other art cited by the Examiner, arguing, among other things, that it was likely that the cited prior art patents were not compatible and could not be combined. *See* CX-41, CX-42 ('764 Patent Prosecution History), Paper No. 7 at 17-18. The '764 patent issued over de Haan and Romeas. *See, e.g.,* CX-16/RX-57 ('764 Patent).

The '764 prosecution history appears, therefore, like the '764 patent specification to indicate to one of ordinary skill reading the document that the auxiliary codes are separate from

synchronization signals.

Having reviewed the claims, the specification and the prosecution history of the '764 patent it is clear that the term "auxiliary codes," as used in the asserted claims does not include synchronization signals.

B. Infringement Determination

Philips argues that Respondents' accused products directly infringe the asserted claims of the '764 patent. It is argued that infringement was demonstrated by tests performed by Philips' technical expert. Philips also argues that additional evidence of infringement is found in Respondents' documentation concerning the ATIP encoder of the accused discs, and Respondents' admission that their discs are Orange Book compliant. Philips' Post-Hearing Patent Brief at 43.

Respondents argue that their accused products do not infringe any asserted claim of the '764 patent because all the asserted claims require a record carrier operating in a recording device. With respect to asserted claim 24, Respondents further argue that when it is properly construed there is no infringement because the accused discs do not have tracks with the required "periodic" excursions. Respondents' Post-Hearing Patent Brief at 44-45; Respondents' Post-Hearing Patent Reply Brief at 12.

The Commission Investigative Staff argues that the accused products infringe the asserted claims of the '764 patent without the use of a recorder or player, and that when claim 24 is properly construed, the accused products have a track that is "traversely modulated such that there is a periodic excursion." OUII Post-Hearing Patent Brief at 23 (citing Hesselink Tr. 646-647, 650-651).

Respondents' defense to Philips' allegations of infringement is based on their proposed claim construction, which has been rejected. Philips has demonstrated by at least a preponderance of the evidence that Respondents' accused products directly infringe the asserted claims of the '764 patent.

C. Validity

Respondents argue that the asserted claims 20 and 32-34 of the '764 patent are anticipated by the prior art, and that asserted claims 23-31 of the '764 patent are obvious in view of the prior art. Therefore, it is argued that all asserted claims of the '764 patent are invalid. *See* Respondents' Post-Hearing Patent Brief at 46-50; Respondents' Post-Hearing Patent Reply Brief at 16.

Philips argues that the asserted claims of the '764 patent are valid, and that the art relied upon by Respondents is not relevant. It is argued that in some instances the prior art was already considered by the PTO during prosecution of the '764 patent. *See* Philips' Post-Hearing Patent Brief at 44-45.

The Commission Investigative Staff argues that Respondents have failed to meet their burden of demonstrating by clear and convincing evidence that the asserted claims of the '764 patent are invalid. *See* OUII Post-Hearing Patent Brief at 26-28, 35.

Anticipation⁹¹

Respondents argue that claims 20 and 32-34 of the '764 patent are anticipated by the Rijnsburger '216 patent (RX-66); the disclosure of the European Lagadec patent (RX-80);

⁹¹ A discussion of the law of anticipation is contained, *supra*, in the section pertaining to the '825 patent.

Philips' '825 patent at issue in this investigation (CX-17); and Philips' Blue Book, a standard for recordable optical media and systems (RX-155C).

Respondents' anticipation arguments depend on Respondents' proposed claim construction that equates the "auxiliary codes" claimed by the '764 patent with synchronization signals. They argue that synchronization signals in the prior art inform a recording device that an address signal is about to be encountered, thereby allowing a recording beam to locate quickly a desired track location where data is to be recorded. In fact, it is argued, data cannot be properly recorded on an optical disc in the absence of the synchronization signals. *See, e.g.,* Respondents' Post-Hearing Reply Brief at 16.

Philips does not dispute the importance of synchronization signals. Yet, Philips argues, synchronization signals have no information associated with them and cannot be read. It is argued that synchronization signals are simply different from the claimed auxiliary codes. Philips adds that the PTO considered Rijnsburger, Lagadec and the '825 patent during prosecution of the '764 patent.

The Commission Investigative Staff, as a matter of claim construction, argues that as made clear in the specification of the '764 patent, auxiliary codes are not the same as synchronization codes. It is argued that synchronization signals indeed signal a system that an address code or auxiliary code is about to begin or end, although the synchronization signals themselves do not provide the encoded data.

As discussed in detail in the section on claim construction, synchronization signals are not the claimed auxiliary codes. The '764 patent specification explicitly distinguishes the two. The difference between synchronization signals and auxiliary codes was appreciated by the PTO

Examiner, who allowed the asserted claims, even in view of the Rijnsburger patent, the '825 patent and the European Lagadec patent. In addition, there is no evidence that synchronization signals could provide a system with the data that can be provided by the claimed auxiliary codes.

Respondents have not demonstrated by clear and convincing evidence that any asserted claim of the '764 patent is invalid due to anticipation.

*Obviousness*⁹²

Respondents argue that claims 23-31 of the '764 patent are rendered obvious in view of combinations of the prior art discussed above with respect to anticipation (i.e., the Rijnsburger patent, the European Lagadec patent, and the Blue Book), and two additional items: U.S. Patent No. 4,496,993 to Sugiyama et al. (RX-79)(with particular reference to claims 26, 27 and 29), and U.S. Patent No. 4,879,975 to Taniyama (RX-76)(with particular reference to claims 28, 30 and 31). Respondents detail how they propose that these specific items disclose the particular limitations added by dependent claims 23-39. Nevertheless, Respondents' arguments also rely on the fact that the prior art allegedly discloses all elements of independent claim 20, and that auxiliary codes are the same as synchronization signals.⁹³

Philips for the most part relies on the same arguments to counter Respondents' allegations of obviousness and anticipation, yet adds specific arguments related to the Sugiyama and Taniyama patents. It is argued that the so-called "control area" of Sugiyama consists only of

⁹² A discussion of the law of obviousness is contained, *supra*, in the section pertaining to the '209 and '493 patents.

⁹³ *See, e.g.* Respondents' Post Hearing Brief at 49 ("The Rijnsburger '216 patent, the European Lagadec '695 patent, Philips' '825 patent, and the Blue Book all disclose address codes and *auxiliary codes (synchronization signals)* at equidistant locations along the track on an optical disc." (emphasis added)).

pre-recorded information that does not show a table of contents, much less specify where a table of contents is to be recorded, just the beginning of the sector and the end of the sector. It is argued that while Taniyama discloses information “pre-cut” in a control track separate from the disc area where user information is recorded, it employs neither a transverse modulation of the track pregroove, nor anything approximating it, and does not provide the type of information required by the asserted claims. Philips’ Post-Hearing Patent Brief at 44-45 (citing, *inter alia*, Hesselink Tr. 2593-2596).

The Commission Investigative Staff argues that Respondents’ obviousness arguments depend on independent claim 20 being anticipated – which it is not. The Staff argues that Respondents have not met their burden of establishing obviousness by clear and convincing evidence.

Respondents do not address the validity or invalidity of independent claim 20 of the ‘764 patent apart from their arguments relating to anticipation. Moreover, it has not been found that claim 20 is invalid due to anticipation, and the Administrative Law Judge finds no basis upon which to conclude that claim 20 or any claim of the ‘764 patent is obvious. Respondents’ arguments in support of their invalidity defenses concerning the ‘764 patent are based on a misinterpretation of the claimed auxiliary codes and of synchronization signals.

Respondents have not demonstrated by clear and convincing evidence that any asserted claim of the ‘764 patent is invalid due to obviousness.

VIII. DOMESTIC INDUSTRY

Respondents stipulated that Philips “has satisfied its burden of proof on the domestic industry -- both on the ‘technical prong’ and ‘economic prong’ -- based upon the manufacturing

in the United States of CD-R discs by Mitsui Advanced Media, Inc. ["Mitsui"] and/or CD-RW discs by Imation Corporation (including each of their successors and assigns)." Stipulation and Statement of Non-Opposition at 1; *see also Id.*, Exhibit A (concerning Mitsui's domestic activities). Consequently, it has been established that the domestic industry requirement of section 337 is satisfied.

IX. PATENT MISUSE

A. Background Facts

Respondents raise as a defense that the patents at issue are unenforceable because Complainant has engaged in patent misuse involving the creation of an unlawful patent pool and the use of its power to control the United States CD-R and CD-RW markets. *See* Respondent Gigastorage's Answer to Complaint, Fifth Affirmative Defense. These unlawful practices, according to Respondents, include engaging in a policy of mandatory and coercive package licensing, requiring grantback licenses, and engaging in predatory patent litigation. *See id.*

In order to understand the scope of Respondents' allegations, it is necessary to review the extensive background facts behind them, including, in particular, the technological standards that have been implemented by Complainant for CD-R and CD-RW technology, the patent pools maintained by Complainant to license that technology, and the extensive regulatory history of those patent pools.

1. The "Orange Book"

The patents at issue are among those in their patent pools that Complainant alleges are essential for manufacturers to implement the technical standards for manufacture of CD-Rs and CD-RWs as set out in two publications that are jointly issued by Philips and Sony Corporation ("Sony"). Complaint, ¶ 2.4. One of these publications is entitled "Compact Disc Recordable System Description" (for CD-Rs) and the other is entitled "Compact Disc Rewriteable System Description" (for CD-RWs). *Id.*; RX-407C; RX-408C.⁹⁴ These publications are more commonly

⁹⁴ The versions of these sections of the Orange Book that were introduced into evidence are "Part II: CD-R Version 3.1," dated December 1998 (RX-407C), and "Part III: CD-RW Version (continued...)"

referred to as Parts II and III, respectively, of the “Orange Book.” *Id.* Complainant makes the Orange Book available only to licensees of patented CD-R and CD-RW technology or to entities under other contractual arrangements with Complainant. *Id.*

The technical specifications in the Orange Book include certain features that Complainant alleges are covered by the patents in the pool, including the patents at issue. *See* Complaint, ¶ 2.5. Complainant licenses these patents as a package to manufacturers of CD-Rs and CD-RWs. *Id.* In turn, manufacturers of CD-R discs or CD-RW discs include the features set forth in the Orange Book in order for the discs to be compatible with CD players, CD-ROM drives and MultiRead drives that are installed in personal computers and home entertainment systems that are also manufactured in accordance with corresponding Orange Book standards for those devices. *See id.*

2. The Philips CD-R and CD-RW Patent Pools

In the early 1990s, Philips, Sony and Taiyo Yuden formed a pool of the CD-R patents that each own in order to license manufacturers to produce and sell Orange Book compliant CD-R discs. Philips and Sony formed a similar patent pool along with Ricoh for Orange Book compliant CD-RW discs.⁹⁵ Similar pools were also formed by Philips and Sony to license patents for compatible CD-R and CD-RW recorders. The original CD-R standard license agreements provided licenses for a list of some 45 U.S. patents and many other foreign patents

⁹⁴ (...continued)
2.0,” dated August 1998 (RX-408C).

⁹⁵ For convenience, the patent pools of Philips, Sony, Taiyo Yuden and Ricoh in their various forms are collectively referred to hereafter as the “Philips CD-R patent pool” and the “Philips CD-RW patent pool.”

owned by Philips, Sony and Taiyo Yuden for Orange Book compliant CD-R discs. *See, e.g.*, RX-1832 (1999 Gigastorage CD-WO/MO⁹⁶ Disc Agreement). Those agreements required royalty payments of three percent of the net sales price for each disc, with a minimum royalty of 10 Japanese yen. *See id.* (1999 Gigastorage CD-WO/MO Disc Agreement, ¶ 4.02).

As time passed, the Philips CD-R and CD-RW patent pools have changed formats somewhat. Whereas the CD-R pool was originally licensed to manufacturers as a single package of patents, it has evolved into a series of packages of so-called “essential” and “non-essential” patents, the former of which must be licensed by the manufacturer but the latter of which may be licensed in addition without paying any additional royalty fee. These packages have been further broken up into sub-packages consisting of the essential and non-essential patents of each licensor partner and the combined essential and non-essential patents of Philips and Sony. The many combinations of CD-R patent packages consist of exhibits to the standard “CD-R Disc Patent License Agreement” of all three partners and are maintained on a Philips internet website. *See* “Philips Intellectual Property and Standards, CD-R/RW Patents,” at <http://www.licensing.philips.com/licensees/patent/ob/>, “CD-R/RW hyperlink” (last visited on September 27, 2003). Philips’ CD-RW packages are divided into similar arrangements, but they are not shown on the Philips website.

3. Regulatory History of Patent Pools

a. The DOJ Antitrust Division Business Review Letters

⁹⁶ “CD-WO” and CD-MO” were names originally used in Philips’ licensing agreements for the two prevalent specifications for what was known in the market as “CD-R” technology. Eventually, CD-WO came to be accepted in the market more than CD-MO. Thus, it is CD-WO technology that today is synonymous with CD-R. *See* RX-1871C (Taiwan ROC Opinion at GT 000328-29).

Patent pools for technology in industries related to the CD-R industry have been reviewed by the Antitrust Division of the U.S. Department of Justice (“DOJ”) in three business review letters that were issued in the middle and late 1990s. *See* CX-355 (the June 26, 1997 “MPEG-2 Business Review Letter”); CX-357 (the December 16, 1998 “3C DVD Business Review Letter”); CX-358 (the June 10, 1999 “6C DVD Business Review Letter”). In those letters, the DOJ placed restrictions on the types of patents that could be included in such pools in order to avoid anticompetitive effects, and set forth restrictions on the manner in which patents could be included in the pools. *See id.* However, Philips and its licensor-partners have never submitted the CD-R and CD-RW patent pools to the DOJ for business review.

In the three business review letters issued by the DOJ in the 1990s, the structure of the reviewed pools were limited to “essential” patents for practicing the technology in question. In the first MPEG-2 Business Review Letter, the patents in the pool were defined as those that are “essential to compliance” with the industry manufacturing standards for the MPEG-2 product, and “there is no technical alternative to any of the Portfolio patents within the standard.” *See* CX-355 (MPEG-2 Business Review Letter at 9). The essentiality of the patents in the pool was to be monitored by “an independent expert as an arbiter of essentiality” to review patents for inclusion in, or exclusion from, the pool. *See id.* at 5.

“The limitation of the Portfolio to technically essential patents, as opposed to merely advantageous ones,” the DOJ went on in the MPEG-2 letter, “helps ensure that the Portfolio patents are not competitive with each other and that the Portfolio license does not, by bundling in non-essential patents, foreclose the competitive implementation options that the MPEG-2 standard has expressly left open.” CX-355 at 10. Further, the DOJ opined, “[t]he continuing role

of an independent expert to assess essentiality is an especially effective guarantor that the Portfolio patents are complements, not substitutes.” *Id.* Consequently, the DOJ determined in the MPEG-2 Business Review Letter that the patent pool under review would not trigger enforcement action as so described.

In the second 3C DVD Business Review Letter, the patent pools in question were limited to “essential” patents that were defined somewhat more broadly from the MPEG-2 pool as being “necessary (as a practical matter) for compliance with the DVD[-Video or DVD-ROM] Standard Specifications.” *See* CX-357 (3C DVD Business Review Letter at p. 3). The DOJ stated that it understood this definition “to encompass patents which are technically essential – *i.e.*, inevitably infringed by compliance with the specifications – and those for which existing alternatives are economically unfeasible.” *See id.* at 3 n.8. In finding that no enforcement action would be triggered by this patent pool as so described, the DOJ asserted the following *caveat*:

Some uncertainty arises from this definition’s imprecision: Unlike the MPEG-2 pool, which required actual technical essentiality for eligibility, this pool introduces the concept of necessity “as a practical matter.” On its face, this latter standard is inherently more susceptible to subjective interpretation. [footnote omitted] An excessively liberal interpretation of it could lead to the inclusion of patent rights for which there were viable substitutes. In that event, the pool could injure competition by foreclosing such substitutes.

Based on what you have told us, however, the definition of “necessary (as a practical matter)” that the expert will be employing is sufficiently clear and demanding that the portfolio is unlikely to contain patents from which there are economically viable substitutes. [footnote omitted] Thus, so long as the patent expert applies this criterion scrupulously and independently, it is reasonable to expect that the Portfolio will combine complementary patent rights while not limiting competition between them and other patent rights for purposes of the licensed applications.

CX-357 (3C DVD Business Review Letter at p. 10).

b. The Taiwan Fair Trade Commission Investigation

In 2001, the Taiwan Fair Trade Commission (“Taiwan FTC”) conducted an investigation into the Philips CD-R patent pool and ruled that it was illegal under the Taiwanese Fair Trade Law. *See* RX-1871C (translation). The Taiwan FTC found that Philips, Sony and Taiyo Yuden were horizontal competitors in the CD-R manufacturing technology market through their ownership of technologies and patents related to that activity. *See id.* at GT000332. Through their joint decision on the royalty rate and joint licensing of that technology, they had acquired a dominant position in the CD-R technology patent license market in Taiwan, had improperly maintained the royalty rate, had refused to provide licensees with important information regarding the license agreements, and had prohibited licensees from objecting to the validity of the patents in the pool. *See id.* at GT000311.

According to the conclusions of the Taiwan FTC, the CD-R technology owned by Philips and its licensor-partners had “an overwhelmingly superior position in the CD-R patented technology license market and may exclude other enterprises from participating in competition,” thereby constituting a “monopolistic enterprise” under Taiwan law. RX-1871C at GT000336. The Taiwan FTC also found that the royalty rate of three percent of net sales or a minimum of 10 yen did not have a detrimental impact on manufacturers when average selling prices of CD-R discs in the world market in 1996 was \$7.00 U.S. per disc, but by 2000, that price had dropped drastically to less than 50 cents U.S. *See id.* at GT000339. Juxtaposed with the rapid growth in global CD-R demand and production from 1996 to 2000, which was much faster than expected, Philips’ licensing profits under its existing royalty structure in 2000 would amount to 20 to 60 times that in 1997, far more than originally expected. *See id.* at GT000339-40. The 10 yen

minimum rate under this scenario would amount to 17.8 percent of the net selling price of a disc which, the Taiwan FTC found, is far more than the licensees can bear. *See* GT000340. Philips and its licensor partners had failed to make adjustments to its royalty structure to meet the market needs of manufacturers and had thus violated the Taiwan Fair Trade Law, according to the Taiwan FTC. *Id.* at GT000340-41.

c. The EC Anti-dumping Investigation

The European Commission (“EC”) has conducted an anti-dumping proceeding concerning imports of CD-Rs originating in Taiwan. RX-1704C. At the conclusion of the investigation in late 2001, the EC determined that CD-R disc manufacturers in Taiwan had been dumping their products in Europe. RX-1379C (p. 77). In response to dumping of CD-R discs by Taiwanese manufacturers, the EC established duties on such CD-Rs, based on its investigation of pricing and volume sales to Europe and how these related to costs and other factors. RX-1379C (p. 77). The duties imposed by the EC ranged from 18.8% to 39.3%, the lower amount charged to companies that cooperated with the EC investigation and were found to practice reasonable pricing standards. The higher charges were made to non-cooperating companies. RX-1379C (p. 77). The anti-dumping duty imposed on Gigastorage was 20.1%, and the duty imposed on Princo was 29.9%. RX-1379C (p. 78).

B. Overview of the Patent Misuse Defense

Given these background developments, Respondents now raise the defense of patent misuse in this investigation by alleging that the patents at issue are unenforceable because, as part of the Philips CD-R and CD-RW patent pools, their imposition on Respondents violates U.S. antitrust laws or otherwise unreasonably restrains trade.

“The patent misuse doctrine, born from the equitable doctrine of unclean hands, is a method of limiting abuse of patent rights separate from the antitrust laws. The key inquiry under this fact-intensive doctrine is whether, by imposing the condition, the patentee has impermissibly broadened the physical or temporal scope of the patent grant with anticompetitive effect.”

B. Braun Medical, Inc. v. Abbott Laboratories, 124 F.3d 1419, 1426 (Fed.Cir. 1997) (internal quotation marks omitted); *Windsurfing Intern. Inc. v. AMF, Inc.*, 782 F.2d 995, 1001 (Fed.Cir.), *cert. denied*, 477 U.S. 905 (1986); *also see Morton Salt Co. v. Suppiger Co.*, 314 U.S. 488, 492-93 (1942). Where patent misuse is found, it results in the withholding of any remedy for infringement or breach of a license agreement until the misuse is purged upon abandonment of the abusive practice and dissipation of any harmful consequences. *See* 6 Donald S. Chisum, *Chisum on Patents* § 19.04 (2000).

Patent misuse “is viewed as a broader wrong than an antitrust violation because of the economic power that may be derived from the patentee’s right to exclude. Thus, misuse may arise when the conditions of antitrust are not met.” *C.R. Bard, Inc. v. M3 Systems, Inc.*, 157 F.3d 1340 (Fed. Cir. 1998). In other words, conduct that falls short of being an antitrust violation may constitute patent misuse. *See Virginia Panel Corp. v. MAC Panel Co.*, 133 F.3d 860, 872 (Fed.Cir. 1997) (“*Virginia Panel*”) (“[V]iolation of the antitrust laws . . . requires more exacting proof than suffices to demonstrate patent misuse.”).

A patentholder deemed to have misused its patents may resume the enforcement of patent rights when a “purge” of the misuse has been accomplished. *United States Gypsum v. National Gypsum Co.*, 352 U.S. 457, 494 (1957) (“It is now, of course, familiar law that the courts will not aid a patent owner who has misused his patents to recover any of their emoluments accruing

during the period of misuse or thereafter until the effects of such misuse have been dissipated, or 'purged'”). “Courts have uniformly applied a two-prong test to determine whether a purge has been effected. The patent holder must demonstrate a complete abandonment of the improper practices found to constitute misuse and that the consequences of the misuse have been fully dissipated.” *In re Yarn Processing Patent Validity Litigation*, 472 F. Supp. 180, 183-84 (S.D. Fla. 1979). With respect to the first prong, in the licensing context this requires that all licenses containing the improper provisions must have expired, or at least that the improper provisions be removed. *See Koratron Co. v. Lion Uniform, Inc.*, 409 F. Supp. 1019, 1023 (N.D. Cal. 1976) (misuse did not stop until the last of the “old-form” licenses expired). The patentholder that has engaged in misuse bears the burden of proving that a purge has occurred. *In re Yarn Processing Patent Validity and Antitrust Litigation*, 398 F. Supp. 31, 63 (S.D. Fla. 1975), *affd sub nom. In re Yarn Processing Patent Validity Litigation*, 541 F.2d 1127 (5th Cir. 1976), *cert. denied sub nom. Lex Tex Ltd., Inc. v. Universal Textured Yarns, Inc.*, 433 U.S. 910 (1977).

One form of patent misuse stems from tying arrangements, whereby a seller forces a purchaser desiring to buy one product (the “tying product”) to also buy another, unwanted product (the “tied product”) as a condition to buying the first product. Tying arrangements “are an object of anti-trust concern for two reasons – they may force buyers into giving up the purchase of substitutes for the tied product, and they may destroy the free access of competing suppliers of the tied product to the consuming market.” *United States v. Loew’s, Inc.*, 371 U.S. 38, 44-45 (1962) (citations omitted) (“*Loew’s*”). The benchmark of illegality of such arrangements “is that the seller must have ‘sufficient economic power with respect to the tying product to appreciably restrain free competition in the market for the tied product’”. *Id.* at 45.

Such power comes not only from a seller's market dominance derived from its ability "to control price and to exclude competition," but can also come from "the tying product's desirability to consumers or from uniqueness in its attributes." *Id.*

At one time, market power in antitrust cases involving tying arrangements was presumed when the tying product was patented or copyrighted. *Loew's, supra*, 371 U.S. at 45. A long line of cases utilizing this presumption reflected "a hostility to use of the statutorily granted patent monopoly to extend the patentee's economic control to unpatented products. The patentee is protected as to his invention, but may not use his patent rights to exact tribute for other articles." *Id.* at 46 and cases cited therein. Such tie-ins, the Supreme Court noted, "pose an unacceptable risk of stifling competition and therefore are unreasonable 'per se.'" *Jefferson Parish Hospital District No. 2 v. Hyde*, 466 U.S. 2, 9 (1984) ("*Jefferson Parish*").

Eventually, however, the law evolved to where market power was no longer presumed to flow solely from the statutory monopoly conferred on a patentholder or copyright holder. Instead, the Supreme Court came to the unanimous view "that every refusal to sell two products separately cannot be said to restrain competition. If each of the products may be purchased separately in a competitive market, one seller's decision to sell the two in a single package imposes no unreasonable restraint on either market, particularly if competing suppliers are free to sell either the entire package or its several parts." *Jefferson Parish, supra*, 466 U.S. at 11-12. In the patent context, Justice O'Connor noted in a concurring opinion that "[a] common misconception has been that a patent or copyright, a high market share, or a unique product that competitors are not able to offer suffice to demonstrate market power. While each of these three factors might help to give market power to a seller, it is also possible that a seller in these

situations will have no market power: *for example, a patent holder has no market power in any relevant sense if there are close substitutes for the patented product.*” *Id.* at 38 n.7 (O’Connor, J., concurring) (emphasis added).

This view of market power prevailed in later cases. *See, e.g., A.I. Root Co. v. Computer/Dynamics, Inc.*, 806 F.2d 673, 676 (6th Cir. 1986) (“[W]e find the pronouncement in *Loew’s* to be overbroad and inapposite to the instant case. Accordingly, we reject any absolute presumption of market power for copyright or patented product, . . . [T]he evil of tie-ins exists only when the tying product can force consumers to buy an unwanted tied product. This exists only when the tying product confers great market power, evidenced by an exceptional demand for the tying product. However, such a presumption is not warranted merely by existence of a copyright or patent.”). In 1988, Congress codified this view when it revised the patent law to narrow the use of the patent misuse defense in certain instances, including defenses based on antitrust-type concerns flowing from patent tying arrangements. In Title II of the 1988 Patent and Trademark Office Authorization Act, entitled “Patent Misuse Reform,” Section 271(d) of the Patent Code was amended to state, in relevant part:

No patent owner otherwise entitled to relief for infringement or contributory infringement of a patent shall be denied relief or deemed guilty of misuse or illegal extension of the patent right by reason of his having done one or more of the following: . . . (5) conditioned the license of any rights to the patent or the sale of the patented product on the acquisition of a license to rights in another patent or purchase of a separate product, unless, *in view of the circumstances*, the patent owner has *market power in the relevant market* for the patent or patented product on which the license or sale is conditioned.

Patent and Trademark Authorization Act of 1988, Pub. L. No. 100-703, Title II, § 201, 102 Stat. 4676 (1988) (current version at 35 U.S.C. § 271(d)(5) (2001)) (emphasis added).

Remarks in the *Congressional Record* by the bill's sponsors show that the purpose of the bill was to eliminate the presumptive view of market power in patent-based cases where substitutes for the patented product exist in the relevant market:

. . . [T]he bill before us proceeds on the basis of consensus about two categories of misuse that the Committee on the Judiciary concluded *should not be the subject of a rigid per se rule*.

The two subject matters affected by the proposed amendment are “refusal to use or license” a patented invention *and the tying of a patented product to another separate product*.

* * *

The underlying principle being advanced by this proposal is the elimination of any vestiges of a per se or automatic inference of patent misuse from certain tying practices.

* * *

The use of the term [“]relevant market[”] is designed to import into the courts’ analysis the idea that the scope of the product involved focuses the courts[’] attention on the nature of the property right. *If a patented product is unique because no practical substitutes exist, the scope of the relevant market would be coextensive with the patent. In the situation where the product is sold in a marketplace context where there are substitute products, the scope of the market should resemble the typical antitrust analysis of relevant market.*

* * *

The use of the term [“]in view of the circumstances,[”] is again designed to give the courts the requisite flexibility to exercise their equitable powers. See 35 U.S.C. section 283. *This phrase is designed, in part, to allow the courts to assess the potentially competitive or anticompetitive effects of the tie-in practice.*

134 Cong. Rec. 32,295 (October 20, 1988) (remarks of Rep. Kastenmeier) (emphasis added).

A decade later, the Federal Circuit, in *Virginia Panel supra*, recognized that the 1988 amendment resulting in Section 271(d)(5) “provides that, *inter alia*, in the absence of market

power, even a tying arrangement does not constitute patent misuse.” *Virginia Panel, supra*, 133 F.3d at 869. Thus, under Section 271(d)(5), an infringement action may be precluded by a patent misuse defense based on a patent tying arrangement that is found to be illegal “*per se*,” meaning that its “nature and necessary effect are so plainly anticompetitive” that it should be treated as unlawful without an elaborate inquiry into the restraint’s likely competitive effect (*See Federal Trade Commission v. Superior Court Trial Lawyers Association*, 493 U.S. 411, 433 (1990)),⁹⁷ but only if an analysis of market power is made that includes an inquiry into whether substitutes for the patented product are available.⁹⁸

⁹⁷ “Among the restraints that have been held *per se* unlawful are naked price-fixing, output restraints, and market division among horizontal competitors, as well as certain group boycotts and resale price maintenance.” U.S. Dep’t. of Justice and Fed. Trade Comm., *Antitrust Guidelines for the Licensing of Intellectual Property* § 3.4, 1995 WL 229332 (April 6, 1995).

⁹⁸ Some controversy has arisen in recent case law as to whether Section 271(d)(5) has somehow “eliminated” the “*per se*” approach to finding patent misuse in patent tie-ins, leaving the “rule of reason” as the only way to analyze a patent tying arrangement. *See, e.g., Texas Instruments, Inc. v. Hyundai Electronics Industries, Ltd.*, 49 F.Supp.2d 893, 910-11 (E.D.Tex.,1999) (“[T]he legislative history of the 1988 Patent Misuse Reform Act supports the death of *per se* patent misuse due to tying . . .”). This view misperceives what Section 271(d)(5) does. Section 271(b)(5) does not eliminate the *per se* approach’s presumption that certain arrangements cause competitive harm when market power is present. *See Atlantic Richfield Co. v. USA Petroleum Co.*, 495 U.S. 328, 342 (1990) (“The *per se* rule is a presumption of unreasonableness based on ‘business certainty and litigation efficiency.’ ‘Once experience with a particular kind of restraint enables the Court to predict with confidence that the rule of reason will condemn it, it has applied a conclusive presumption that the restraint is unreasonable.’”). Rather, it merely codifies the evolution of the law from the use of a presumption of market power *by virtue of a patent*, as was done in *Loew’s, supra*, to the use of a more thorough analysis into whether market power exists when substitutes for the patented product are available in the marketplace, as was later recognized in *Jefferson Parish, supra*. This view is consistent with the course followed by the Federal Circuit in *Virginia Panel, supra*, in holding that a “rule of reason” analysis should be applied *after* it is found that “a practice alleged to constitute patent misuse is neither *per se* patent misuse nor specifically excluded from a misuse analysis by § 271(d) . . .” *See Virginia Panel, supra*, 133 F.3d at 869.

The alternative approach to a finding of *per se* illegality is a finding of illegality under the “rule of reason.” In *Virginia Panel*, the Federal Circuit enunciated a “rule of reason” approach to patent misuse defenses that are neither in the *per se* category or specifically excluded by § 271(d). The rule of reason analysis requires a preliminary step of examining the “scope of the patent grant,” as follows:

When a practice alleged to constitute patent misuse is neither *per se* patent misuse nor specifically excluded from a misuse analysis by § 271(d), a court must determine if that practice is “reasonably within the patent grant, *i.e.*, that it relates to subject matter within the scope of the patent claims.” If so, the practice does not have the effect of broadening the scope of the patent claims and thus cannot constitute patent misuse. If, on the other hand, the practice has the effect of extending the patentee’s statutory rights and does so with an anti-competitive effect, that practice must then be analyzed in accordance with the “rule of reason.” Under the rule of reason, “the finder of fact must decide whether the questioned practice imposes an unreasonable restraint on competition, taking into account a variety of factors, including specific information about the relevant business, its condition before and after the restraint was imposed, and the restraint’s history, nature, and effect.”

Virginia Panel, supra, 133 F.3d at 869 (citations omitted).

In making a “rule of reason” analysis, the issue to be addressed is “whether a restraint is ‘unreasonable,’ *i.e.*, whether its anticompetitive effects outweigh its procompetitive effects.” *Atlantic Richfield Co. v. USA Petroleum Co.*, 495 U.S. 328, 342 (1990). “If this balancing shows that the restraint has a net procompetitive effect on competition or if the balance is even, the restraint is lawful.” See American Bar Association Section on Antitrust Law, Antitrust Law Developments 60 (5th Ed. 2002); also see *Smith v. Pro Football, Inc.*, 593 F.2d 1173, 1183 (D.C. Cir. 1978) (“If, on analysis, the restraint is found to have legitimate business purposes whose realization serves to promote competition, the ‘anticompetitive evils’ of the challenged practice must be carefully balanced against its ‘procompetitive virtues’ to ascertain whether the former

outweigh the latter. A restraint is unreasonable if it has the ‘net effect’ of substantially impeding competition.”).

C. Patent Pooling

The form of tying arrangement that has given rise to Respondents’ antitrust patent misuse defenses in this investigation is the practice of packaging patent licenses known as “patent pooling.” Respondents and the Staff allege that Philips, together with competitors Sony, Ricoh and Taiyo Yuden, pool their patents in the technology for manufacturing CD-Rs and CD-RWs in accordance with the standards set forth in the Orange Book and license them to manufacturers as a single package for a single royalty. A manufacturer cannot license any one patent in the pool without licensing all or at least some of the other patents in the pool. This practice, Respondents and the Staff maintain, constitutes a horizontal restraint that violates the antitrust laws under both *per se* and “rule of reason” approaches. *See* RPHB at 6; RPHRB at 9 and 16; SPHB at 27-28 (rule of reason); SPHRB at 3 (rule of reason).

The patent pool at issue in this investigation fits the following general description of such arrangements:

Patent pools are private contractual agreements whereby rival patentees transfer their rights into a common holding company for the purpose of jointly licensing their patent portfolios. Pools can comprise as few as two patents, or as many as hundreds. Although the contractual provisions governing each pool are tailored to the technologies and patents at hand, patent pools generally share two common characteristics. First, patent pools consolidate the patent rights into a central, independent entity. In many cases, the entity will be a partnership or limited liability corporation. The entity then sells licenses to the portfolio of pooled patents, often as a single package.

Steven C. Carlson, “Patent Pools and the Antitrust Dilemma,” 16 *Yale J. on Reg.* 359, 367-68 (1999) (footnotes omitted) (“Carlson, *Patent Pools*”).

According to the 1995 joint antitrust guidelines of the U.S. Department of Justice and the Federal Trade Commission on the licensing of intellectual property, patent pools “may provide procompetitive benefits by integrating complementary technologies, reducing transaction costs, clearing blocking positions, and avoiding costly infringement litigation.” U.S. Dep’t. of Justice and Fed. Trade Comm., *Antitrust Guidelines for the Licensing of Intellectual Property* § 5.5, 1995 WL 229332 (April 6, 1995) (“DOJ/FTC Guidelines”). Patent pools can also have anticompetitive effects, according to the DOJ/FTC Guidelines. “For example, collective price or output restraints in pooling arrangements, such as the joint marketing of pooled intellectual property rights with collective price setting or coordinated output restrictions, may be deemed unlawful if they do not contribute to an efficiency-enhancing integration of economic activity among the participants.” *Id.* When patent pools “are mechanisms to accomplish naked price fixing or market division, they are subject to challenge under the *per se* rule.” *Id.*, citing *United States v. New Wrinkle, Inc.*, 342 U.S. 371 (1952) (price fixing).

The DOJ/FTC Guidelines make clear that “[p]ooling arrangements generally need not be open to all who would like to join. However, exclusion from cross-licensing and pooling arrangements among parties that collectively possess market power may, under some circumstances, harm competition. [Citation omitted]. In general, exclusion from a pooling or cross-licensing arrangement among competing technologies is unlikely to have anticompetitive effects unless (1) excluded firms cannot effectively compete in the relevant market for the good incorporating the licensed technologies and (2) the pool participants collectively possess market power in the relevant market.” DOJ/FTC Guidelines § 5.5.

The patent pools at issue here are combinations of the patents to CD-R and CD-RW technology held by Philips, Sony, Ricoh and Taiyo Yuden that manufacturers use in making CD-Rs and CD-RWs that conform to the specifications of the Orange Book. All six of the patents at issue in this investigation are included in the Philips patent pools. Dr. Kenneth R. Rubenstein, who refers to himself as a “neutral evaluator,”⁹⁹ has been retained by the pool to issue determinations about which of the patents in the Philips patent pools meet a particular definition of “essentiality.”¹⁰⁰

The similarity of this pool to the patent pools examined by the DOJ in their business review letters of the late 1990s, however, ends there. What follows is an analysis of how the practices followed by the Philips CD-R and CD-RW patent pools measure up against the patent misuse and antitrust criteria set forth earlier herein, under both a “*per se*” and “rule of reason” analysis.

D. *Per Se* Analysis

Respondents contend that a *per se* violation is made out by Complainant’s maintenance together with its licensor-partners of the Philips CD-R and CD-RW patent pools. *See* RPHRB at

⁹⁹ It is interesting to note in this regard that Dr. Rubenstein’s description of himself as a “neutral evaluator” avoids the DOJ’s stronger description of the necessary decisionmaking authority in patent pools as that of “an *independent* expert as an *arbiter* of essentiality.” *See* CX-355 (MPEG-2 Business Review Letter at 5) (emphasis added).

¹⁰⁰ In issuing his determinations on a patent’s “essentiality” for compliance with the Orange Book, Dr. Rubenstein includes both “technical” and “commercial” essentiality. “Commercial” essentiality, or “essentiality as a practical matter,” means to Dr. Rubenstein that “the patent covers something that’s not explicitly in the [Orange Book], but as a practical matter you need the patent to do something that is in the [Orange Book].” Rubenstein Tr. 2182:6-23. In fact, in practice, Dr. Rubenstein used a much broader or more liberal definition of commercial essentiality. *See* p. 185-213 *infra*.

9. Complainant rejects Respondents' *per se* arguments. See CPHRB at 2-3. The Staff implicitly assumes in its briefs that the instant case does not fall into a *per se* category. See SPHB at 18 and 27-28.

According to the Complainant, 35 U.S.C. § 271(d)(5) and certain court cases have established that “[t]ying is not a *per se* offense.” See CPHRB at 2, *citing* 35 U.S.C. § 271(d)(5) and its legislative history; *NCAA v. Board of Regents*, 468 U.S. 85, 104 n.26 (1984); *Windsurfing International Inc. v. AMF, Inc.*, 782 F.2d 995, 1001 (Fed.Cir. 1986). That is an inaccurate reading of Section 271(d)(5) and the case law of *per se* tying arrangements. As explained earlier, Section 271(d)(5) does not eliminate the *per se* approach to examining an antitrust-based patent misuse defense; it only codifies the prevailing case law that disfavors a presumption that patent ownership equates with the element of market power, an essential part of the *per se* analysis. The cases cited by Complainant do not yield a different result; rather, they support the use of a *per se* analysis with tie-ins.¹⁰¹

¹⁰¹ To buttress its argument, Complainant takes a statement in a footnote in the Supreme Court’s opinion in *NCAA*, *supra*, out of context. See CPHRB at 2-3. The full text of the footnote (with the portion quoted by Complainant underscored) is as follows:

Indeed, there is often no bright line separating *per se* from Rule of Reason analysis. *Per se* rules may require considerable inquiry into market conditions before the evidence justifies a presumption of anticompetitive conduct. For example, while the Court has spoken of a "per se" rule against tying arrangements, it has also recognized that tying may have procompetitive justifications that make it inappropriate to condemn without considerable market analysis. See *Jefferson Parish Hospital Dist. No. 2 v. Hyde*, 466 U.S., at 11-12, 104 S.Ct., at 1558.

NCAA v. Board of Regents, *supra*, 468 U.S. at 104 n.26 (emphasis added). Taken in its entirety, this footnote cannot be read for the proposition that there is no longer any *per se* analysis for tying arrangements; rather, it must be read in conjunction with the rest of the opinion, which

(continued...)

Contrary to Complainant's contentions, tying arrangements, including tie-ins involving patent licenses, have long been recognized by the Supreme Court to pose a danger of *per se* illegality under the antitrust laws. *See, e.g., Jefferson Parish, supra*, 466 U.S. at 9 ("It is far too late in the history of our antitrust jurisprudence to question the proposition that certain tying arrangements pose an unacceptable risk of stifling competition and therefore are unreasonable '*per se.*'"); *International Salt Co. v. United States*, 332 U.S. 392, 396 (1947) ("Not only is price-fixing unreasonable, *per se*, [citations omitted], but also it is unreasonable, *per se*, to foreclose

¹⁰¹ (...continued)

states in the text accompanying this footnote that "[b]oth *per se* rules and the Rule of Reason are employed 'to form a judgment about the competitive significance of the restraint.' [Citation omitted] *Per se* rules are invoked when surrounding circumstances make the likelihood of anticompetitive conduct so great as to render unjustified further examination of the challenged conduct." *Id.* at 103-04 (emphasis added).

As for Complainant's citation in *Windsurfing International, Inc., supra*, to the Federal Circuit's footnoted *dictum* that "[r]ecent economic analysis questions the rationale behind holding any licensing practice *per se* anticompetitive," it too is taken out of context. The text of the opinion accompanying that footnote states as follows: "To sustain a misuse defense involving a licensing arrangement *not held to have been per se anticompetitive by the Supreme Court*, [footnote here] a factual determination must reveal that the overall effect of the license tends to restrain competition unlawfully in an appropriately defined relevant market." *Windsurfing International, Inc., supra*, 782 F.2d at 1001-02 n.9 (emphasis added). This statement presupposes that *per se* analyses of tying arrangements can be made, and if not, then a "rule of reason" analysis is appropriate.

competitors from any substantial market.”).¹⁰² Accordingly, it is appropriate to review the facts of record in this investigation to determine whether they point to a *per se* showing of illegality.

1. Market Power

“[M]arket power in the relevant market” is the *sine qua non* of the antitrust analysis of a patent misuse defense. See 35 U.S.C. § 271(d)(5); *Jefferson Parish, supra*, 466 U.S. at 12.

Market power has been described by the Supreme Court as “some special ability” on the part of the seller “to force a purchaser to do something that he would not do in a competitive market.”

Jefferson Parish, supra, 466 U.S. at 13-14. More specifically, the Supreme Court described market power in the following terms:

Our cases have concluded that the essential characteristic of an invalid tying arrangement lies in the seller's exploitation of its control over the tying product to force the buyer into the purchase of a tied product that the buyer either did not want at all, or might have preferred to purchase elsewhere on different terms. When such "forcing" is present, competition on the merits in the market for the tied item is restrained and the Sherman Act is violated.

Jefferson Parish, supra, 466 U.S. at 12.

As the Supreme Court further explained in *Jefferson Parish*, “[t]he same strict rule is appropriate in other situations in which the existence of market power is probable. When the seller’s share of the market is high, or when the seller offers a unique product that competitors

¹⁰² Recently, another Administrative Law Judge found a tying arrangement involving patents to be illegal *per se* under the antitrust laws and therefore sustained a defense of patent misuse. See *Certain Set-top Boxes and Components Thereof*, Inv. No. 337-TA-454, Initial Determination (U.S.I.T.C., Public version, November 8, 2002). The Commission, on review of the Initial Determination in *Set-top Boxes*, took no position on its patent misuse findings. See *Set-top Boxes*, Notice of Decisions to Review In Part, Take No Position In Part, and Not Review In Part the Administrative Law Judge's Final Initial Determination; Notice of Decisions to Affirm Three Rulings of the Administrative Law Judge; Notice of Determination of No Violation of Section 337 of the Tariff Act of 1930, 2002 WL 31874855 (U.S.I.T.C., August 30, 2002).

are not able to offer, the Court has held that the likelihood that market power exists and is being used to restrain competition in a separate market is sufficient to make *per se* condemnation appropriate.” *Jefferson Parish, supra*, 466 U.S. at 17.

In the present case, Philips and its licensor-partners have united in their patent pools all of the patents that are technically and economically essential to manufacture CD-Rs and CD-RWs according to Orange Book standards, along with other patents that are admittedly non-essential to that activity. Although the existence of these patents alone would have been legally sufficient at one time to presume the existence of market power in the hands of these entities, *See Jefferson Parish*, 466 U.S. at 17 (“[I]f the government has granted the seller a patent or similar monopoly over a product, it is fair to presume that the inability to buy the product elsewhere gives the seller market power”), 35 U.S.C. § 271(d)(5) has subsequently ruled out a mere presumption and requires a look into the presence of substitutes in the relevant market for the patented technology at issue.

The relevant market issue has two components: (1) the relevant product market; that is, those products that compete with one another; and (2) the relevant geographic market; that is, the location in which the competition is geographically defined. *See Brown Shoe Co. v. United States*, 370 U.S. 294, 324 (1962). It is to these questions that we now turn.

a. Relevant Product Market

The relevant product market is "the area of effective competition" within which a firm's products compete. *AD/SAT v. Assoc. Press*, 181 F.3d 216, 227 (2d Cir.1999) (“*AD/SAT*”), quoting *Tampa Elec. Co. v. Nashville Coal Co.*, 365 U.S. 320, 327 (1961). The market must include all products “that have reasonable interchangeability for the purposes for which they are

produced – price, use and qualities considered.” *United States v. E.I. du Pont de Nemours & Co.*, 351 U.S. 377, 404 (1956); *See AD/SAT, supra*, 181 F.3d at 227. Products are “reasonably interchangeable” where there is sufficient cross-elasticity of demand; *i.e.*, where consumers would respond to an increase in the price of one product by purchasing another product. *See AD/SAT*, 181 F.3d at 227.

In this case, the “relevant product market” has been defined by the parties on two different levels. One is the market for the products themselves; namely, CD-R/RWs. The other is the market for patent licenses in CD-R/RW technology. Respondents contend that the relevant product market in this case is the market for “licensing of United States patents essential for production and/or sale of CD-R and CD-RW discs, respectively.” *See* RPHB at 23. Similarly, the Staff argues that the relevant product market is that for “intellectual property related to the manufacture of CD-R/RWs.” *See* SPHB at 10. Complainant counters that “a patent alone does not demonstrate market power” (quoting *In re Independent Sec. Orgs. Antitrust Litig.*, 203 F.3d 1322, 1325 (Fed.Cir. 2000)) and that “the appropriate market” in this instance is “the market for products.” *See* CPHRB at 6 and 7 n.5. Each side of the dispute is considered separately.

(i) CD-R/RW Product Market

The evidence in this case conclusively establishes that CR-R/RWs and their associated readers and recorders are the predominant means utilized by modern personal computers to store and distribute programs and data cheaply and easily for transfer from one PC to another. CD-R/RWs have no substitutes that are reasonably interchangeable with them.

This lack of interchangeability is a function of both the prices, uses and quality of products that might conceivably be considered as substitutes for the storage and distribution

function that CD-R/RWs fulfill for consumers. As Respondents' economic expert, Mr. Walter Bratic, testified at the hearing, floppy discs, MiniDiscs, audiocassettes and flash memory cards are not interchangeable with CD-R/RWs because they require individual players that a PC user having only a CD player would have to buy and install into the PC separately. *See* Bratic Tr. 1701:11-1702:18. Hard drives are not interchangeable with CD-R/RWs because they are not portable. *See* Bratic Tr. 1702:19-1703:8. E-mail is not interchangeable because it can distribute data but cannot store it. *See* Bratic Tr. 1703:9-15; McCarthy Tr. 2034:8-2035:18.

CD-R/RWs are rapidly surpassing the once-ubiquitous high-density floppy discs as the predominant means to store and distribute programs and data. *See* CX-618 (Slides 20 and 21). This is so because the capacity of a typical CD-R/RW, at around 700 MB, easily accommodates the large programs and data files used by present-day computers that floppy discs, with capacities of no more than 1.44 MB, cannot handle. *See* CX-50 at PA033204; McCarthy Tr. 2033:20-22. It defies logic to think that a PC user would forego purchasing a single CD-R/RW to transfer programs and data from one computer to another in favor of purchasing 400 or more floppy discs to accomplish the same task. *See* SPHB at 8; McCarthy, Tr. 2128:20-2129:7 (difference in storage capacity between CD-R/RWs and floppy discs would be a factor in considering whether products are in the same market). Indeed, one cannot substitute a floppy disc for a CD-R/RW to record music at all, because the capacity of a floppy disc is inadequate for the average three-minute song. *See* SPHB at 8. Further, CD-R/RWs are the only storage media that are backward compatible with the enormous installed base of CD players and CD-ROM drives in addition to the large installed base of CD-R/RW drives. *See* RPHB at 23. The lack of substitutability between CD-R/RWs and floppy discs is also shown by the evidence adduced at trial of the Princo

Respondents' reaction to the steady decline in their CD-R/RW sales prices and profits. Rather than switch to manufacturing floppy discs, audio cassettes, hard drives and other products, the Princo Respondents continued to manufacture CD-R/RWs. When asked at the hearing whether the companies had considered switching to manufacturing audio cassettes or floppy discs, Mr. Jerry Chen of Gigastorage and Mr. Louis Chen of Princo said they had not. J. Chen Tr. 965:19-966:6; L. Chen Tr. 1051:21-1052:5.

At the hearing, Philips' economics expert, Dr. Thomas McCarthy, opined that the relevant market for CD-R/RWs should include a number of substitute products that he generally termed as "recordable storage media and devices," including floppy discs, blank audio cassettes and recordable/rewriteable DVDs. *See* SPHB at 8; McCarthy Tr. 1965:19-1966:1; 1972:9-16; CX-618 (Slide 21). In particular, Dr. McCarthy attempted to show at trial that although the prices per disc of CD-R/RWs compared to recordable/rewriteable DVDs differ considerably, the prices *per megabyte* of the storage capacities of both products are comparable to one another. McCarthy Tr. 1975:1-1976:19; CX-618 (Slides 14-16). Further, using his own business, National Economic Research Associates ("NERA"), as an example, Dr. McCarthy stated that NERA has DVD burners to put large sets of files or data on DVD for archiving, and those DVD burners can also burn a CD-R or CD-RW. McCarthy Tr. 1977:12-24. Thus, according to Dr. McCarthy, the interchangeability of recordable/rewriteable DVDs and CD-R/RWs is sufficient to combine at least those two products together into a single relevant product market.

Dr. McCarthy's opinion testimony does not satisfy the standard for defining the products in the relevant market in terms of the "reasonable interchangeability for the purposes for which they are produced – price, use and qualities considered," or in terms of their "cross-elasticity of

demand,” as the law requires. *See United States v. E.I. du Pont de Nemours & Co., supra; AD/SAT, supra.* Dr. McCarthy admitted on cross-examination that he did not even consider cross-elasticities of demand between recordable/rewriteable DVDs on the one hand and CD-R/RWs on the other. *See McCarthy Tr. 2031:11-19.* Indeed, on cross-examination from the Staff, Dr. McCarthy opined that competitive conditions in the market for CD-Rs would not allow the price of CD-Rs to go up, and therefore he could not answer whether an increase in the price of CD-Rs would cause CD-R disc users to switch over to recordable/rewriteable DVDs, the essential test of cross-elasticity of demand. *McCarthy Tr. 2153:5-20.*

Dr. McCarthy’s opinion testimony also failed to account for the relative “use and qualities” of recordable/rewriteable DVDs compared to CD-R/RWs; indeed, he suggested that there are substantial functional and qualitative differences between the two. Aside from the sizable price differential between recordable CDs and recordable/rewriteable DVDs in per-disc terms that Dr. McCarthy’s data showed, which is the primary difference that consumers actually see on store shelves (*See CX-618, slides 14-15*), Dr. McCarthy had to concede the point raised by Mr. Bratic that DVDs will not play on CD players. *McCarthy Tr. 2032:6-11; Bratic Tr. 1699:9-12.* The prices that consumers typically pay for DVD players, as Mr. Bratic further showed, are ten times higher than prices for CD players. *Bratic Tr. 1699:19-1701:2; RX-2362.* Moreover, as Dr. McCarthy testified and his sales volume evidence shows, the “installed base [for recordable/rewriteable DVDs] is yet to really take off.” *McCarthy Tr. 1976:20-25; CX-618 (Slide 17).* Dr. McCarthy’s own forecast of global demand for recordable storage devices by technology type in 2003 shows a market share of only two percent for recordable and

Rewriteable DVDs combined, compared to a market share of nearly 77 percent for CD-R/RWs combined. See CX-618 (Slide 21).

This lack of market penetration on the part of recordable/rewriteable DVDs belies Dr. McCarthy's price-per-megabyte evidence, because even if the price per megabyte of CD-R/RWs and recordable/rewriteable DVDs are as close as Dr. McCarthy says they are, consumers are nevertheless unlikely to buy more data storage capacity than they need given the current state of computer technology. The low market share of recordable/rewriteable DVDs compared to that of CD-R/RWs at the present time suggests that consumers do not now need the excessive capacity of recordable/rewriteable DVDs. The example Dr. McCarthy gave of his own business environment at NERA confirms this state of affairs; even NERA, McCarthy admitted, does not have too many DVD burners "because we don't have a need to archive stuff a lot" McCarthy Tr. 1977:19-21. These facts lead to the conclusion that the relevant market should be determined on the basis of the most prevalent hardware that consumers now have in place, which are CD-R/RW players, not recordable/rewritable DVD players. See *Microsoft v. United States*, 253 F.3d 34, 52 (D.C. Cir. 2001) (relevant market for Intel-compatible PC operating systems did not include Mac PC operating systems because of the costs of acquiring the new hardware needed to run the Mac system); See also *Eastman Kodak Co. v. Image Technical Services, Inc.*, 504 U.S. 451, 481-82 (1992) (relevant market must be determined by choices available to owners of Kodak photocopiers, not owners of all photocopiers).

The foregoing analysis leads to the conclusion that, to the extent that the relevant product market in this case rests at the product level, it consists of the market for CD-R/RWs alone, with no close substitutes.

(ii) **CD-R/RW Patent License Market**

The law also recognizes that, in addition to products covered by patents, the relevant market for purposes of patent misuse may be made up of licenses for the intellectual property making up the products' technology. *See* 35 U.S.C. § 271(d)(5) (permitting patent misuse defenses based on tie-ins to lie in instances where the patentholder is shown to have "market power in the relevant *market for the patent . . .*"); DOJ/FTC Guidelines § 3.2.2 ("When rights to intellectual property are marketed separately from the products in which they are used, [footnote omitted], the Agencies may rely on technology markets to analyze the competitive effects of a licensing arrangement."); *also see Set-top Boxes, supra*, Initial Determination at 155-56 (relevant market recognized to be technology licensing market).

Here, the evidence demonstrates that Philips and its licensor-partners, Sony, Taiyo Yuden and Ricoh, sell licenses to their pooled patents that cover the essential technology for the manufacture of CD-R/RWs in accordance with Orange Book standards in a market that exists independently of the market for the sale of CD-R and CD-RW discs to retailers and distributors. During the period from 1998 to 2000, Philips and its licensor-partners licensed no more than approximately 50 percent of discs sold worldwide; today, that number has increased to approximately 65 percent. *See* Beune Tr. 2384:19-2385:7. More than 100 companies have been licensed under the Philips CD-R/RW patent pools to make discs, and about 60-70 companies remain licensed today. Beune Tr. 2341:9-22. By contrast, in the corresponding product market for CD-R/RWs, Philips and its licensor-partners in 2002 had a worldwide market share of only 13 percent of sales for CD-R discs and only 10 percent of sales for CD-RW discs. CX-618 (Slides 27 and 28). The evidence also shows that current and historic royalty rates for the patent

pool and the sales price of the discs bear little or no relationship to one another. *See* RX-2344, RX-2345.

Finding a relevant market in licensing patented technology is consistent with a trend followed by several major technology companies, including IBM, Ericsson, Qualcomm, InterDigital and Rambus, that are garnering an ever larger amount of their revenues from the licensing of their intellectual property rights compared to their revenues for end-products. *See* Bratic Tr. 1913:16-1916:14. Philips' practices are consistent with this trend, having received patent licensing revenues of approximately 500 million euros (\$570 million) in 2002. Beune Tr. 2509:21-2510:12.

These facts lead to the conclusion that the licensing of essential CD-R/RW patented technology to manufacturers and the sale of CD-R/RW discs to retailers and distributors operate in separate and distinct markets. However, that fact alone does not answer the question of what the relevant market is. One must take into account "close substitutes – that is, the technologies or goods that are close enough substitutes significantly to constrain the exercise of market power with respect to the intellectual property that is licensed." DOJ/FTC Guidelines § 3.2.2.

The legislative history of 35 U.S.C. § 271(d)(5) provides a ready answer to this inquiry: "If a patented product is unique because no practical substitutes exist, the scope of the relevant market would be coextensive with the patent." 134 Cong. Rec. 32,295 (October 20, 1988) (remarks of Rep. Kastenmeier). As the analysis earlier herein of the relevant product market has established, CD-R/RWs are unique products that have no close practical substitutes. Consequently, the scope of the relevant market for licensing essential CD-R/RW patents is

coextensive with the relevant product market for CD-R/RWs because manufacturers are constrained to enter into those licenses in order to make such unique products.

Accordingly, to the extent that the relevant market in this case rests at the patent licensing level, it consists of the market for licensing the essential patents for the manufacture of CD-R/RWs in accordance with Orange Book standards, there being no close substitutes for such products.

b. Relevant Geographic Market

Respondents contend that the relevant geographic market for the patent licensing relevant market that they espouse is the United States because that is the country in which the patents of the pool apply. *See* RPHB at 25. Licenses to patents in other countries would not provide manufacturers the ability to sell their products in the United States, Respondents argue, and therefore are not part of the same market. *Id.* The Staff, on the other hand, contends that the relevant geographic market for the same patent licensing relevant market is the global market, because manufacturers of CD-R/RW discs exist in many countries around the world. *See* SPHB at 10. Complainant discredits both arguments on the ground that both are based solely on the fact that Philips owns patents, but patents do not constitute a relevant market and do not by themselves demonstrate market power. *See* CPHRB at 6, *citing Integraph Corp. v. Intel Corp.*, 195 F.3d 1346, 1355 (Fed.Cir. 1999) (“*Integraph*”); *B.V. Optische Industrie De Oude Delft v. Hologic, Inc.*, 909 F.Supp. 162, 172 (S.D.N.Y. 1955) (“*Oude Delft*”).

“A geographic market is an area of effective competition where buyers can turn for alternate sources of supply.” *Morgan, Strand, Wheeler & Biggs v. Radiology, Ltd.*, 924 F.2d 1484, 1490 (9th Cir. 1991) (internal quotation marks omitted); *accord, Independent Ink, Inc. v.*

Trident, Inc., 210 F.Supp.2d 1155, 1171 (C.D.Cal. 2002) (“*Independent Ink*”) (“Geographic market definition is based upon the market area in which the seller and its competitors operate and consumers can practicably turn for supplies.” (internal quotation marks omitted)). For a product market, a determination of the relevant geographic area typically involves analyzing such factors as “price data and such corroborative factors as transportation costs, delivery limitations, customer convenience and preference, and the location and facilities of other producers and distributors.” *Independent Ink, supra*.

Unlike a commercial product market, however, a patent licensing market such as the one advocated by Respondents and the Staff here does not deal with such factors. A licensing pool of U.S. patents is “sold” for a price – the royalty – to manufacturers from any country who wish to make, use or sell their products *in* the United States. The market for licenses for U.S. patents essential to the manufacture, use and sale of CD-R/RWs in the United States sets no price at all for the right to make, use or sell CD-R/RWs *outside* of the United States. As one court has observed, “[The] United States is the only geographic market where a U.S. patent can be misused in a manner leading to antitrust violations” *Buehler AG v. Ocrim S.p.A.*, 836 F.Supp. 1305, 1325 (N.D. Tex. 1993) (internal quotations omitted), *aff’d*, 34 F.3d 1080 (Fed.Cir. 1994) (Table) (unpublished opinion). Consequently, the geographic market for patent licenses for CD-R/RW (Orange Book) technology is limited to the United States.

On the other hand, viewing the relevant market as that for CD-R/RW discs themselves, the competitors being compared in that market for the purposes of this investigation are those manufacturers who are licensed by the pool versus those who are not. Purchasers of CD-R/RW discs; *i.e.*, retailers and distributors, can look worldwide for alternative sources of supply.

Manufacturers of CD-R/RW discs exist in many countries around the world. *See* Beune Tr. 2501:12-20 (Moser Baer manufactures in India); J. Chen Tr. 828:17-24; L. Chen Tr. 973:2-8 (the Princo Respondents manufacture in Taiwan, Switzerland and Germany); Wieghaus Tr. 341:25-342:9 (Mitsui manufactures in the United States). Unlicensed sales still represent 35 percent of the CD-R/RW market. *See* Beune Tr. 2384:19-2385:7. It is true that only manufacturers who are licensed under the U.S. patents can legally serve U.S. customers, but from a practical standpoint, as Complainant suggests (*See* CPHB at 33 n.18), the unlicensed seller does not stop selling until legal action puts a stop to it.

Complainant's citations to *Integraph* and *Oude Delft* have no relevance to the geographic market issue. In the first case, *Integraph*, a manufacturer of graphics work stations, sued Intel, a manufacturer of microprocessors, for patent infringement and antitrust violations. *Integraph's* product did not compete directly with Intel's, but *Integraph* claimed that its "Clipper" patent covered microprocessor technology and therefore the two companies "competed" with one another in the relevant market for microprocessors. *Integraph, supra*. The Court of Appeals disagreed:

the patent grant is a legal right to exclude, not a commercial product in a competitive market. *Integraph* abandoned the production of Clipper microprocessors in 1993, and states no intention to return to it. Firms do not compete in the same market unless, because of the reasonable interchangeability of their products, they have the actual or potential ability to take significant business away from each other.

Id. *Integraph* offers no guidance in determining what the relevant geographic market is here. Its point that the *Integraph* patent was not a "commercial product" that competed in the relevant market for microprocessors has no bearing to the issue at hand. Here, unlike *Integraph*, no one

claims that any *patent* competes with any *product*. Rather, as the Staff points out in its post-hearing reply brief, the technology licensing market is in *licenses* for essential patents, which must be viewed for these purposes as tantamount to “products” that have a “price;” namely, the royalty. *See* SPHRB at 15. Also unlike *Integrgraph*, there is only one “product” in this market with no competitor – a license for the essential patents of the pool. In the same vein, the product market for CD-R/RWs also at issue here does not pit patents in competition with products. Only commercial products – CD-R/RWs themselves – compete with each other in that market, and the competitors being compared in that market for the purposes of this investigation are those manufacturers who are licensed by the pool and those who are not.

Oude Delft equally says nothing about the geographic market issue. In that case, Hologic sued *Oude Delft* partly on the ground that the latter’s patents in chest equalization radiography equipment were procured from the PTO by fraud and constituted an attempt to monopolize in violation of the antitrust laws. In dismissing Hologic’s antitrust allegation for failure to define a relevant market, the court rejected Hologic’s contention that *Oude Delft* wanted to block its efforts to market its product in the United States by obtaining fraudulent patents. *Oude Delft, supra*. “[I]t is obvious that merely obtaining a patent for a product does not create a product market for antitrust purposes,” the court held. *Id.* This holding merely pointed out that Hologic’s contention missed the point of defining a relevant market; it did not establish a legal principle that patents cannot constitute relevant markets, as Complainant incorrectly reads the case.

All told, the evidence demonstrates that at the product level, the relevant geographic market for CD-R/RWs is worldwide, but the relevant geographic market for licensing the

essential U.S. patents for the manufacture of CD-R/RWs in accordance with Orange Book standards is the United States.

2. The Extent of Philips' Market Power in the Relevant Markets

As stated earlier herein, market power is “some special ability” on the part of the seller “to force a purchaser to do something that he would not do in a competitive market.” *Jefferson Parish, supra*, 466 U.S. at 13-14. It is generally regarded as “the ability profitably to maintain prices above, or output below, competitive levels for a significant period of time.” DOJ/FTC Guidelines § 2.2. Ordinarily, market power can be inferred from the seller’s possession of a predominant share of the market. *Eastman Kodak Co. v. Image Technical Services, Inc.*, 504 U.S. 451, 464 (1992).

In this case, we must look at whether Philips and its fellow licensors in the CD-R/RW licensing pools possess market power in the two relevant markets being examined: (i) the worldwide product market for CD-R/RW discs; and (ii) the United States market for licensing the essential U.S. patents for the manufacture of CD-R/RW discs in compliance with Orange Book standards.

a. The Product Market for CD-R/RW Discs

In the worldwide product market for CD-R/RW discs, the undisputed evidence presented by Complainant’s economics expert, Dr. McCarthy, shows that worldwide demand, supply and manufacturing capacity for CD-R discs grew rapidly during the years 2000-2002 to the point where, in 2002, there was a worldwide demand for nearly six billion CD-R discs and an available supply of nearly 8 billion discs out of a total manufacturing capacity of over 10 billion discs. McCarthy Tr. 1962:21-1963:22; CX-618 (Slide 8). The evidence thus shows that over that entire

time period, available supply consistently exceeded demand and there was always excess manufacturing capacity. The evidence also shows that during 1999-2001, wholesale and retail prices for CD-Rs and CD-RWs fell steadily. *See* McCarthy Tr. 1956:17-1958:7; CX-618 (Slides 5 and 6). Falling product prices over time is a typical pattern in the electronics industry. *See* Smith Tr. 1486:19-25. The evidence also shows that, following a rapid increase during the late 1990s, the number of manufacturers of CD-R discs peaked in 2000 and has fallen in the years thereafter. McCarthy Tr. 1965:5-11; CX-618 (Slide 9); CX-330.

As for the worldwide market share for the manufacture and sale of CD-R/RW discs, Philips and Sony have held only a minor share of the world's manufacturing output of CD-Rs that, combined with Taiyo Yuden's output, reached to approximately 8.8 percent in 2002. *See* McCarthy Tr. 1986:5-13; CX-618 (Slide 24). With respect to the manufacturing output for CD-RWs, the collective share of Philips, Sony and Ricoh amount to approximately 2 percent in 2002. *See* McCarthy Tr. 1986:24-1987:6; CX-618 (Slide 25). In terms of worldwide sales to retail outlets, the sales of CD-R discs by Philips, Sony and Taiyo Yuden amount to approximately 13 percent in 2002, and the sales of CD-RW discs by Philips, Sony and Ricoh amount to approximately 10 percent. *See* McCarthy Tr. 1989:22-1990:8; CX-618 (Slides 27 and 28). Thus, the choice of Philips, Sony, Taiyo Yuden and Ricoh to license manufacturers of CD-Rs and CD-RWs represents a decision to profit in a significant way from royalty revenue, rather than to seek major profits from the manufacture and sale of discs.

During the years 1998-2000, the percentage of CD-R and CD-RW discs that were sold in which no royalties were paid to the patent pool, despite their ostensible infringement of those patents, amounted to approximately 50 percent. Beune Tr. 2384:19-25. Since 2000, that

percentage has dropped to about 30-35 percent. Beune Tr. 2385:1-7. This drop evinces a concerted effort on the part of Philips and its licensor-partners to sign up manufacturers to their patent pools. This effort coincided with the period during which manufacturers of CD-R/RW discs were exiting the worldwide market. Prices have continued their inevitable pattern of falling despite the success of Philips and its licensor-partners in signing up over 70 percent of the world's supply of CD-R discs under the pool (*See* RX-1903C (listing current CD-R licenses) and CX-330C (showing percent market shares for CD-R manufacturers)).

The foregoing evidence of the relatively minor impact of Philips and its fellow licensors in the worldwide product market for CD-R/RW discs and on disc prices does not conclusively demonstrate that they possess market power in that market.

b. The Licensing Market for Essential U.S. CD-R/RW Patents

In the United States market for licensing essential U.S. patents for the manufacture and sale of CD-R/RW discs in compliance with Orange Book standards, the situation is quite different. Philips, Sony, Taiyo Yuden and Ricoh are horizontal competitors in the patent licensing market. As Philips has stated in its initial pleadings and as economics experts for both Complainant and Respondents confirmed, no one can manufacture or sell CD-R or CD-RW discs legally in the United States without taking a license to the Philips patents. *See* McCarthy Tr. at 2038:3-3039:11; 2039:25-2040:15; Bratic Tr. 1705:25-1706:11; Complaint ¶¶ 2.4 and 2.5. All CD-Rs and CD-RWs sold in the marketplace must comply with Orange Book standards. *See* Lang Tr. 234:19-25. Licenses to at least some of the Philips patents are essential to the manufacture of CD-R/RWs that are in technical and practical compliance with the Orange Book.

In the patent licensing market, Philips and its licensor-partners have maintained royalty rates above competitive levels for a significant period of time, despite the fall in CD-R/RW disc prices that have squeezed manufacturer profits. The minimum royalty rates under the CD-R patent pools range from 4.5 cents to eight cents (10 yen) depending which royalty rate program is implemented.¹⁰³ These rates have been maintained despite the fall in CD-R/RW prices to the point where those royalty rates now represent between 50 and 70 percent of today's average net selling price in the industry. Bratic Tr. 1725:14-1727:11; RX-2348C; RX-2349C.

Subsequent to the 2001 Taiwan FTC decision finding the Philips patent pools to be illegal under Taiwan law, Respondent Gigastorage was able to enter into individual license agreements with Sony and Taiyo Yuden for the CD-R/RW patents in the pool that they owned. In comparison to royalty rates that Gigastorage was able to work out individually with Sony and Taiyo Yuden, the 10-yen rate demanded by the Philips CD-R patent pool is approximately [] times those individual rates.¹⁰⁴ See J. Chen Tr. 875:21-886:20; RX-1466; RX-1872; RX-1873; RX-1875; RX-1951. According to Roger S. Smith, Esq., Respondents' expert in intellectual

¹⁰³ Under a so-called "compliance program," the Philips CD-R pool gives a licensee a CD-R royalty rate of 6 cents per disc for a license to the patents of all licensor-partners and 4.5 cents for a Philips-only license. Smith Tr. 1416:7-1417:6, 1424:9-15; Beune Tr. 2342:22-2343:3; RX-992 (CD-R Disc Patent License Agreement, ¶ 5.02). In return for that rate, Philips requires the licensee to submit on a yearly basis a list of the equipment it uses to manufacture CD-R discs, and to demonstrate to Philips' satisfaction that the equipment originated from a Philips licensee; otherwise, the higher (10 yen) royalty rate applies. See Smith Tr. 1416:17-1417:6; RX-992 (CD-R Disc Patent License Agreement, ¶ 6.01).

¹⁰⁴ It is interesting to note in connection with Gigastorage's agreement with Taiyo Yuden that the actual royalty rate paid by Gigastorage is reflected in a supplemental "side letter" agreement rather than the main license agreement between the parties. See Smith Tr. 1482:5-13. Such agreements, Smith opined, "are often used when one does not want the world to see the end result." Smith Tr. 1482:12-13.

property licensing practices in the field of information handling technology, such percentages are “outrageous” compared to industry norms, and would not allow a CD-R licensee to stay in business. Smith Tr. 1417:7-15, 1419:12-24. Nonetheless, Philips and its licensor-partners have signed up more than 100 manufacturers to the patent pools and approximately 60-70 remain signatories today. Beune Tr. 2341:9-22.¹⁰⁵ Further, if Philips is successful in this Section 337 investigation, it will win either a general or a limited exclusion order as well as cease-and-desist orders against Respondents, which by their nature restrict output that is imported into the United States market.

Thus, the Philips CD-R and CD-RW patent pools constitute horizontal agreements among competitors to control the royalty rate for U.S. patents that are essential for the manufacture and sale of CD-R/RW discs in the United States market, agreements that indisputably afford them the market power of an absolute monopoly.

3. *Per Se* Misuse

In characterizing conduct under the *per se* rule, “our inquiry must focus on whether the effect and, here because it tends to show effect, the purpose of the practice [is] to threaten the proper operation of our predominantly free-market economy – that is, whether the practice facially appears to be one that would always or almost always tend to restrict competition and decrease output . . . or instead [is] one designed to increase economic efficiency and render

¹⁰⁵ It is to be noted, however, as explained later herein, that many of these manufacturers pay lowered royalties or no royalties because they receive special considerations of one kind or another that have nothing to do with the standard CD-R/RW patent license agreements. *See* p. 180-182, *infra*.

markets more, rather than less, competitive.” *Broadcast Music, Inc. v. Columbia Broadcasting System, Inc.*, 441 U.S. 1, 19-20 (1979) (“*Broadcast Music*”).

a. The Royalty Rate as a Price-Fixing Restraint

The Philips CD-R and CD-RW patent pools, in all of their forms, require fixed royalty rates for the licensing of the patents in the pool, regardless of whether they are essential or non-essential to the manufacture and sale of CD-R/RW discs according to the Orange Book. For CD-Rs, the fixed royalty rate is officially equal to three percent of the net selling price per disc or 10 yen (approximately 8 cents U.S.), whichever is greater. J. Chen Tr. 916:15-18. Although the three-percent rate determined the relevant royalty in the early 1990s when CD-R prices were high enough to result in royalties in the order of 20 to 25 cents per disc, prices in recent years for CD-R discs have fallen to the point where only the 10-yen minimum is the relevant per-disc royalty. Beune Tr. 2339:20-22, 2342:2-21.¹⁰⁶ For CD-RWs, the pool partners initially offered a joint royalty rate for all patents in the pool of three percent of the net selling price or 15 cents per disc, whichever was higher; now, that minimum rate is 10 cents per disc. Beune Tr. 2343:10-2344:1.

There are several problems with the royalty arrangements of the Philips CD-R and CD-RW patent pools from the standpoint of a *per se* review. Complainant does not contest the opinion testimony of Respondents’ expert on intellectual property licensing, Roger S. Smith, to the effect that, as a general rule in the data storage industry, a royalty is considered reasonable if it “produces income for the licensor and still allows the licensee to operate at a profit so that he

¹⁰⁶ As mentioned earlier, for manufacturers who agree to enter into a “compliance program” that requires the auditing of a manufacturer’s sales reports in order to assure accuracy in reporting sales data, the CD-R pool gives a CD-R royalty rate of 6 cents per disc for a joint license and 4.5 cents for a Philips-only license. Smith Tr. 1416:7-1417:6; Beune Tr. 2342:22-2343:3; RX-992.

can continue to manufacture, use, lease, or sell products that are covered.” Smith Tr. 1409:12-17. In Smith’s experience in negotiating royalty rates for IBM patents in the information handling systems area, license rates of one percent or less are normal for an individual patent. *See* Smith Tr. 1409:18-25. In licensing multiple IBM patents, Smith found that each patent could add one percent to the total royalty rate, but only up to a maximum of five percent. Smith Tr. 1410:1-20. By contrast, the current 6-cents per disc “compliant” royalty for a license to the entire CD-R patent pool amounts to an effective royalty rate of 40 percent of the disc selling price. Smith Tr. 1417:7-15. Obviously, the “non-compliant” royalty rate of 8 cents per disc (10 yen) represents a higher percentage. Gauged by the measure enunciated by Mr. Smith, the royalty rates for the Philips CD-R and CD-RW patent pools are excessive enough to force a manufacturer taking such a license to be priced out of the market for CD-R/RW discs and to leave the industry.¹⁰⁷

The royalty rate that Philips now offers to license its own pooled patents alone is no better. In 2001, after the Taiwan Federal Trade Commission declared the Philips CD-R patent pool to be illegal under Taiwanese law, Respondents Princo and Gigastorage were able to secure individual licenses from Sony and Taiyo Yuden for their own U.S. patents for CD-Rs in the pool at far lower royalty rates than the combined pool rates. *See* Smith Tr. 1418:24-1419:4, 1422:1-23, 1423:23-1424:8; RX-1873, RX-1875, RX-1951 (Gigastorage agreements); RX-1757, RX-1865, RX-1866 (Princo agreements). Philips at that time also started offering separate licenses to its

¹⁰⁷ Mr. Smith admitted on cross-examination that his knowledge about the amount of profits that CD-R/RW manufacturing licensees of the Philips patent pool have been making is limited to the experience of Respondents Princo and Gigastorage. *See* Smith Tr. 1440:20-1441:15. Although Complainant argues that so limited an examination on Smith’s part is flawed, Complainant has not produced any countering evidence to show that any other manufacturing licensee of the pool who is paying the full royalty rate is making a profit on the sale of its CD-R/RWs.

own CD-R patents in the pool. Smith Tr. 1418:24-1419:4. However, in so doing, Philips structured the royalty for its own CD-R patents under the separate license so that it would receive a greater amount from such individual licenses than it would under the pool licenses. Smith Tr. 1425:21-1427:18; RX-2367.¹⁰⁸ This arrangement results in a higher royalty to Philips and also exceeds industry norms. Smith Tr. 1413:14-24.

The concerted pricing policies of Philips and its licensor-partners follows that of a horizontal combination to fix prices at higher than competitive levels, which has long been considered by the law to be illegal *per se*. “Price fixing in commerce, reasonable or unreasonable, has been considered a *per se* violation of the Sherman Act.” See *United States v. New Wrinkle, Inc.*, 342 U.S. 371, 377-78 (1952) (patent pooling agreement that fixed minimum prices at which all licensed manufacturers might sell amounts to “[p]rice control through cross-licensing [that] was barred as beyond the patent monopoly.”); also see DOJ/FTC Guidelines § 5.1, Example 9 (horizontal combination of consumer electronic product manufacturers to assign competing, non-blocking product patents to jointly-owned firm for licensing to other manufacturers at established royalty rates “likely would result in higher royalties and higher goods prices than would result if the owners licensed or used their technologies independently,” possibly resulting in *per se* illegal horizontal price fixing); § 5.5 (“When cross-licensing or pooling arrangements

¹⁰⁸ Under the original CD-R patent pool, Philips receives [] percent of the pool royalty proceeds while Sony and Taiyo Yuden []. This puts Philips’ share of the 6-cent “compliant” pool royalty rate at approximately [] cents per disc. By contrast, under the separate license of its own patents, Philips receives a royalty of approximately [] cents per disc without having to share this amount with Sony and Taiyo Yuden. Smith Tr. 1425:21-1427:18; RX-2367.

are mechanisms to accomplish naked price fixing or market division, they are subject to challenge under the *per se* rule.”).

This price-fixing scheme strays considerably from the competitive benefits of patent pools that the Department of Justice has identified in its guidelines and business review letters; namely, that they “may provide competitive benefits by integrating complementary technologies, *reducing transaction costs*, clearing blocking positions, and avoiding costly infringement litigation” at royalty rates that “are likely to constitute *a tiny fraction*” of product prices. CX-355 (MPEG-2 Business Review Letter at 11) (internal quotation marks deleted; emphasis added); DOJ/FTC Guidelines § 5.5. In the opinion of Respondents’ expert, Mr. Smith, a manufacturer cannot profitably make CD-R/RW discs for sale in the United States at the royalty rates demanded by Philips, either for the Philips-only patent pool or for the pool of Philips and its licensor-partners. See Smith Tr. 1419:17-24, 1433:25-1434:13.¹⁰⁹

¹⁰⁹ It is not sufficient to counterargue, as Complainant does, that its pool royalty rates are no worse as a percentage of CD-R/RW disc prices than the combined royalties paid by DVD disc manufacturers under the three DVD patent pools that were approved by the DOJ in its Business Review Letters. Those royalties represent a total of 33% of the current net selling price of DVD discs. See Beune Tr. 2399; *also see* CX-355 at p. 6 n.20; CX-357 (3C DVD Business Review Letter at p. 5); CX-358 (6C DVD Business Review Letter at p. 6). This argument misses the point of the antitrust analysis that was conducted in those Business Review Letters and that must be conducted here. Two of the three Business Review Letters analyzed the likelihood that the patent pool royalty rates in question would facilitate collusion among licensors or licensees in any market, and in both instances the DOJ concluded that the contemplated royalty rates were “*sufficiently small relative to the total costs of manufacture*” to render collusion unlikely. See CX-357 (3C DVD Business Review Letter at p. 11); CX-358 (6C DVD Business Review Letter at PHX009134) (emphasis added). In the third MPEG-2 Business Review Letter, the DOJ concluded even more definitively that “since the contemplated royalty rates are likely to constitute *a tiny fraction of MPEG-2 products’ prices, at least in the near term,*” collusion was unlikely. CX-355 (MPEG-2 Business Review Letter at 11 (emphasis added). By contrast, the evidence of record here shows that the patent pool royalty rates charged by Philips and its licensor-partners for CD-R/RWs are *significant* product price components that currently equal

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b. Price Discrimination

Not only do the Philips CD-R and CD-RW patent pools constitute price-fixing; they are also economically discriminatory in nature and application. Inherently, “[a] license fee based upon a percentage of gross revenue is discriminatory in that it grants the same number of rights to different licensees for different total dollar amounts, depending upon their ability to pay.” Cirace, “*CBS v. ASCAP: An Economic Analysis of A Political Problem*,” 47 Ford.L.Rev. 277, 288 (1978), *quoted in Broadcast Music, supra*, 441 U.S. at 31 n.17 (Stevens, J., dissenting). As an “all-or-nothing” patent pool, the one-rate royalty price structure imposed on manufacturers by Philips and its licensor-partners is totally unrelated to factors that would normally affect the royalty rate of a patent in a competitive market, such as the associated costs or quality or quantity of the individual patents in the pool. Such a structure requires licensees to buy more patent rights than they want at a price that may well be far higher than what they would choose to pay for each patent in a competitive system, which is “a classic example of economic discrimination.” *See Broadcast Music, Inc., supra*, 441 U.S. at 31-32 (Stevens, J., dissenting).¹¹⁰

¹⁰⁹ (...continued)

[] of Respondents’ costs of manufacture. *See* L. Chen Tr. 1009:11-1010:8; CX-183C; RX-1945C (Princo and Gigastorage’s 2002 CD-R manufacturing costs were between [] cents compared to the “compliant” pool royalty rate of 6 cents). Even if these costs were much higher in the early 1990s when the patent pools began, they are no longer and do not excuse Philips’ insistence on a royalty rate that amounts to far more than a “tiny fraction” of CD-R/RW selling prices.

¹¹⁰ This pricing scheme can be contrasted with the type of industry licensing practice followed by IBM, the world’s largest holder of U.S. patents, as described at trial by Respondents’ expert on that subject, Roger S. Smith. As Mr. Smith testified, IBM’s licenses of its information storage technology patents are typically priced at royalty rates of one percent per patent, and when licenses to multiple patents are granted, the one percent rate is cumulated for each patent in the package until a maximum of five percent is reached. *See* Smith Tr. 1409:18-1410:14. Any
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The inherently discriminatory nature of this “all-or-nothing” royalty scheme is aggravated by the discriminatory manner in which Philips and its licensor-partners have applied the royalty to different manufacturers. Specifically, Complainant neither agrees nor disagrees with Respondents’ assertion that manufacturers who sell CD-R/RW discs to Philips or its licensor-partners pay no royalty on those discs to the pool members. J. Chen Tr. 858:3-859:22; Beune Tr. 2439:1-7, 2439:20-2440:12. The same is true for Respondents’ contention that manufacturers who sell CD-R/RW discs to a company that has entered into a cross-license with Philips are not required to pay royalties on those discs. J. Chen Tr. 858:3-859:22; Beune Tr. 2439:8-20, 2444:17-22, 2447:1-8, 2450:2-4.

Philips maintains that in the case of discs sold to cross-licensees, there are no royalties because the royalty has, in effect, already been paid “in kind” by the cross-license back to Philips. *See* Beune Tr. 2447:1-8. This contention has no merit, however, because there is no connection between the vendor relationship of a manufacturer selling discs to a company that cross-licenses with Philips on the one hand, and the cross-license relationship of that company to Philips on the other. The fact that a company purchasing CD-R/RW discs from an unrelated disc seller happens to be a cross-licensee of Philips for technology of any type, related or unrelated, does not translate into a “payment” by that seller of a royalty to Philips for the sale of those discs to that company. At best, this exemption of the seller from the obligation to pay a royalty is nothing more than a giveaway that Philips offers to CD-R/RW vendors of its cross-licensees in order to

¹¹⁰ (...continued)

number of patents can be chosen for licensing from IBM. *See* Smith Tr. 1472:9-20, 1490:3-8. Thus, unlike the Philips pool, IBM’s licensees have a choice of acquiring rights only to patents that they need at royalty rates that reflect the number of patents they actually acquire.

foster good business relations with the cross-licensees. As such, it discriminates economically against manufacturers who do not have the benefit of such a vendor relationship.

4. Conclusion on *Per Se* Misuse

The foregoing restraints on the U.S. market for unique CD-R/RW patented technology rise to the level of a *per se* antitrust violation because they are sure to “threaten the proper operation of our predominantly free-market economy” in a way that “would always or almost always tend to restrict competition” in such technology. Further, the patent pooling and licensing practices of Complainant have not been shown to “increase economic efficiency and render markets more, rather than less, competitive.” See *Broadcast Music, supra*, 441 U.S. at 19-20.¹¹¹ Consequently, the pool patents at issue in this investigation are unenforceable by reason of patent misuse on the part of Philips.

E. “Rule of Reason” Analysis

Under the Federal Circuit’s ruling in *Virginia Panel, supra*, where a *per se* analysis is inappropriate, a court evaluating a defense of patent misuse must first “determine if that practice is ‘reasonably within the patent grant, *i.e.*, that it relates to subject matter within the scope of the

¹¹¹ The Supreme Court held in *Broadcast Music* that when a television network seeking to purchase a blanket license of music copyrights from a copyright pool at a single royalty rate had a “real choice” of obtaining individual licenses of those rights directly from composers in lieu of taking the blanket license, the blanket license fee was not illegal *per se*, but must instead be viewed under the “rule of reason.” *Broadcast Music, supra*, 441 U.S. at 23-24. That principle, however, does not foreclose a *per se* analysis here. Manufacturers in the market for CD-R/RW discs are unable to negotiate a reasonable royalty rate with Philips for only particular *blocking* patents for the purpose of making CD-R/RWs that comply with Orange Book standards. This situation is not the same as that faced by CBS, which was free to license music from individual composers that were ready substitutes for one another. The licensing practice followed by Philips, by contrast, affords a manufacturer no “real choice,” *i.e.*, a choice of taking a pool license, or to leave the market altogether. Thus, a *per se* analysis is warranted notwithstanding the holding under the facts of *Broadcast Music*.

patent claims.”” *Virginia Panel, supra*, 133 F.3d at 869 [citation omitted]. If “the practice has the effect of extending the patentee’s statutory rights and does so with an anti-competitive effect, that practice must then be analyzed in accordance with the ‘rule of reason.’” *Id.* If it does not, however, then it cannot constitute patent misuse under the rule of reason. *See id.*

“A rule of reason analysis requires a determination of whether an agreement is on balance an unreasonable restraint of trade, that is, whether its anti-competitive effects outweigh its pro-competitive effects.” *Columbia Broadcasting System, Inc. v. American Soc. of Composers, Authors and Publishers*, 620 F.2d 930, 934 (2d Cir. 1980), *cert. denied*, 450 U.S. 970 (1981), *citing National Society of Professional Engineers v. United States*, 435 U.S. 679 (1978); *Continental T.V., Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36 (1977); *Chicago Board of Trade v. United States*, 246 U.S. 231 (1918). Furthermore, under the rule of reason the challenger of the alleged anticompetitive practice “bears the initial burden of showing that the challenged action has had an *actual* adverse effect on competition as a whole in the relevant market; to prove it has been harmed as an individual competitor will not suffice. Insisting on proof of harm to the whole market fulfills the broad purpose of the antitrust law that was enacted to ensure competition in general, not narrowly focused to protect individual competitors.” *Capital Imaging Associates, P.C. v. Mohawk Valley Medical Associates, Inc.*, 996 F.2d 537, 543 (2d Cir.), *cert. denied*, 510 U.S. 947 (1993) (emphasis in original), *citing Atlantic Richfield Co. v. USA Petroleum Co.*, 495 U.S. 328, 343-44 (1990).

1. Scope of the Patent Grant

The practice of pooling “essential” with “non-essential” patents under a license agreement is well-recognized under the antitrust laws to constitute an extension beyond the

statutory right to exclude. As the Third Circuit held in *American Securit Co. v. Shatterproof Glass Corp.*:

Each patent gives its owner a monopoly in respect to its disclosures, so much and no more. It is a grant of the exclusive right to manufacture, use and sell the invention which is disclosed. That invention is what the patent grant protects by the monopoly, not that invention plus some embellishment, improvement, or alternate product or process, which also happens to be patented. See *Motion Picture Patents Co. v. Universal Film Co.*, 1917, 243 U.S. 502, 511-513, 37 S.Ct. 416, 61 L.Ed. 871. Each monopoly must stand on its own footing. Cf. *United States v. Paramount Pictures*, 1948, 334 U.S. 131, 158, 68 S.Ct. 915, 92 L.Ed. 1260. [Footnote omitted] Mandatory package licensing is no more than the exercise of the power created by a particular patent monopoly to condition the licensing of that patent upon the acceptance of another patent but that is too much. The protection, or monopoly, which is given to the first patent stops where the monopoly of the second begins.

American Securit Co. v. Shatterproof Glass Corp., 268 F.2d 769, 777 (3rd Cir.), cert. denied, 361 U.S. 902 (1959).

The ruling of *American Securit* holds equally true today, as embodied in the expressed position of the U.S. Department of Justice in its business review letters that the pooling of “essential” with “non-essential” patents can “foreclose the competitive implementation options” that an industry standard like the Orange Book “has expressly left open.” See CX-355 at 10.

What is more, the pools’ bundling of patents that are “technically essential” with patents that are “essential as a practical matter,” as Philips and its licensor-partners do, extends the statutory scope of each patent in the pools as well. As will be addressed more fully later herein, the definition of “essential as a practical matter” that is used by the pools under this standard adds patents to the pools that do not technically cover specific parts of the Orange Book. Dr. Rubenstein, the “neutral evaluator,” considers patents to be “practically” or “economically” essential to practicing the Orange Book standards when he determines that no viable alternative

technology exists. However, his interpretation is applied in a manner that expands the statutory monopoly of technically essential patents in the Orange Book to innovations that really have nothing to do with the Orange Book, other than that they are found on an Orange Book-compliant CD-R/RW disc and are utilized by a large number of disc manufacturers. When the non-essential patents are added to the pools on the ground that they are “necessary as a practical matter,” the statutory monopolies of the essential patents are impermissibly expanded. Adding these patents to the pools adds leverage to that patent’s bargaining position in licensing negotiations with manufacturers, and unfairly competes with existing or emerging alternate technologies. It constitutes an inducement of an all-encompassing license to the totality of technology for making CD-R/RW discs, far beyond the scope of the Orange Book.

Consequently, Philips’ bundling of “essential” with “non-essential” patents in its CD-R and CD-RW patent pooling license agreements, as well as its bundling of “technically essential” patents with patents that are improperly deemed to be “necessary as a practical matter,” exceed the scope of its statutory right to exclude under its patents, and therefore must be further analyzed under the “rule of reason” to balance the procompetitive and anticompetitive effects of this practice.

2. Application of “Essentiality” Standards to Patents in the Pools

The decision whether a patent owned by Philips and its licensor-partners that involves CD-R/RW technology is to be included in the pools has been assigned by the pools to Dr. Kenneth Rubenstein, a patent attorney with a PhD. in physics, who decides whether the patent is “essential” and therefore included, or “non-essential” and therefore excluded. *See Rubenstein Tr. 2172:22-2173:7.* Dr. Rubenstein considers himself to be an “independent evaluator” of the

essentiality of patents submitted to him for inclusion in the pools, not merely an attorney in an attorney-client relationship with Philips or any of its licensor partners. *See* Rubenstein Tr. 2171:24-2172:6, 2191:9-18. He has performed in a similar capacity with the MPEG-2 and DVD patent pools that were the subject of the Department of Justice's three business review letters. *See* Rubenstein Tr. 2173:8-14.

In deciding whether a patent is "essential," Dr. Rubenstein breaks his analysis into two subparts – whether the patent is "technically essential" and whether the patent is "essential as a practical matter" (also referred to by Dr. Rubenstein as "commercially essential"). *See* Rubenstein Tr. 2182:14-23. In one of his status reports to Sony rendering decisions on the essentiality of patents that Sony submitted to him for inclusion in the CD-R patent pool, Dr. Rubenstein gave his definition of a patent that is "technically essential" to the pool as being one wherein "at least one claim of the patent covers (i.e., is essential to implement) a portion of the Specifications for Recordable Compact Disc Systems, Part II: CD-R, Version 3.1, December 1998 ('the CD-R Standard')"; that is, the CD-R section of the Orange Book. *See, e.g.,* CX-563C (July 3, 2001 Rubenstein Status Report at PH065751).

Dr. Rubenstein further testified that if he decides that a patent is not "technically essential," he then decides whether the patent is nevertheless "essential as a practical matter" and should nevertheless be included in the pools on that basis. *See* Rubenstein Tr. 2184:15-25. To Dr. Rubenstein, "essential as a practical matter" means that the patent "must be shown to have at least one claim having no commercially reasonable alternative for implementing a portion of the CD-R Standard." CX-563C (July 3, 2001 Rubenstein Status Report at PH065751). However, he does not make this latter discussion on a technical basis, but rather Dr. Rubenstein looks at

“what's going on in the marketplace” to see if substantially all of the relevant products practice the patent; if many do not, then he considers a commercially feasible alternative to exist and he finds the patent to be commercially non-essential as well as technically non-essential. *See* Rubenstein Tr. 2185:8-25.¹¹² Dr. Rubenstein testified that approximately 50 patents have been submitted to him for review by Philips and its licensor-partners, and that of these, approximately 30 have been included in the pools as “technically essential” whereas two have been included as “essential as a practical matter.” *See* Rubenstein Tr. 2195:20-2196:13; *also see, e.g.*, CX-563C; CX-564C; CX-565C; CX-569C; CX-572C.¹¹³

¹¹² According to Dr. Rubenstein’s status report to Sony mentioned earlier herein, when a patent is submitted by Philips or its licensor-partners for inclusion in the pools on the basis of essentiality as a practical matter, Dr. Rubenstein asks the submitting company for evidence that demonstrates such essentiality, which can come in several forms as follows:

Preferably, evidence submitted should describe: the technical/commercial reason(s) why the invention claimed in the patent is the only practical way to implement part of the CD-R Standard; any known alternatives to the invention claimed; and why these alternatives are not used. The evidence may also cover a study of the products available in the market to demonstrate that substantially all (*e.g.*, 90% or more) of the market infringes one or more claims of the patent. Other forms of evidence that similarly demonstrate pervasive use in the marketplace of the patent or patents may be provided.

CX-563C (July 3, 2001 Rubenstein Status Report at PH065751).

¹¹³ Philips’ CD-R/RW patent pool licensing agreements have a provision that requires a licensee that has an “essential patent” (*i.e.*, both “technically” essential and essential “as a practical matter”) to grant such patent back to the licensors and other licensees on reasonable terms and conditions, including the payment of a royalty. Smith Tr. 1448:2-22; RX-992C (Philips CD-R Disc Patent License Agreement § 2.06, at PH077998 and PH077001). During the 1990s, however, this “grantback” provision required a grant back of all “pertinent” patents, not all “essential” patents. Bratic Tr. 1779:21-1780:23. Several CD-R and CD-RW licensees continue to operate under licenses with grantback clauses that require them to grant back all “pertinent” patents. *See, e.g.*, RX-1903C, tab 2 (¶ 2.07), tab 4 (¶ 2.07), tab 7 (¶ 2.07), tab 9 (¶ 2.07); Bratic Tr. 1781:3-6. There have never been any grantbacks under the CD-R or

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In support of the patent misuse defense raised in this investigation, Respondents and the Staff have called into question the essentiality of several patents in the pools. *See* RPHB at 9-21; SPHB at 23-27. In so doing, Respondents have offered the opinion of Dr. Steven McLaughlin, Respondents' expert in the field of optical data storage, who testified that several patents in the pools are non-essential. McLaughlin Tr. 1499:6-13.

According to Dr. Rubenstein, there are several differences between his definitions of "essentiality" and Dr. McLaughlin's that cause him to include more patents in the pools as "essential" than Dr. McLaughlin does. Rubenstein Tr. 2206:11-14, 2210:2-18. The principal difference, according to Dr. Rubenstein, is that he deems patents to be essential if they cover any section of the Orange Book, whereas Dr. McLaughlin does not count patents that cover technology identified in the Orange Book as only "recommended" or "optional." *See* Rubenstein Tr. 2209:15-25, 2211:14-2214:11. Another difference Dr. Rubenstein perceived was that Dr. McLaughlin included theoretical alternative technologies as substitutes, not just alternatives that actually exist in the marketplace. *See* Rubenstein Tr. 2214:12-2216:25.

Although it is not mandatory for a CD-R or CD-RW disc to comply with some portions of the Orange Book, according to Dr. Rubenstein those provisions are nevertheless so integrated

¹¹³ (...continued)

CD-RW disc license agreements. Bratic Tr. 1781:20-1782:4; Beune Tr. 2354:4-7. Respondents contend that these grantback provisions are anticompetitive to the extent that they formerly required broad licenses to all "pertinent" patents rather than to the current requirement of all "essential" patents. Yet the lack of actual experience under this provision leaves insufficient evidence to analyze the procompetitive and anticompetitive effects of such grantback provisions. Moreover, the current provision tracks a similar provision requiring a grantback of "essential" patents that was reviewed by the DOJ in its 3C DVD business review letter and was not found to be anticompetitive. *See* CX-357 (3C DVD Business Review Letter at pp. 12-13). Accordingly, the impact of the grantback provisions on patent misuse is not further considered herein.

with other mandatory sections that it is best to view the Orange Book as a whole and to consider that manufacturer to be an infringer if a patent in the pool covers the optional technology. *See* Rubenstein Tr. 2295:8-2296:7; RX-407C (Orange Book CD-R Standard § 1.3 at PH015684) (“All parts in this document are mandatory unless they are specially defined as recommended or optional or informative.”).

On the other hand, if the manufacturer practices a methodology that is identified in the Orange Book as an “alternative” or “optional” methodology that is *not* covered by any patent in the pool, a manufacturer utilizing such optional technology would be in technical compliance with the Orange Book and would not be an infringer. Thus, in examining the Respondents’ CD-R and CD-RW discs, it is important not to confuse “technical compliance” with the Orange Book, which includes both patented *and* non-patented components and methods, with infringement of a “technically essential” patent in the pool.

The breadth of Dr. Rubenstein’s definition of essentiality “as a practical matter” is a significant factor in considering whether the Philips CD-R and CD-RW patent pools are unreasonably anticompetitive. In its business review letters, the Department of Justice noted that it understood “essentiality” to “encompass patents which are technically essential – *i.e.*, inevitably infringed by compliance with the specifications – and those for which existing alternatives are economically unfeasible.” CX-357 (3C DVD Business Review Letter at 3 n.8). However, the DOJ expressed misgivings that the definition of essentiality “as a practical matter” could be interpreted too liberally:

If our understanding of the criterion “necessary (as a practical matter)” is correct, [footnote omitted] then it appears that the Licensors intend to license through the pool only complementary patents for which there are no substitutes for the

purposes of compliance with the Standard Specifications. Some uncertainty arises from this definition's imprecision: Unlike the MPEG-2 pool, which required actual technical essentiality for eligibility, this pool introduces the concept of necessity "as a practical matter." On its face, this latter standard is inherently more susceptible to subjective interpretation. [footnote omitted] An excessively liberal interpretation of it could lead to the inclusion of patent rights for which there were viable substitutes. *In that event, the pool could injure competition by foreclosing such substitutes.*

CX-357 (3C DVD Letter at 10) (emphasis added).

The danger of this "subjective" interpretation of "essential as a practical matter" in this case is that it suppresses emerging technologies by gradually extending the reach of the pools beyond the Orange Book like a creeping vine. This risk is evident from Dr. Rubenstein's way of implementing this definition.

From Dr. Rubenstein's point of view, the procompetitive impact of his "commercial essentiality" criterion is that it provides licensees with all the patents they need to make an Orange Book compliant CD-R or CD-RW disc by including all patents found by Dr. Rubenstein to be used by virtually all of the CD-R/RW market in addition to those that are "technically essential" to Orange Book compliance. *See Rubenstein Tr. 2279:7-16.* However, from a manufacturer's point of view, this definition merely facilitates Dr. Rubenstein's hunt through the marketplace for infringers of the patent that he happens to be reviewing at the moment for inclusion in the pools. If Dr. Rubenstein finds a large number of infringers, he adds the patent to the pool by declaring that patent to be "essential as a practical matter" to the pool. The loose definition of "essential as a practical matter" permits Dr. Rubenstein to make this connection easily because, in reality, *any* innovation that is found on an Orange Book-compliant CD-R disc or CD-RW disc can be deemed "essential as a practical matter" if it exists on the disc, the disc

works in an Orange Book-compliant CD reading and recording system, and the innovation has been adopted by a large number of manufacturers.

Connecting the pool to a patent in this way adds leverage to the licensing value of both the patent and the pool by permitting the patentholder and its fellow pool members to demand from licensees the high pool royalty rate that the subject patent might not be able to achieve on its own. This result is inherently anticompetitive because it tends to raise royalty rates above competitive levels. At the same time, although submitting a patent to Dr. Rubenstein for evaluation as to whether it can be included in the pool is voluntary on the part of the pool member (Rubenstein Tr. 2320:18-2321:14), the anticompetitive pressure that the pool exerts on outside competitors is strong because licensees are wedded to the pool technology and are reluctant to add to their royalty costs by using the competitor's non-pool innovation in place of what is licensed through the pool.

By contrast, Dr. McLaughlin's definition of "essential as a practical matter" includes "only complementary patents for which there are no substitutes," which is the same definition that the DOJ found acceptable. *See* CX-357 (3C DVD Business Review Letter at 10). Dr. McLaughlin's approach identifies viable substitutes in the marketplace and, if they are found at all, excludes the patent in question from the pools. This approach necessarily limits the pools to the technology of the Orange Book and does not extend its reach to innovations that fall outside of that which is essential to its practice.

As mentioned before, a "rule of reason" analysis of the pools' method for deciding whether technically non-essential patents are to be added to the pools as "essential as a practical matter" requires a balancing of the procompetitive effects against the anticompetitive effects and

an evaluation of the actual harm to competition as a whole. *See* pp. 182-83. A primary anticompetitive effect of this practice that the Staff identifies is that a manufacturer's entering into a license of a pool that includes nonessential patents as a package with essential patents serves as a disincentive for the manufacturer to license a technology that competes with improperly included non-essential patents in the pool. SPHB at 18, *citing Grid Systems Corp. v. Texas Instruments, Inc.*, 771 F.Supp. 1033, 1038 (N.D. Cal. 1991).

Complainant disputes the asserted anticompetitive effects on several grounds. First, Complainant asserts that the theory of Respondents and Staff that licensees that use nonessential patents in the pools for free (or without added royalty) will not use competing technology assumes that licensees know what technology they need and are using, and there is no evidence in the record that they do or that they choose the technology that their discs employ. CPHRB at 14-15. Rather, Complainant asserts, licensees enter the business by purchasing "off-the-shelf" replicating machines, doing some "fine-tuning," and plugging them in, not by consciously choosing from alternative technologies. *Id.* Second, Complainant argues that there is no evidence in the record that licensees actually use the technology in the pools' "nonessential" patents or that they have a need to use such technology or its alleged alternatives. CPHRB at 15. Third, Complainant asserts that there is no evidence in the record that any alternative technology identified by Respondents has a cost that prohibits a licensee from switching to it from pool technology because of the cost already being incurred under the license. CPHRB at 16-17.

On balance, the anticompetitive effect on alternative technologies of the way that the pools determine which patents are "essential as a practical matter" and which are not outweighs the procompetitive effect of creating a convenient, broad package of patents for manufacturers to

license. Dr. Rubenstein's analysis of essentiality "as a practical matter" is virtually arbitrary. Deciding that a patented CD-R/RW innovation that falls outside the Orange Book should nevertheless be included in the pools solely because a large number of manufacturers happen to use it has an anticompetitive effect on alternative technologies in the marketplace. Dr. Rubenstein's rationale is directly contrary to the DOJ's definition of patents that are "essential as a practical matter" in its business review letters; namely, patents "for which there are no substitutes for the purposes of compliance with the Standard Specifications." CX-357 (3C DVD Letter at 10) (emphasis added). Under the DOJ's definition, if even a tiny fraction of the market uses an alternative to the non-Orange Book patent that is being considered for inclusion in the pools, it should *not* be included. As will be seen below in connection with Taiyo Yuden's Hamada patents that were included in the pools not as technically essential patents but only as "essential as a practical matter," Dr. Rubenstein has failed to follow this principle.¹¹⁴

Dr. Rubenstein claimed at trial that his methodology does not stifle innovation because he continually reviews his essentiality determinations and can remove a patent from the pools if competing alternative technologies have arisen that render the patent no longer "essential as a practical matter." *See* Rubenstein Tr. 2286:4-2287:7. Even if this practice were followed, however, it would nevertheless stifle innovation while the patent remains in the pools, and would

¹¹⁴ The pools' definition of the "technical" essentiality of a patent to the practice of Orange Book standards also leads to troublesome results. Philips gives licensees no information about which patents in the pool cover which aspects of the Orange Book. Thus, a manufacturer can mistakenly believe that all Orange Book methodologies require a patent license whereas in reality, some of them are not patented by Philips or its licensor-partners and require no license from them at all. Therefore, in evaluating whether a non-licensed manufacturer's product infringes the pool patents, therefore, care must be taken to assure that the product is being compared to a patent in the pool, not merely to a standard in the Orange Book.

not stop until Dr. Rubenstein were to decide (for whatever reason) to reassess his essentiality determination of that patent in light of new technology.

It is not enough to say in response to this consideration, as Complainant does, that the patent pools are convenient and allow a licensee to avoid infringement litigation in one fell swoop. The evidence cited by Complainant that purportedly shows that manufacturers do not know what technology they are licensing when they license the pool patents does not support Complainant's argument; if anything, the evidence of record shows that manufacturers know enough about the patents in the pools to realize that they are being forced to license technology that they do not want. *See J. Chen Tr. 918:4-920:7.*¹¹⁵

¹¹⁵ The relevant testimony of Jerry Chen is as follows:

Q You had a copy of the license and the patent list before you entered into the license; is that right, sir?

A In the --

Q No, I'm just asking you, you had a copy of the license and the patent list before you entered into the license with Philips?

A They give us, yes.

Q And you didn't look at that patent list, did you?

A Of course, yes. I just explained that. I will explain again. Before we signed the patent license, we have a patent list, because Philips offer us so-called standard joint license agreement to us, so of course, including the patent list. But in the patent list, there are over 100, over 100 patents. So -- and also, there are a lot of irrelevant patents in the list, for example the CD audio, CD-ROM and CD-I, and also the CD-MO patent in the list. Of course, we have a list, and also, we expressed such opinion to Philips Taipei. So I have a phone with Danny Lin. He's a manager of Philips Taipei who is in charge of patent licensing in Taiwan. I, on the phone, spoke with him regarding this issue, those patents we don't need, why they need to put in the list. But we got the answer I just explained. We got

(continued...)

Dr. Rubenstein's definition of "essential as a practical matter" that includes patents in the pools if a substantial portion of the market practices the patent is unreasonably anticompetitive. The better, and procompetitive, definition of "essential as a practical matter" is Dr. McLaughlin's, which includes in the pools "only complementary patents for which there are no substitutes."

¹¹⁵ (...continued)

the answer, even if you use one patent of the list or two or more, you still need to pay the same royalty rate, the same amount. So I have, before, we signed a joint license agreement.

Q Mr. Chen, I want to direct you to tab 2 of your binder, which is a copy of your deposition testimony, and direct your attention to page 158, line 13. Page 158, line 13.

A Line 13.

Q You testified at your deposition "I have looked at the patent list, this is an attachment to the agreement, and there are so many numbers that I didn't look at them in detail, and I remember there were over 100." Do you remember that testimony?

A Yeah, that's my answer, right.

JUDGE HARRIS: Yes, he remembers that.

BY MS. AQUINO:

So you didn't look at the patents in detail; correct?

A Yes. I also explained that we have a patent list, but we don't have the patent in very detail, but from the patent list, I remember in the deposition, I also explain to you, it's very easy to take a look in the list, there are different category for the patent. So at that time I explained to you they are CD audio, CD-ROM and CD-I and also the CD-MO in the patent list. So it's very obvious we don't need that, but in the detail, we don't have time, we don't have the manpower to go into the detail, and also, that's over 100 patents.

J. Chen Tr. 918:4-920:7.

3. The Presence of Non-essential Patents in the Pools

Having the foregoing definition of “essentiality” in mind, we now turn to an analysis of the so-called “essential” patents in the pools that Respondents and the Staff contend are actually non-essential. Respondents and the Staff maintain that the patent pools violate the “rule of reason” because Dr. Rubenstein’s faulty analysis of essentiality has allowed non-essential patents into the pools. *See* RPHB at 12-16; SPHB at 23-27. Alternative technologies that compete with these patents, Respondents and the Staff maintain, are unreasonably foreclosed from use by licensee manufacturers because they are wedded to the nonessential patents that they are compelled by the pools to accept.

Among the patents in the Philips CD-R and CD-RW pools that have been identified by the Staff as non-essential are Sony’s U.S. Patent No. 4,942,565 (the “Lagadec ‘565 patent”) and Philips’ U.S. Patent No. 5,001,692 (the “Farla ‘692 patent”). *See* SPHB at 23. Neither of these patents have been asserted by Complainant as having been infringed by Respondents. Respondents, in addition to identifying the Farla ‘692 patent as non-essential, contend that Philips’ U.S. Patent Nos. 4,962,493 and 4,807,209 (the “Kramer ‘493 and ‘209 patents”) in the pools are non-essential.¹¹⁶ The Kramer patents have been asserted by Complainant as being

¹¹⁶ Respondents somewhat inconsistently state in a portion of their initial post-hearing brief that each of the asserted patents, if found valid and infringed, are “essential” to the practice of the Orange Book. *See* RPHB at 10 (The Princo Respondents contend that their discs do not infringe the asserted patents and that the asserted patents are invalid. If the ALJ finds otherwise, however, the Princo Respondents contend that the asserted patents are essential and that Philips is misusing them by coercing licensees to accept non-essential patents.”). Inconsistently, however, in another part of their initial post-hearing brief, Respondents contend that the asserted Kramer ‘493 and ‘209 patents are non-essential. *See* RPHB at 15-16. It is assumed for purposes of this Initial Determination that Respondents intend to argue that these patents, although characterized erroneously by Complainant as essential, are really non-essential. *See* RPHRB at

(continued...)

infringed by Respondents. Respondents also identify as non-essential the following patents in the pools, which Complainant has not asserted as being infringed by Respondents: (i) Sony's U.S. Patent No. Re. 34,719 (the "Yamamoto '719 patent"); (ii) Ricoh's U.S. Patent No. 5,740,149 (the "Iwasaki '149 patent"); (iii) Sony's U.S. Patent No. 5,126,994 (the "Ogawa '994 patent"); (iv) Philips' U.S. Patent No. 5,978,351 (the "Spruit '351 patent"); (v) Philips' U.S. Patent No. 5,060,219 (the "Lockhoff '219 patent"); (vi) Philips' U.S. Patent No. 5,835,462 (the "Mimmagh '462 patent"); and (vii) Taiyo Yuden's U.S. Patent Nos. 4,990,388 and 5,090,009 (the "Hamada '388 and '009 patents"). *See* RPHB at 12 and 15-16.

a. The Sony Lagadec '565 Patent

In April of 2001, Sony submitted the Lagadec '565 patent – the same patent asserted by the Princo Respondents in support of their invalidity arguments as to the '856 and '825 patents – to Dr. Rubenstein for the purpose of including it in the Philips CD-R patent pool as essential for the practice of the CD-R standard. RX-1800. Dr. Rubenstein agreed with Sony that Lagadec was "technically" essential, meaning that in his view, at least one of its claims covered at least a portion of the Orange Book standards. *See* CX-563C (July 3, 2001 Rubenstein Status Report on the Study of Sony's Patent Submissions for CD-R at PH065751). Dr. Rubenstein found that in Lagadec, "[a]t least claim 6 is essential for a disc with a substrate, a recording layer, and a protective layer, where the substrate has a substantially spiral wobbled pregroove formed thereon by a control signal consisting of a carrier frequency (22.05 kHz) modulated by an ATIP

¹¹⁶ (...continued)

10. Accordingly, notwithstanding the inconsistency in Respondents' brief, this argument will be addressed as such in this Initial Determination.

signal,”¹¹⁷ which he found consistent with certain sections of the Orange Book. *See id.* at PH065753.¹¹⁸ As a consequence, the Lagadec ‘565 patent was then added to the CD-R “essential” patent list and remains on the most current list. *See, e.g.*, RX-695 at PH 086957; RX-41 at PH 108046.

Prior to Sony’s submission of that patent to Dr. Rubenstein, the Lagadec ‘565 patent had never been on the list of essential CD-R patents. *See, e.g.*, RX-755 (Exhibit B4). According to the testimony of Hans Mons, a Philips engineer who worked with Philips and Sony technicians on the cooperative efforts of both companies to develop CD-R technology, the Lagadec digital method for storing time code information proposed by Sony during that phase of the project was rejected by both Philips and Sony in favor of Philips’s frequency-modulated ATIP method. *See* Mons Tr. 394:19-409:2. “I think that was in the next meeting that Sony decided to accept the ATIP proposal,” Mons testified, “because in the next meeting, they had evaluated our ATIP proposal and the discs. They had written information on it, and what they told us, that it was simple and it worked well, and they silently withdr[e]w their own proposals.” Mons Tr. 408:33-409:2.

Later during Complainant’s rebuttal phase of the trial, Dr. Hesselink testified against Respondents’ position that the Lagadec ‘565 patent anticipates the ‘825 patent at issue. Dr.

¹¹⁷ “ATIP” stands for “Absolute Time In Pre-groove,” standing for the methodology for inputting time-code information in the CD-R groove. *See* RX-407C (Orange Book CD-R Standard § 1.4.1 at PH015685 (definition of “ATIP”).

¹¹⁸ Since the patent was technically essential in his view, Rubenstein expressly chose not to reach the issue of whether Lagadec was also essential “as a practical matter.” CX-563C (July 3, 2001 Rubenstein Status Report on the Study of Sony’s Patent Submissions for CD-R at PH065752).

Hesselink opined that Lagadec would not work with a CD-R system: “As a result, Philips and Sony dismissed the Lagadec approach because this is a very difficult problem to solve and Lagadec just did not provide a scheme that would work and was reliable and could be used for a variety of different purposes as is required under these patents.” Hesselink Tr. 2585:1-5.

According to the Staff, the Lagadec ‘565 patent demonstrates not only that a nonessential patent remains on the CD-R list of “essential” patents, but also “raises serious questions about the good faith of Sony and Philips in placing the patent on the list.” SPHB at 24.¹¹⁹ According to Mons, Philips and Sony jointly addressed during the CD-R development phase the issue of having the “absolute time” encoded into the pregroove of a disc. Mons Tr. 385:10-386:24. The two companies came up with two different ways to solve this problem. Philips came up with the ATIP method of analog modulation of the frequency of the “wobble” signal of the pregroove, whereas Sony came up with two alternative methods, one of which was a digital modulation of the wobble signal. Mons Tr. 399:21-401:2, 401:6-403:13. The digital modulation alternative ultimately formed the basis of Sony’s Lagadec ‘565 patent. *See* Hesselink Tr. 2585:1-13.

In arguing that the Lagadec ‘565 patent did not anticipate the ‘825 patent at issue, Dr. Hesselink testified at trial that the digital modulation methodology of Lagadec differs substantially from the analog modulation technology of the ‘825 patent:

So if you look at this signal, this is a digital approach. And in fact, it turns out that Lagadec discloses in its patent that he doesn't want to use an analog approach

¹¹⁹ In response to the Staff’s findings of fact on this issue, Complainant contends that there is nothing inconsistent about Professor Hesselink’s opinion that Lagadec does not anticipate the ‘825 patent and Dr. Rubenstein’s conclusion that some portion of the Orange Book standard meets all of the limitations of at least one claim of Lagadec, making Lagadec an essential patent to practice of the Orange Book. *See* Complainant’s Response to Staff’s Proposed Findings of Fact and Conclusions of Law at 13.

because there are some problems with the analog approach in his opinion. And so he opts for a digital approach

* * *

Furthermore, there is a real difficulty with actually analyzing this information in a player or reading it out and trying to decode it, because there's only one area in this code where you have to make sure that you understand that this transition is now twice as long. And so the measurement of this is prone to errors, and it is very difficult to carry out a decoding of this particular approach.

* * *

Lagadec has a broad spectrum. Rijnsburger has a broad spectrum. They do not look like frequency-modulated signals. They don't act like frequency-modulated signals and they don't produce the results of a frequency-modulated signal. As a result, Philips and Sony dismissed the Lagadec approach because this is a very difficult problem to solve and Lagadec just did not provide a scheme that would work and was reliable and could be used for a variety of different purposes as is required under these patents.

Hesselink Tr. 2580:16-21, 2581:7-14, 2584:25-2585:5.

It is clear from an examination of the sections of the Orange Book that Dr. Rubenstein cited in concluding that Lagadec was “technically essential” that the Orange Book relies upon Philips’ ATIP technology, not Lagadec’s digital technology. *See* CX-563C (July 3, 2001 Rubenstein Status Report on the Study of Sony’s Patent Submissions for CD-R at PH065753); RX-407C (Orange Book CD-R Standard § IV). Inasmuch as there is no evidence in the record to show that the claims of Lagadec are any broader than what the patent discloses or that those claims somehow cover the ATIP technology of the Orange Book as well as the digital methodology that Lagadec discloses,¹²⁰ it follows that Dr. Rubenstein’s characterization of

¹²⁰ As shown above, the Hesselink testimony offered by Complainant is not just that the Lagadec ‘565 patent disclosure is too narrow to anticipate the ‘825 patent; it is that the Lagadec ‘565 patent constitutes *completely different technology* that does not work well according to the Orange Book standards. This testimony renders Lagadec extraneous to the Orange Book, and necessitates a finding that it is non-essential to the pool. Its inclusion in the pool appears to be an
(continued...)

Lagadec as “technically essential” was in error. Lagadec constitutes, at best, a substitute technology for the ATIP standard, and at worst, an extraneous, non-working add-on to the patent pool. Either way, Lagadec is “technically non-essential” to the patent pool and has not been shown to be “essential as a practical matter.” Accordingly, it represents alternative technology and its inclusion in the pool unreasonably forecloses competition.

b. The Philips Farla ‘692 Patent

Both Respondents and the Staff contend, without contravention by Complainant, that the Philips Farla ‘692 patent is non-essential and should not be included in the Philips CD-R and CD-RW patent pools. *See* RPHB at 13-15; SPHB at 24-27. The claims of the Farla ‘692 patent are directed to a particular method of carrying out a strategy for writing data, otherwise known as a “write strategy,” onto a blank recordable disc. In particular, the patent relates to whether additional write pulses or additional information relating to the write pulses is necessary for the write strategy. McLaughlin Tr. 1525:18-1526:6; RX-1472. The methodology and claims of the patent are directed to optimizing the writing accuracy of an optical recorder when faced with the properties of a particular disc. *See* RX-1472 (‘692 patent, col. 1:67-2:3).

On May 21, 2001, Dr. Rubenstein sent Philips a status report in which he stated that the Orange Book CD-R standard did not appear to require the Farla ‘692 patent and therefore was not “technically essential.” RX-1792 (May 21, 2001 Rubenstein Status Report re Study of Philips’ Patent Submissions re CD-R at RK005216). Dr. Rubenstein analyzed the following

¹²⁰ (...continued)
attempt to forestall digital approaches to achieving what the Philips analog technology has achieved.

passage from independent claim 1 of the patent, which is similar to the language of independent claims 10 and 13:

. . . a record carrier having optically readable adjustment information signifying whether a sequence of write pulses for recording a bit sequence . . .

said adjustment information signifying the number and relative positions of said additional pulses in a write pulse sequence

Id.; also see RX-1472 ('692 patent, col. 16:27-33).

According to Dr. Rubenstein's status report, the "adjustment information" limitation of the claim could be viewed as the "special information" encoded in the ATIP frames of the Lead-in Area" of an Orange Book compliant CD-R disc, but "this 'special information' does not appear to provide information about having additional write pulses (*i.e.*, increasing the number of write pulses)." *Id.*, citing RX-407C (Orange Book CD-R Standard § IV.4). Dr. Rubenstein also pointed out that the "Optimum Power Control" ("OPC") procedure described in the Orange Book "did not appear to require writing additional pulses" or "varying the number or relative positions of additional write pulses in accordance with 'adjustment information'" as claimed in the '692 patent. *Id.*, citing RX-407C (Orange Book CD-R Standard Attachment B3). Dr. Rubenstein noted, however, that his group did not know if the Farla '692 patent was nevertheless "essential as a practical matter,"¹²¹ and invited Philips to comment further on that possibility. *Id.* at RK005217.

¹²¹ In his status report, Dr. Rubenstein defined a patent that is "essential as a practical matter" as one having "at least one claim which is found to have no realistic alternative for implementing the CD-R Standard (or a portion thereof). However, for a patent to be found essential on this basis, evidence must be submitted that demonstrates such essentiality." RX-1792C (May 21, 2001 Status Report at RK005214). The evidence, according to the status report definition, could include, *inter alia*, "technical/commercial reason(s) why the invention claimed in the patent is the only practical way to implement part of the CD-R Standard" *Id.*

On May 16, 2002, Dr. Rubenstein again wrote Philips in reference to the essentiality of the Farla '692 patent to the Orange Book CD-RW standard. *See* RX-1781C (May 16, 2002 Rubenstein Status Report on CD-R & CD-RW Patent Evaluation for CD-R & CD-RW Patent Licensing Programs at RK007930-31). Dr. Rubenstein's findings for CD-RW matched his earlier findings for the CD-R standard that the patent was not "technically essential." *Id.* Again, he requested information from Philips as to whether the Farla '692 patent was nevertheless "essential as a practical matter" for the CD-RW standard. *Id.*

Dr. Rubenstein's conclusions were echoed at trial by the testimony of Respondents' expert, Dr. McLaughlin, who opined that the Farla '692 patent is not necessary to practice the CD-RW portion of the Orange Book. *See* McLaughlin Tr. 1525:14-1528:8. Moreover, although Dr. Rubenstein had not opined on whether the Farla '692 patent is essential "as a practical matter" to the CD-R and CD-RW standards, Dr. McLaughlin testified that at least one economically viable alternative for performing write strategy exists that does not infringe the Farla patent. McLaughlin Tr. 1563:1-12. Dr. McLaughlin identified an OPC and write strategy method available from Calimetrix, Inc., where he is employed as a Principal Scientist, as an alternative that is not covered by the Farla '692 patent and that would comply with the requirements of the Orange Book if it were used. McLaughlin Tr. 1493:3-8; 1520:16-22, 1521:12-1522:13, 1527:7-1528:8.

According to Dr. McLaughlin, the Calimetrix OPC and write strategy method uses a write strategy matrix. McLaughlin Tr. 1519:12-22. It examines information that has been written to a recordable disc and information to be written to the disc, and uses the write strategy matrix to define the strategy for writing data onto the disc by appropriately setting the power of the write

laser. *Id.* It has been applied to CD-R and CD-RW discs, and has been shown to operate and to be effective in Orange Book-compliant discs. McLaughlin Tr. 1564:17-23. Further, McLaughlin opined, and Complainant neither concurs nor contests, that the Calimetrics OPC and write strategy method is not covered by the Farla '692 patent. McLaughlin Tr. 1527:7-1528:8. In particular, the Calimetrics method does not use or examine information from a disc to make a determination if additional write pulses are necessary to record a particular sequence of information onto the disc. *Id.*

The foregoing evidence conclusively demonstrates that the Farla '692 patent is not "technically essential" and has not been shown to be "essential as a practical matter" as properly defined, and therefore should not be included as such in the Philips CD-R and CD-RW patent pools. The patent was included in the CD-R license agreement for many years before it was removed from the list of essential patents in 2001. *Compare* RX-840; RX-778; RX-755; RX-914. However, at least as of a license agreement signed in January 2002, the Farla '692 patent was still being listed as an essential patent under the CD-RW license agreement. *See* RX-770 at PH087634.

It is unclear whether the Farla '692 patent remains listed on Philips' standard license agreements as an essential patent in the CD-RW pool. Philips' website of form license agreements does not include the lists of essential and non-essential patents for the CD-RW disc pool. *See* "Philips Intellectual Property and Standards, CD-R/RW Patents," at <http://www.licensing.philips.com/licensees/patent/ob/> (CD-R/RW hyperlink) (last visited on August 26, 2003). In the absence of evidence to the contrary, it can only be assumed that the Farla '692 patent continues to be listed as an essential patent on the form CD-RW license as well

as on the agreements of all existing CD-RW licenses. As such, it unreasonably forecloses competition from alternative technologies that also comply with the Orange Book.

c. The Ricoh Iwasaki '149 Patent

Respondents contend, without contest by Complainant, that the Ricoh Iwasaki '149 patent is non-essential and should not be included as such in the Philips CD-R and CD-RW patent pools. RPHB at 13-15. The claims of the Iwasaki '149 patent are directed to a particular method of performing the OPC procedure, which is setting laser power to an appropriate level to record onto a particular disc. McLaughlin Tr. 1516:24-1518:7; RX-52 (Iwasaki '149 patent). The OPC method defined by the Iwasaki patent consists of calculating a standardized gradation factor by monitoring the amplitudes of signals from test data patterns. McLaughlin Tr. 1520:23-1421:11; RX-52 (Iwasaki '149 Patent).

Respondents assert that the Iwasaki '149 patent is not essential to practice the Orange Book for at least two reasons. First, the Orange Book does not mandate a particular method for carrying out the OPC function. McLaughlin Tr. 1507:10-1509:17; RX-407C (Orange Book CD-R Standard at PH015759); RX-408C (Orange Book CD-RW Standard at PH023331-023332). Philips's employee and technical witness, Hans Mons, testified that some of the characteristics the Orange Book defines for CD-Rs and CD-RWs are not mandatory, and that Orange Book-compliant CD-Rs and CD-RWs do not need to conform to the non-mandatory characteristics defined by the Orange Book. Mons Tr. 453:18-454:2; McLaughlin Tr. 1504:10-18.

Second, as stated earlier in connection with the Farla '692 patent, the Iwasaki '149 patent is not essential as a practical matter because at least one economically viable alternative for performing OPC exists that does not infringe the Iwasaki '149 patent. McLaughlin Tr. 1563:1-

12. The OPC and write strategy method available from Calimetrics, Inc. was identified by Dr. McLaughlin as an alternative that is not covered by the Iwasaki patent and would comply with the requirements of the Orange Book if it were used. McLaughlin Tr. 1521:12-1522:13; 1523:5-13.

Finally, Respondents contend that the Calimetrics method is not covered by the Iwasaki '149 patent. McLaughlin Tr. 1521:12-18. The Iwasaki patent requires the calculation of a certain mathematical quantity, and the calculation of that mathematical quantity does not occur during the Calimetrics OPC procedure. McLaughlin Tr. 1521:19-1522:13.

Dr. Rubenstein has not rendered any opinion as to the essentiality of the Iwasaki '149 patent. Rubenstein Tr. 2263:11-2264:12. Neither has Complainant offered any expert testimony to counter the evidence presented by Dr. McLaughlin on the patent's non-essentiality. Thus, the evidence of record demonstrates that the Iwasaki '149 patent is non-essential to the practice of the Orange Book, and its inclusion among the list of "essential" patents in the pools unreasonably forecloses competition.

d. The Sony Yamamoto '719 Patent

Respondents also contend, and Complainant does not contest, that the Sony Yamamoto '719 patent is non-essential and should not be included as such in the Philips CD-R and CD-RW patent pools. RPHB at 15. The claims of the Yamamoto patent contain functional limitations for creating a master disc. McLaughlin Tr. 1534:14-25; RX-50. The limitations define a method of using a single laser beam to create a master containing both a wobbled pre-groove and pre-recorded data. *Id.*

Respondents assert, without contest from Complainant, that the Yamamoto patent is not essential to practice the Orange Book for at least two reasons. First, the Orange Book does not require or specify a particular mastering technique. McLaughlin Tr. 1535:1-6. Thus, the Yamamoto mastering method is not “technically essential” because it is not inevitably infringed by Orange Book compliant discs. *Id.* Second, the Yamamoto patent is not essential as a practical matter. At least one economically viable alternative for creating a master exists that does not infringe the Yamamoto patent. McLaughlin Tr. 1535:7-15. According to Dr. McLaughlin, the Calimetrics two-beam mastering method is a commercially viable alternative to the patent. McLaughlin Tr. 1568:3-15, 1570:1-9. The two-beam mastering system allows a groove and pits to be simultaneously formed in a master disc. McLaughlin Tr. 1535:7-1536:13. The two-beam alternative is not covered by the Yamamoto patent because it does not use one recording beam modulated at two different frequencies to create marks and a track. McLaughlin Tr. 1535:16-1536:13.

Dr. Rubenstein has not rendered any opinion as to the essentiality of the Yamamoto ‘719 patent. Rubenstein Tr. 2262:14-2263:10. Neither has Complainant offered any expert testimony to counter the evidence presented by Dr. McLaughlin on the patent’s non-essentiality. Thus, the Yamamoto ‘719 patent fails to meet the criteria for essentiality and, as such, unreasonably forecloses competition by appearing on the “essential” list of patents in the pools.

e. The Philips Kramer ‘493 and ‘209 Patents

As noted earlier, the Kramer ‘493 and ‘209 patents are the only patents listed as “essential” by the pools and alleged by Respondents to actually be “non-essential” that have been asserted by Complainant against Respondents as being infringed by Respondents’ CD-R/RW

discs. As already found earlier in this Initial Determination, the asserted claims of these patents are indeed infringed by Respondents' products. *See* p. 50.

With regard to the essentiality of the Kramer '209 and '493 patents, Dr. Rubenstein has determined that they are "technically essential" patents to the CD-R disc standard, but as of February 2002 had not yet reached an opinion on their essentiality to the CD-RW disc standard. *See* Rubenstein Tr. 2299:20-23; RX-87C (October 17, 2001 Rubenstein Status Report at PH065770); RX-1798C (February 25, 2002 Rubenstein Status Report at RK000239, RK000242). Dr. McLaughlin found the opposite way from Dr. Rubenstein, that these patents were technically non-essential on the ground that both patents are directed to recordable discs with diffractive follow-on tracks that cover single-beam tracking methods under Respondents' claim interpretation. McLaughlin Tr. 1536:14-25, 1537:9-17; RX-58; CX-13. Since the Orange Book indicates that single-beam or three-beam systems can be used within the standard, McLaughlin opines, there are thus alternative tracking methods that are recognized by the Orange Book but not covered by the Kramer patents that are foreclosed from competition with the Kramer method by the inclusion of those patents in the pools, thus rendering them "non-essential." McLaughlin Tr. 1537:9-17; RX-407C (Orange Book CD-R Standard at PH015776).

It has been concluded in the infringement section of this Initial Determination, that Respondents' claim construction for the asserted claims of the Kramer '493 and '209 patents is erroneous. *See* p. 44, 46, 48. Rather, it has been determined herein that those claims cover both single-beam *and* three-beam methods. *See* p. 44. These claims are broad enough to encompass two of the three tracking methods that have been identified in the Orange Book as alternatives to one another, but there is no evidence in the record as to whether it covers the third alternative,

known as the “Differential Phase Detection” or “DPD” method. *See* RX-407C (Orange Book CD-R Standard Attachment B13 at PH 015776). There is also no evidence in the record as to whether this method is covered by any other patent in the pool.

In the absence of such evidence, this unpatented alternative technology that complies with the Orange Book precludes a finding that the Kramer patents are “technically essential” to practicing the Orange Book, even if they are infringed. Accordingly, their inclusion in the pools as “technically essential” is erroneous and anticompetitive.

f. The Taiyo Yuden Hamada ‘388 and ‘009 Patents

With respect to Taiyo Yuden’s Hamada ‘388 and ‘009 patents, Dr. Rubenstein found that they were not technically essential to the Orange Book, but also found on the basis of tests conducted by his own independent expert, ETA-Optik, and by Taiyo Yuden that virtually all of the CD-R discs in the U.S. market practiced those patents. He therefore concluded that the Hamada patents were “essential as a practical matter,” and included them in the CD-R disc pool as well. Rubenstein Tr. 2264:21-2280:6; RX-1777C (June 21, 2001 Rubenstein Status Report to Taiyo Yuden at RK008207); RX-1759C (October 16, 2001 Rubenstein Status Report to Taiyo Yuden at RK008151-53). Dr. McLaughlin disagreed with Dr. Rubenstein’s analysis, finding that the Hamada patents relate to disc layer structure and have commercially viable substitutes that are not covered by the patents. McLaughlin Tr. 1539:9-22, 1540:18-1545:1.

Dr. Rubenstein’s conclusion that the Hamada ‘388 and ‘009 patents are “commercially essential” even though they are not “technically essential” is unconvincing. The evidence shows that, of the CD-R brands of 27 different manufacturers that Dr. Rubenstein and his colleagues collected for testing purposes, 26 satisfied the tests for coverage by the patents that ETA-Optik

performed and all 27 satisfied the tests for coverage that Taiyo Yuden performed. *See* Rubenstein Tr. 2264:21-2280:6; RX-1759C (October 16, 2001 Rubenstein Status Report to Taiyo Yuden at RK008151-53). To reach this result, however, Dr. Rubenstein had to construe the '009 patent in a particular way so that the test results would result in a finding of "commercial essentiality."

Specifically, the relevant claim of the Hamada '009 patent requires an optical parameter to fall within a specific range, and that parameter is dependent upon a variable determined by measuring the thickness of the recording layer of a CD-R disc. *See* RX-1759C at RK008152. This measurement is shown in the patent to be essentially equal throughout the recording layer of a CD-R disc, but this disclosure does not account for CD-R discs that have a pregroove even though the patent acknowledges the use of pregrooves on optical discs. *See id.* Dr. Rubenstein avoided this problem by deciding that it was appropriate to measure the thickness of the recording layer of such discs only in the pregroove "in view of the recording of information only in the pregroove" on the disc. *Id.* Measuring thickness in this way yielded a higher result than if the thickness of the "land" on the disc had also been accounted for, since the thickness of the recording layer in the groove is thicker than it is in the "land." *Id.*

Using this value, ETA-Optik was able to report to Dr. Rubenstein that 25 of the 26 brands that it tested met the claim limitation of the '009 patent. *Id.* However, one brand, the Verbatim CD-R disc manufactured by Mitsubishi, did not. *Id.* Dr. Rubenstein dismissed this difference on the ground that the Verbatim disc was "an old type of CD-R disc," that "newer discs do not use such thick dye," that "Mitsubishi's market share is only around 1.7-1.8%," and that "a Yamaha disc also manufactured by Mitsubishi but bearing a different ATIP code did meet the requirement" *Id.* Dr. Rubenstein also found that an alternative thickness measurement devised by Taiyo

Yuden, consisting of a weighted average of the thickness of the recording layer in the groove and the “land,” resulted in optical parameter values that fell within the claimed range for all 26 discs that were tested. RX-1759C at RK008152-53. He therefore concluded that both Hamada patents were “essential as a practical matter.” *Id.*

That Dr. Rubenstein construed the ‘009 patent so liberally in order to achieve the result that pool member Taiyo Yuden wanted underscores the danger that the DOJ warned about in its business review letters when it examined the “essentiality as a practical matter” criterion. This criterion, as the DOJ cautioned, is “inherently more susceptible to subjective interpretation.” *See* CX-357 (3C DVD Letter at 10). Dr. Rubenstein’s analysis, moreover, belies not only his own self-description as a “neutral evaluator” of patents for inclusion in the pool, but also the DOJ’s even more stringent requirement that he act as an “independent arbiter.” *See* CX-355 (MPEG-2 Business Review Letter at 5). Moreover, in view of Dr. McLaughlin’s unchallenged testimony of the existence of several alternative technologies to both Hamada patents, including alternatives that were developed by Mitsui Toatsu, Bayer AG, and Philips itself, and also including the Mitsubishi Verbatim disc that was actually found by Dr. Rubenstein to exist in the market and to be licensed by Philips (McLaughlin Tr. 1540:18-1545:1), Dr. Rubenstein’s addition of the Hamada patents in the pools invariably leads to “the inclusion of patent rights for which there were viable substitutes,” thereby “incurring] competition by foreclosing such substitutes.” *See* CX-357 (3C DVD Letter at 10). Accordingly, the Hamada ‘388 and ‘009 patents should not have been included in the pools because by doing so competition is unreasonably foreclosed.

g. Other Non-essential Pool Patents Erroneously Classified as “Essential”

Finally, Respondents contend that several other patents in the pools that have been identified by Dr. Rubenstein as “essential” are really non-essential. RPHB at 15-16. They are the Sony Ogawa ‘994 patent, and the Philips Spruit ‘351, Lockhoff ‘219, and Mimmagh ‘462 patents.

Dr. Rubenstein found that the Ogawa ‘994 patent was technically essential to the Orange Book and therefore included that patent in the CD-R disc pool. Rubenstein Tr. 2291:19-2292:16; RX-87C (October 17, 2001 Rubenstein Status Report at PH065774). The Spruit ‘351, Lockhoff ‘219, and Mimmagh ‘462 patents were also found by Dr. Rubenstein to be technically essential to both the CD-R and CD-RW disc standards and were included in those pools. Rubenstein Tr. 2292:17-25; RX-126C (May 14, 2002 Rubenstein Status Report at PH065718, PH065719 and PH065726).

According to Dr. McLaughlin, the Ogawa, Spruit, Lockhoff, and Mimmagh patents are not essential to comply with the Orange Book CD-R and CD-RW specifications. McLaughlin Tr. 1500:16-1501:16; RX-45 (Ogawa); RX-48 (Lockhoff); RX-49 (Mimmagh); RX-53 (Spruit). The Ogawa and Spruit patents relate to OPC and write strategy methods. McLaughlin Tr. 1517:21-1518:7, 1522:14-1523:4. Thus, Dr. McLaughlin opined, like the Farla and Iwasaki patents, these patents are not essential to practice the Orange Book for at least two reasons. First, the Orange Book does not mandate a particular method for carrying out OPC and write strategy functions. McLaughlin Tr. 1518:8-15, 1523:5-16, 1524:1-7. Thus, according to Dr. McLaughlin, the Ogawa and Spruit write strategy and OPC methods are not technically essential. McLaughlin Tr. 1518:8-15, 1523:5-16, 1524:1-7. Second, according to Dr. McLaughlin, the patents cannot be essential as a practical matter because the Calimetrix OPC and write strategy method – an economically viable alternative for performing write strategy that does not infringe the patents – exists.

McLaughlin Tr. 1518:16-1519:1, 1519:23-1520:15, 1521:12-1522:13, 1523:5-13, 1524:8-1525:13.

Dr. McLaughlin further testified that the Lockhoff patent relates to a copy control method (McLaughlin Tr. 1528:11-19; RX-48) and the Mimmagh patent relates to a recording velocity control system (McLaughlin Tr. 1532:10-17). Dr. McLaughlin identified alternatives to the Lockhoff patent that are not covered by it. McLaughlin Tr. 1529:14-1531:21. Furthermore, Dr. McLaughlin testified, the subject matter defined by the Lockhoff and Mimmagh patents is not essential to carry out one of the purposes of the Orange Book; namely, interchangeability. McLaughlin Tr. 1528:23-1530:3, 1532:18-25, 1533:15-23. Thus, he found, the Lockhoff, Mimmagh and Kramer patents are not essential to comply with the Orange Book.

Even though Dr. Rubenstein concluded that the foregoing patents were “technically essential” because they covered Orange Book technology, Dr. McLaughlin’s testimony convincingly shows that Orange Book-compliant alternatives exist that have not been shown to be covered by any patent in the Philips CD-R or CD-RW pools. Accordingly, these patents have erroneously been included in the pool as “essential” when they are in fact “non-essential,” and that error is anticompetitive in effect.

4. Unreasonableness of the Royalty Rate

The reasons given earlier herein as to why the royalty rate mechanism of the pools is anticompetitive, and therefore illegal *per se*, apply equally to finding that mechanism anticompetitive under the “rule of reason.” *See* pp. 175-182. However, more is required under the rule of reason; there must also be a balancing of whether its anticompetitive effects outweigh its procompetitive effects, and a determination of “*actual* adverse effect on competition as a

whole in the relevant market.” *Columbia Broadcasting System, Inc. v. American Soc. of Composers, Authors and Publishers, supra*, 620 F.2d at 934.

Here, Complainant raises two procompetitive aspects of their royalty rate strategy. First, Complainant points out that in the 10 years since Philips has licensed its patent pools, sales of CD-R and CD-RW discs have become so successful that they are now a mature, price-sensitive market of consumer commodities. McCarthy Tr. 1955:25-1956:16.; 1992:2-25; Beune Tr. 2384:2-2385:22. Complainant further asserts that numerous manufacturers, distributors and retailers compete vigorously for sales, and manufacturing capacity has greatly expanded to meet and exceed increased demand. RX-1379C; CX-618C (pp. 8-9). In the late 1990s, prices of CD-R and CD-RW products have declined. J. Chen Tr. 888:7-9, 896:5-18. From 1997 to 2002, Complainant further points out, worldwide demand for CD-R discs increased from a few hundred thousand to more than 5 billion, supply increased from several hundred thousand to almost 8 billion, prices to consumers for CD-R and CD-RW discs decreased by more than 50% from 1999 to 2001, supply capacity increased from approximately 6 billion discs in 2000 to more than 10 billion discs in 2002, the number of CD-R manufacturers increased by nearly 50% from 1997 to 2002, CD-R and CD-RW drive sales that were negligible in 1996 increased to almost 60 million units in 2002, and the price of CD-R/RW drives decreased from \$700 to approximately \$100 over that period of time. *See* CX-619C at p. 3, 6, 8, 9, 17 and 18.

Second, Complainant asserts that a procompetitive benefit of a specified standard royalty rate is that it allows manufacturers which respect others’ intellectual property rights to plan their intellectual property costs for the term of the license with the knowledge that such costs will not

be increased even if additional essential or “blocking” patents of the licensors are identified and licensed. Beune, Tr. 2337:5-2340:19.

The standardization of components in the computer technology industry is nothing new. The Orange Book is very much like the Joint Electronic Devices Engineering Council (“JEDEC”) standards that computer hardware manufacturers follow in order to make readily interchangeable products. *See, e.g., Winbond Electronics Corp. v. International Trade Com’n*, 262 F.3d 1363, 1367 (Fed. Cir. 2001) (JEDEC, charged with setting industry standards, evaluates requester’s patented technology for adoption as industry standard with understanding that requester will grant royalty free licenses (*i.e.*, licenses for a one-time fee) to any manufacturer and to place the subject matter of the patent in the public domain if JEDEC accepts technology as a standard); *Micron Technology, Inc. v. Rambus Inc.*, 189 F.Supp.2d 201, 202-03 (D. Del.2002) (JEDEC requires its members to disclose their patents and patent applications to the organization to prevent unknowing standardization of a patented technology). Like the JEDEC standards, the Orange Book has aided the CD-R/RW industry in converting the innovation and development of CD-R/RW discs into a readily interchangeable commodity that is far more efficient to manufacture in vast quantities and at low cost than when the product was novel. As a result of this standardization, prices for CD-R/RW discs have fallen dramatically, as is typical with such technology. *See Smith Tr.* 1486:19-25.

As has already been discussed, the procompetitive effects of pools that license technically essential patents are well-recognized, including “integrating complementary technologies, reducing transaction costs, clearing blocking positions, and avoiding costly

infringement litigation.” CX-355 (MPEG-2 Business Review Letter at 11) . However, patent pools that encompass non-essential patents pose inherent competitive problems.

As already explained, patent pools such as the one maintained by Philips and its licensor-partners have a tendency to gobble up innovative patented technologies in the relevant product market that prove to be popular among manufacturers. The most dramatic example of this effect is the evidence in the record of the enormous drop in royalty rates that certain pool members charged to Taiwanese manufacturers of CD-R/RW discs after the Taiwan Fair Trade Commission declared the Philips CD-R patent pool to be illegal in Taiwan and ordered the pool licensors to license their patents on an individual basis. *See* p. 144-45. Rather than pay the 10-yen royalty rate that the pool had demanded, Sony and Taiyo Yuden dropped their royalties substantially after the ruling. *See id.* This experience demonstrates that when illegal patent pools collapse, royalty rates collapse.

What is particularly anticompetitive about the fixed royalty rates set by Philips and its licensor-partners in the case of this patent pool is that the royalty amount, in and of itself, is necessarily arbitrary. There is no economically-driven rhyme or reason for the fixed amounts that Philips has picked for its “minimum” per-disc rates. They are set unilaterally by the pool members; they are not negotiated with licensees.

If the royalty rate were a no-minimum fee based on a reasonable percentage of sales that afforded licensees a decent profit margin, then the amount that Philips and its licensor-partners would earn for the patents in the pool would grow as CD-R/RW sales volume grows and shrink as volume shrinks. Manufacturers would not be driven out of the market by a cost squeeze caused by the pool’s excessive minimum royalty. They truly would be able to plan their

intellectual property costs for the term of the license with the knowledge that such costs will not be increased, as Complainant now erroneously claims they can do now under the pool's current royalty rates. *See* Beune, Tr. 2337:5-2340:19. Prices could continue their declining trend and volume could continue to increase, benefitting consumers, manufacturers and licensors alike. Instead, by arbitrarily establishing an impracticable floor below which royalties cannot go unless a discriminatory arrangement of some kind is worked out with the pool's licensors, Philips and its licensor-partners in the pool have created an anticompetitive scenario.

The fact that Philips and its licensor-partners have broken their once-unified pool into separate lists of so-called "essential" patents that are offered at the pool royalty rate and so-called "non-essential" patents that are purportedly offered for "free" when the "essential" patents are also licensed, in various permutations of "Philips-only" patents or "Philips/Sony/Taiyo Yuden/Ricoh" patents, does not ameliorate the anticompetitive nature of the arbitrarily-set, fixed minimum royalty. As Respondents and the Staff have observed, manufacturers tend to license all of the pool patents that they can license, both essential and non-essential, in order to avoid all possibility of infringement litigation from Philips and its licensor-partners; they do not pick and choose some lists and not others. *See, e.g.,* J. Chen Tr. 918:4-920:7. Not only that, the makeup of each list of "essential" and "non-essential" patents, "Philips-only" patents, "Sony-only" patents and other combinations, is entirely within the control of Philips and its licensor partners. Each list must be taken by the licensee as a whole package; it cannot be divided up further by negotiation between the licensors and a licensee. This necessarily mixes essential and non-essential patents together, and in particular it draws non-essential patents into the list of essential patents when those patents are erroneously included by a stretching of their scope to be included

as “essential as a practical matter” or erroneously included as “technically essential,” as Dr. Rubenstein has done.

Of the cases cited by Complainant to suggest that courts do not attempt to adjudicate reasonable royalty rates under the antitrust laws, one Supreme Court case actually suggests the opposite under the facts presented here. In the case of *Standard Oil Co. v. United States*, 283 U.S. 163, 172 (1931) (“*Standard Oil*”), cited by Complainant in its Post-hearing Brief at 41, certain patent pooling was countenanced and the Supreme Court specifically held that “[u]nless the industry is dominated, or interstate commerce directly restrained, the Sherman Act does not require cross-licensing patentees to license at a reasonable rate others engaged in interstate commerce.” *Standard Oil, supra*, 283 U.S. at 172. But the Court sounded a warning that: “[i]f combining patent owners effectively dominate an industry, the power to fix and maintain royalties is tantamount to the power to fix prices.” *Id.* at 174 (emphasis added). The Supreme Court’s rationale was based upon the fact that “an agreement for cross-licensing and division of royalties violates the [Sherman] Act only when used to effect a monopoly, or to fix prices, or to impose otherwise an unreasonable restraint upon interstate commerce.” *Id.* at 175. The Court laid down the proposition that “[a]ny agreement between competitors may be illegal if part of a larger plan to control interstate markets [citations omitted]. Such contracts must be scrutinized to ascertain whether the restraints imposed are regulations reasonable under the circumstances, or whether their effect is to suppress or unduly restrict competition. [citations omitted]. . . . And pooling arrangements may obviously result in restricting competition.” *Id.* at 169.

Other cases from the Seventh Circuit cited by Complainant along the same lines (CPHB at 41) are equally inapposite to the present investigation. In *USM Corp. v. SPS Technologies*,

Inc., 694 F.2d 505, 512-13 (7th Cir. 1982), *cert. denied*, 462 U.S. 1107 (1983), Judge Posner of the Seventh Circuit held that “no general principle of antitrust law forbids charging different prices to different customers, what is often but loosely called ‘price discrimination.’” *Id.*, 694 F.2d at 512. The court went on to note, however, that “[i]t might in a particular case be condemned as an attempt to monopolize or as an act of monopolization under section 2 of the Sherman Act, 15 U.S.C. § 2, or as a violation of the Rule of Reason under section 1 of that Act, but USM has made no effort to prove the elements of any of these offenses.” *Id.* That lack of proof is not true here.

Here, a flat royalty fee for the pool is imposed arbitrarily by Philips and its licensor partners by means of a price-fixing scheme that takes in not only all “blocking” and “complementary” patents that are “technically” essential to practicing the Orange Book, but also related but non-essential innovation. Efforts on the part of pool members to have their patents included in the pool as “essential as a practical matter,” even though those patents do not cover anything in the Orange Book, is merely an attempt to forestall competing technologies or to attain a royalty for the patent that is higher than the patent could garner from licensees by itself. It is, indeed, an unreasonably anticompetitive, concerted enterprise and a price-fixing scheme.

On balance, these anticompetitive effects of the royalty rate structure of the CD-R/RW patent pools far outweigh the procompetitive effects suggested by Complainant. As a consequence, the CD-R/RW patent pools fail to pass muster under the rule of reason.

5. Conclusion on Misuse Under the “Rule of Reason”

Taking all of the foregoing considerations into effect, the CD-R/RW patent pools of Philips and its licensor-partners constitutes patent misuse because they unreasonably restrain

trade in the U.S. market for licensing patented CD-R/RW technology. It does so under the rule of reason just as surely as it constitutes a *per se* violation of the antitrust laws.

F. Purge of Patent Misuse

Finally, as pointed out earlier herein, patent misuse can be purged if the patentholder demonstrates a complete abandonment of the improper practices found to constitute misuse and that the consequences of the misuse have been fully dissipated. *In re Yarn Processing Patent Validity Litigation, supra*. No such showing has been made by Complainant here. Accordingly, the patent misuse found herein is ongoing.

G. Conclusion on Patent Misuse

For the foregoing reasons, the anticompetitive aspects of the patent pooling arrangements of Philips and its licensor-partners for CD-Rs and CD-RWs, of which the patents at issue in this investigation are a part, outweigh the procompetitive effects and have not been purged, rendering those patents unenforceable by reason of patent misuse.

FINDINGS OF FACT

I. BACKGROUND

The Parties

1. Complainant U.S. Philips Corporation is a corporation organized and existing under the laws of the State of Delaware and having its principal place of business at 580 White Plains Road, Tarrytown, New York 10591-5190. *See* Complaint of U.S. Philips Corporation Under Section 337 Of The Tariff Act of 1930, As Amended (“Complaint”) §2.1; CPFF 1; Respondents’ Identification of Unopposed Findings of Fact and Conclusions of Law at 1.
2. Philips is a wholly-owned subsidiary of Koninklijke Philips Electronics N.V. (collectively “Philips”), a Dutch corporation based in Amsterdam, The Netherlands. *See* Complaint §2.1; CPFF 2; Respondents’ Identification of Unopposed Findings of Fact and Conclusions of Law at 1.
3. Respondent Princo Corporation (“Princo Taiwan”) is an entity existing under the laws of Taiwan. SX-3C, p. 4.
4. Princo Taiwan has its principal place of business and manufacturing facilities at No. 6, Creation 4 TH Road, Science-based Industrial Park, Hsinchu, Taiwan R.O.C. SX-3C, p. 4.
5. Princo Taiwan is in the business of manufacturing CD-R and CD-RW discs in Taiwan. CX-103C, p. 11-12.
6. The CD-R and CD-RW discs that Princo Taiwan manufactures “comply with the relevant Orange Book standards.” CX-106C, p. 4.

7. [

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8. Princo Taiwan sells its CD-R and CD-RW discs for importation into and sale in the United States. Order No. 20: Initial Determination Granting Complainant's Motion for Summary Determination of Importation and Sale ("Order No. 20"); Notice of Commission Decision Not to Review an Initial Determination Granting a Motion for Summary Determination of Importation and Sale, April 24, 2003 ("4/24/03 Commission Decision").
9. Princo Taiwan is not licensed by Philips to practice any of the patents in suit. L. Chen Tr. 993. Respondent Princo America Corporation ("Princo America") is a wholly-owned subsidiary of Princo Taiwan. SX-4C, p. 4.
10. Princo America is a California corporation with its principal place of business at 47517 Seabridge Drive, Fremont, CA 94538. SX-4C, p. 4.
11. Princo America is in the business of importing into and selling in the United States, among other products, CD-R and CD-RW discs manufactured in Taiwan by Princo Taiwan, and selling them after importation in the United States. Response of Princo America Corporation to the Complaint and Notice of Investigation Under Section 337 of the Tariff Act of 1930, as Amended, ("Princo America Response"), p. 35; Order No. 20; 4/24/03 Commission Decision.
12. Respondent Gigastorage Corporation Taiwan ("Gigastorage Taiwan") is an entity existing under the laws of Taiwan. See Response of Gigastorage Corporation Taiwan To The Complaint And Notice Of Investigation Under Section 337 Of The Tariff Act of 1930, As

Amended (“Gigastorage Taiwan Response”) § 3.5.

13. Gigastorage Taiwan has its principal place of business and manufacturing facilities at No. 2 Kuang Fu South Rd., Hsinchu Industrial Park, Hsinchu, Taiwan R.O.C. SX-1C, p. 4.
14. Gigastorage Taiwan is in the business of manufacturing CD-R and CD-RW discs in Taiwan. CX-95C, p. 11.
15. The CD-R and CD-RW discs that Gigastorage Taiwan manufactures “comply with the relevant Orange Book standards.” CX-98C, p. 4.
16. []
17. Gigastorage Taiwan sells CD-Rs and CD-RWs for importation into and sale in the United States. CX-97C, p. 9; Order No. 20; 4/24/03 Commission Decision.
18. Gigastorage is not licensed by Philips to practice any of the patents in suit. CX-86C.
19. Respondent Gigastorage Corporation USA (“Gigastorage USA”) is a wholly-owned subsidiary of Gigastorage Taiwan. CX-97C, p. 12.
20. Gigastorage USA is a corporation organized and existing under the laws of the State of California with its principal place of business at 174 Lawrence Drive, Suite C, Livermore, California 94550. SX-2C, p. 4.
21. Gigastorage USA is in the business, among other things, of importing into and selling in the United States CD-R and CD-RW discs manufactured in Taiwan by Gigastorage Taiwan. CX-190; CX-97C, p. 9; Order No. 20; 4/24/03 Commission Decision.
22. Respondent Linberg Enterprise Inc. (“Linberg”) is a corporation organized and existing under the laws of the State of New York, with its principal place of business at 1 Charles

Street, 130 B, Second Floor, West Orange, New Jersey 07052. *See* Response of Linberg Enterprise Inc. To The Complaint And Notice Of Investigation Under Section 337 Of The Tariff Act of 1930, As Amended (“Linberg Response”) § 3.10.

23. Linberg is in the business of importing into and selling in the United States CD-Rs. *See* Linberg Response § 3.10, Order No. 20; 4/24/03 Commission Decision.

The Products at Issue

24. A CD-R disc is a recordable compact disc on which information may be written once in a CD-R recorder, and played back in a CD-player or CD-ROM drive. CX-163C, p. I-1.
25. CD-R discs contain a “recording material which shows a reflection decrease due to recording ... a wobbled pre-groove for tracking, CLV speed control and timing purposes. Recording takes place in the groove.” CX-163C, p. I-1.
26. CD-R discs allow for both audio and data recording. CX-163, p. I-1.
27. Data that is recorded on CD-R discs by CD-R recorders is encoded via Eight to Fourteen (“EFM”) modulation in accordance with the CD standard. CX-163C, p.VI..X-1, ¶VI; Hesselink Tr. 615-616.
28. All blank CD-R discs “conform to Orange Book Part II (CD-R). . . specifications and should work in all recorders.” CX-282C, p. 38.
29. A CD-RW disc is a recordable compact disc on which information may be written, erased, overwritten and read. CX-162C, p. I-1.
30. A CD-RW disc, once recorded, has a lower reflectivity than a normal CD, so it must be played back either in a CD-RW drive or a player that is designed to read these lower reflectivity discs. CX-162C, p. I-1.

31. CD-RW discs contain a “recording material which shows a reflection decrease due to writing, a reflection increase due to erase, and a reflection decrease or increase due to overwriting.” CX-162C, p. I-1.
32. CD-RW discs contain “a wobbled pre-groove for tracking, CLV speed control and timing purposes. Recording takes place in the groove.” CX-162C, p. I-1.
33. CD-RW discs allow for both audio and data recording. CX-162, p. I-1.
34. Data that is recorded on CD-RW discs by CD-RW recorders is encoded via Eight to Fourteen (“EFM”) modulation in accordance with the CD standard. CX-162C, p. VI X-1, ¶ VI; Hesselink Tr. 615-616.
35. All blank CD-RW discs “conform to Orange Book. . . Part III (CD-RW) specifications and should work in all recorders.” CX-282C, p. 38.
36. The only technical differences between CD-Rs and CD-RWs are differences in the recording material, differences in the color of the disc, and the different depths of the groove. Sun Dep. Tr. 194-196; Tsai Dep. Tr. 183-184.

II. IMPORTATION OR SALE

1. On April 4, 2003, the Administrative Law Judge granted Philips’ motion for summary determination of importation and sale with respect to the Respondents’ CD-R and CD-RW discs. The Initial Determination became the determination of the Commission. Order No. 20 (Initial Determination); Commission Decision Not to Review (Apr. 24, 2003).

III. THE '209 PATENT AND THE '493 PATENT

A. Claim Construction

1. Claim 1 of the '209 patent claims “[a] disk-shaped record carrier body for recording thereon information with a write beam of radiation, said record carrier body having a radiation-sensitive layer on which the information to be recorded is written with the write beam and a continuous, generally circular, diffractive follow-on track extending about the center of said disk-shaped record carrier body for guiding the write beam during recording of the information, said follow-on track being configured to diffract radiation incident thereon when scanned with a spot of radiation of a predetermined size and having a width which is smaller than the dimension of the spot in the width direction so that the intensity distribution of the radiation coming from the record carrier body varies with movement of the spot relative to the center of said follow-on track due to said diffraction so as to enable the position of the spot relative to said follow-on track to be determined.” CX-12, 5:2-19.
2. The term “disc shaped record carrier body” as used in claim 1 of the '209 patent refers to the body of the recordable disc itself. Hesselink Tr. 506; CX 593C, '209 Patent, Art Slide 2.
3. In CD-R and CD-RW discs, the “disc shaped record carrier body” is roughly 120 millimeters in diameter. Hesselink Tr. 506.
4. CD-R and CD-RW discs contain a radiation sensitive layer on which information is written with a beam of radiation. Hesselink Tr. 506-7; CX 593C, '209 Patent Illustration Slide 3.

5. The track on CD-R and CD-RW discs is continuous and generally circular or spiral.
Hesselink Tr. 508; CX 593C, '209 Patent, Illustration Slide 4.
6. When a track is designed so that radiation focused onto the track will be diffracted, the track is configured to diffract radiation incident thereon when scanned with a spot of radiation, within the meaning of claim 1 of the '209 patent. Hesselink Tr. 508; CX 593C, '209 Patent Illustration Slide 5.
7. "Of a predetermined size" refers to the fact that, since the track is designed to diffract incident radiation, the width of the beam of radiation with which it will be used must be taken into account when designing the disc. Hesselink Tr. 509.
8. The width of the track on a CD-R is the width of the groove. Hesselink Tr. 512.
9. When measuring the spot of radiation for comparison with the size of the track, the spot should also be measured at its full-width half maximum. Hesselink Tr. 511.
10. The size of the spot of radiation of "predetermined size" of claim 1 of the '209 patent can be measured in two ways: "full width half maximum" or "first dark ring." Mansuripur Tr. 1106-1110.
11. Claim 5 of the '209 patent claims "[t]he record carrier body according to claims 1 or 2 wherein said follow-on track is a groove formed in said record carrier body." CX-12, 5:32-34.
12. Claim 5 of the '209 patent is dependent on claim 1 and further narrows claim 1 by specifying that the follow-on track is in the form of a groove in the record carrier body. CX-12, 5:32-34; Hesselink Tr. 534-535.
13. The "moulded groove track" referred to in the specifications of the '209 and '493 patents

- is an elongated groove track, as claimed in claim 5 of the '209 patent and claim 11 of the '493 patent. Mansuripur Tr. 1128; CX-12, 5:32-34; CX-13, 6:38-54.
14. Claim 6 of the '209 patent claims “[t]he record carrier body according to claim 1 wherein said follow-on track contains prerecorded data capable of being read with a read beam of radiation.” CX-12, 5:35-37.
 15. Claim 6 of the '209 patent is dependent on claim 1 and further requires that the follow-on track contain pre-recorded data which can consist of, for example, position information or specifics about the recording material. Hesselink Tr. 536-537; CX-12, 5:35-37.
 16. Claim 11 of the '493 patent is similar to claim 1 of the '209 patent except that, instead of a “generally circular,” diffractive follow-on track, it recites an “elongated groove formed in said record carrier body” Hesselink Tr. 537-538; CX-13, 6:38-53.
 17. A reading of the claims and specification of the '209 and '493 patents with an understanding of basic physics makes clear that the track width is equivalent to the full-width half-maximum measurement of that structure and the spot of radiation has to be bigger than this structure in order for diffraction to occur. Hesselink Tr. 510-512, 533-534, 2556, 537-38; CX-12; CX-13.
 18. In order to generate diffraction, the size of the spot of radiation must be larger in the width direction than the width of the track. Hesselink Tr. 509-510; CX 593C, '209 Patent Illustration Slide 6.
 19. Diffraction occurs regardless of how much land is adjacent to the track because “at the edge, you will get fundamental diffraction.” Hesselink Tr. 747.
 20. If the diffractive structure that interacts with the light is not smaller than the size of the

- spot of light, then there will not be a diffraction pattern. Hesselink Tr. 2544-2545.
21. When a beam impinges on a particular structure in which the spot size is larger than the width of the track, light will be diffracted from the track. Hesselink Tr. 730-732.
 22. Dr. Hesselink testified that “the spot is, by all measurements that I have made, larger than the width of the groove. In fact, if it was smaller, both Dr. Mansuripur and I agree that there would be no diffraction.” Hesselink Tr. 516, 2535.
 23. “If this spot actually was just impinging on the center of the groove, there would be no diffraction.” Hesselink Tr. 516.
 24. “[I]f the groove gets illuminated by a beam that is wider than the width of the groove, there will be diffraction. If it is smaller, there is no diffraction.” Hesselink Tr. 2535.
 25. In the ‘209 and ‘493 patents, the track width is not equivalent to the track pitch. Hesselink Tr. 516-517, *see generally*, CX-593C, ‘209 Patent Illustration Slide 14.
 26. Track pitch, as understood by one of ordinary skill in the art, is the average value of the radial distance between the center-points of two lands on either side of the groove. Mons Tr. 459.
 27. Respondents’ interpretation of the track width as being equivalent to the track pitch includes not only the track, but the surrounding lands. Hesselink Tr. 516-518.
 28. If the track width were equivalent to the track pitch, scanning with a spot wider than the track would cause interference. Hesselink Tr. 516-518.
 29. The track pitch of the CD-Rs and CD-RWs manufactured by Princo and Gigastorage is approximately 1.5 micrometers. Hesselink Tr. 529-530; CX-61C-64C, p. 3.
 30. It is standard in texts relating to optical recording to distinguish track width from track

pitch. Hesselink Tr. 521-522; CX 593C, '209 Patent Illustration Slide 14.

31. Principles of Digital Audio, a standard text, states that, "CD-R discs are manufactured with a pregrooved 1.6 μ m pitch spiral track, used to guide the recording laser along the track; The 0.6 μ m wide track is physically modulated with a \pm 0.03 μ m sinusoidal wobble with a frequency of 22.05 kHz as shown in Fig. 9.25." CX-586C, p. 282-283.
32. According to Dr. Mansuripur's text The Physical Principles of Magneto-Optical Recording "neighboring tracks may be separated from each other by a guard-band" which the text refers to as W_g . CX-605, p. 3.
33. Dr. Mansuripur's text indicates that "[a] disk, whether magnetic or optical consists of a number of tracks along which information is recorded" the width of which the text refers to as W_t . CX-605, p. 3.
34. According to Dr. Mansuripur's text, track pitch is calculated as the sum of the width of the track (W_t) and the width of the land or guardband (W_g), which represents the addition of the track width to the width of the guard bands in-between. CX-605, p. 3.
35. According to Dr. Mansuripur's text, "[t]he track-pitch is the center-to-center distance between neighboring tracks." CX-605, p.6.
36. Dr. Mansuripur's text goes explains that "[a] convenient method of defining tracks on an optical disk is provided by pregrooves, which are either etched, stamped, or molded onto the substrate... The space between neighboring grooves is the so-called land. Data may be written in the grooves with the land acting as a guard band." CX-605, p. 7.
37. Dr. Mansuripur admits that in the specification of the '209 and '493 patents "when they talk about the follow-on track, the width of the follow-on track is usually the width of the

groove itself.” Mansuripur Tr. 1103:11-13.

38. The specification of the ‘209 patent refers to a moulded groove track as described in U.S. Patent No. 3,956,582, which describes the use of diffraction to follow a track that has a width smaller than the radiation spot. Hesselink Tr. 741-742; CX-12, 4:34-37; CX-13, 4:38-41; RX-1960, 3:1-3.
39. The ‘582 patent, incorporated by reference in the ‘209 patent, distinguishes the width of the track from the width of the track plus the adjacent lands. Hesselink Tr. 522-523; RX-1960, 3:61-65.
40. Both the ‘769 and ‘582 patents, which are incorporated by reference in the ‘209 patent, disclose a beam wider than the track when disclosing possible methods of tracking. Mansuripur Tr. 1104-1105; CX-12, 4:23-37; CX-13, 4:27-41.
41. The specifications of the ‘209 and ‘493 patents disclose various methods of “optically discriminating the follow-on track” from “the rest of the surface of the record carrier body on which the information is to be written.” CX-12, 1:53-61; CX-13, 1:55-63.
42. The specifications of the ‘209 and ‘493 patents distinguish the follow-on track from the surrounding lands in stating that “the follow-on track may differ from its surrounding, so that the intensity of a beam which emerges from the recordcarrier [sic] body differs according to whether the beam has or has not interacted with the track.” Hesselink Tr. 519; CX-12, 2:19-22; CX-13, 2:22-24.
43. The specifications of the ‘209 and ‘493 patents also distinguish the follow-on track from the surrounding lands in stating that “it is also possible to make the follow-on track interact with the polarization condition of the beam in a different way than with the area

- surrounding the track.” Hesselink Tr. 519-521; CX-12, 2:23-25; CX-13, 2:25-27.
44. The specifications of the ‘209 and ‘493 patents disclose a tracking mechanism designed to take advantage of the optical differences between the track and the rest of the record carrier body -- the lands -- to produce diffraction, which it uses to keep the write beam centered on the track. CX-12, 2:55–3:53; CX-13, 2:64-3:58.
 45. Although the specifications of the ‘209 and ‘493 patents contain numerous references to track width, they mention track pitch only “[i]n the case of a spiral follow-on track, a spiral may be selected having a pitch which initially is comparatively great and which gradually decreases...” CX-12, 4:62-66; CX-13, 4:66–5:2.
 46. The reference in the ‘209 and ‘493 patents to “a spot of radiation” refers to at least one spot, but will allow for more than one. Hesselink Tr. 523-524; CX-12, 5:11; CX-13, 5:17.
 47. The preferred embodiment described in the ‘209 and ‘493 patents uses three beams positioned on the follow-on track. Hesselink Tr. 525; CX-12, Fig. 1; CX-13, Fig. 1.
 48. The specification of the ‘209 patent describes a three-beam tracking system, but also “clearly indicates that a single beam approach is feasible.” Hesselink Tr. 709-710.
 49. Dr. Hesselink testified that “[t]he parties have agreed diffraction is a redistribution in space of the intensity of waves that result from the presence of an object causing variations of either the amplitude or phase of the waves.” Hesselink Tr. 2534.
 50. The three-beam tracking system described in the ‘209 and ‘493 patents uses diffraction. Hesselink Tr. 526-528, 2535; CX 593C, ‘209 Patent Illustration Slides 16-20.
 51. Each of the three beams used in the three-beam method for tracking a follow-on track are

- of equal size. Hesselink Tr. 527-528.
52. The underlying physical mechanism for both the one-beam and three-beam method for tracking a follow-on track is based on diffraction. Hesselink Tr. 2535-2536.
53. Pieter Kramer, one of the two inventors of the '209 and '493 patents, testified that track following using three spots, which is described in at least one embodiment of the '209 and '493 patents, was used in the Video Long Play system that had been demonstrated publicly in 1972. Kramer Dep. Tr. 39-40, 49-50; CX-12, Fig. 1; CX-13, Fig. 1.
54. The Video Long Play system was not a recordable system. Kramer Dep. Tr. 50.
55. Jacques Heemskerk testified that in the three-beam tracking method used in the laser vision system in 1973, when one of the side beams is over a pit, it receives less reflection than when it is not over a pit "[b]ecause there is diffraction of the light spot on the pit." Heemskerk Dep. Tr. 66-70.
56. The limitations of the asserted claims of the '209 and '493 patents pertain only to the configuration of a record carrier. Hesselink Tr. 528-529.
57. The scanning spot size can be calculated without having a CD player. Mansuripur Tr. 1110.
58. The scanning spot size can be calculated "[i]f you know the wavelength of the laser light and if you know the parameter of the lens which is known as the numerical aperture, and if you know the distribution of the light that shines onto the lens, what shape that distribution has." Mansuripur Tr. 1110.
59. Neither a player nor a recorder is necessary to determine whether a disc falls within the limitations of the '209 or '493 patents. Hesselink Tr. 528-529, 537-538.

60. Dr. Hesselink testified that “[i]f I wanted to make a measurement of the diffraction from the disc, all I need to do is find a very simple optical setup in my laboratory or anywhere else in the world.” Hesselink Tr. 2596-2597.
61. In responding to an Office Action, Philips distinguished over Rabedeau, explaining the meaning of the claimed follow-on track as “a diffractive follow-on track which diffracts the incident radiation so that the intensity distribution in the radiation coming from the carrier varies with the movement of the spot relative to the follow-on track.” CX-37, Paper No. 5 at 12.
62. In its Appeal Brief to the Board of Appeals and Patent Interferences following the final rejection of the claims in an Examiner’s Action dated October 4, 1984, Philips clearly described the characteristics of the claimed follow-on track as follows:

As specified in the record carrier claims 10 to 15, the circular follow-on track extends about the center of the disc and is configured to diffract radiation incident thereon when scanned with a spot of radiation which is larger than the width of the follow-on track. Because the incident radiation is diffracted by the follow-on track, less of the radiation will be captured and projected by a lens on a photodetector when the spot is centered on the follow-on track than would be the case when the spot impinges on an adjacent area of the disc. As a result, the intensity distribution of the radiation coming from the disc will vary with radial movement of the spot relative to the center of the follow-on track thereby enabling the radial position of the spot to be accurately determined.

CX-37, Applicant’s Appeal Brief at 6.

B. Infringement Determination

63. The CD-R discs manufactured by Princo have a radiation-sensitive surface for recording information. Hesselink Tr. 506-507; CX-64C, p. 11.

64. The CD-RW discs manufactured by Princo have a radiation-sensitive surface for recording information. Hesselink Tr. 506-507; CX-63C, p. 11.
65. The CD-R discs manufactured by Gigastorage have a radiation-sensitive surface for recording information. Hesselink Tr. 506-507; CX-62C, p. 11.
66. The CD-RW discs manufactured by Gigastorage have a radiation-sensitive surface for recording information. Hesselink Tr. 506-507; CX-61C, p. 11.
67. The CD-Rs manufactured by Princo have a continuous, generally circular or spiral follow-on track. Hesselink Tr. 529-530; CX-64C, p. 3.
68. The CD-RWs manufactured by Princo have a continuous, generally circular or spiral follow-on track. Hesselink Tr. 529-530; CX-63C, p.3.
69. The CD-Rs manufactured by Gigastorage have a continuous, generally circular or spiral follow-on track. Hesselink Tr. 529-530; CX-62C, p. 3.
70. The CD-RWs manufactured by Gigastorage have a continuous, generally circular or spiral follow-on track. Hesselink Tr. 529-530; CX-61, p. 3.
71. The follow-on track on the CD-Rs manufactured by Princo is diffractive. Hesselink Tr. 529-530; CX-64C, p. 4.
72. The follow-on track on the CD-RWs manufactured by Princo is diffractive. Hesselink Tr. 529-530; CX-63C, p. 4.
73. The follow-on track on the CD-Rs manufactured by Gigastorage is diffractive. Hesselink Tr. 529-530; CX-62C, p. 4.
74. The follow-on track on the CD-RWs manufactured by Gigastorage is diffractive. Hesselink Tr. 529-530; CX-61C, p. 4.

75. The full width measurement of the laser spot from a typical CD-R/RW recorder is approximately 1.29 to 1.38 microns. CX-61C, p. 5; CX-62C, p. 5; CX-63C, p. 5; CX-64, p. 5; Hesselink Tr. 531.
76. The full width-half maximum measurement of the laser spot from a typical CD-R/RW recorder is approximately 740 nanometers. Hesselink Tr. 530-532.
77. The width of the track on the CD-Rs manufactured by Princo is approximately 410 nanometers. Hesselink Tr. 531; CX-64C, p. 9.
78. The width of the track on the CD-RWs manufactured by Princo is approximately 576 nanometers. CX-63C, p. 9.
79. The width of the track on the CD-Rs manufactured by Gigastorage is approximately 488 nanometers. CX-62C, p. 9.
80. The width of the track on the CD-RWs manufactured by Gigastorage is approximately 517 nanometers. CX-61C, p. 9.
81. The width of the laser spot generated by a typical CD-R recorder is wider than the groove on a CD-R disc. Hesselink Tr. 530-532; Sun Dep. Tr. 121-122. The tracks in the CD-R discs manufactured by Princo are in the form of a groove in the record carrier body. Hesselink Tr. 535-536; CX-64C, p. 9.
82. The tracks in the CD-RW discs manufactured by Princo are in the form of a groove in the record carrier body. Hesselink Tr. 535-536; CX-63C, p. 9.
83. The tracks in the CD-R discs manufactured by Gigastorage are in the form of a groove in the record carrier body. Hesselink Tr. 535-536; CX-62C, p. 9.
84. The tracks in the CD-RW discs manufactured by Gigastorage are in the form of a groove

in the record carrier body. Hesselink Tr. 535-536; CX-61C, p. 9.

85. The CD-R discs manufactured by Princo contain pre-recorded data regarding position information and other control information. Hesselink Tr. 536; CX-64C, p. 14, 17-18.
86. The CD-RW discs manufactured by Princo contain pre-recorded data regarding position information and other control information. Hesselink Tr. 536; CX-63C, p. 14, 17-18.
87. The CD-R discs manufactured by Gigastorage contain pre-recorded data regarding position information and other control information. Hesselink Tr. 536; CX-62C, p. 14, 17-18.
88. The CD-RW discs manufactured by Gigastorage contain pre-recorded data regarding position information and other control information. Hesselink Tr. 536; CX-61C, p. 14, 17-18.
89. Princo' product literature states that the CD-R discs that Princo Taiwan manufactures have a spiral track. CX-43C, p. 6; CX-50C, p. PA 033205.
90. Princo's product literature states that the CD-RW discs that Princo Taiwan manufactures have a spiral track. CX-43C, p. 10; CX-48C.
91. Princo Taiwan admitted in its second supplemental response to Philips' interrogatories that, in the CD-R and CD-RW discs that it manufactures, "[t]he diffractive track is spiral-shaped." CX-108C, p. 3.
92. Gigastorage Taiwan admitted in its second supplemental response to Philips' interrogatories that, in the CD-Rs and CD-RWs that it manufactures, "[t]he diffractive track is spiral-shaped." CX-107C, p. 5.
93. Gigastorage Taiwan admitted in its second supplemental response to Philips'

interrogatories that the track in the CD-R and CD-RW discs that it manufactures “consists of a channel formed in the disc.” CX-107C, p. 5.

94. The track width of the master used to manufacture Princo’s CD-R discs, measured by Princo at the full-width half-maximum, is 380 +/- 20 nanometers. CX-45C.
95. The track width of the master used to manufacture Princo’s CD-RW discs, measured by Princo at the full width-half maximum, is 450 +/- 20 nanometers. CX-45C.
96. W.L. Sun, a witness designated by Princo Taiwan, testified that for CD-R and CD-RW discs, “the width of the groove should be smaller than the laser point.” CX-109C; Sun Dep. Tr. 108-109.
97. W.L. Sun testified that “according to a reasonable -- reasonable estimation the size of the laser light should be greater than the groove.” Sun Dep. Tr. 122.
98. W.L. Sun testified that the CD-R discs that Princo manufactures have a groove width in the range of 350 to 450 nanometers. Sun Dep. Tr. 164.
99. Mark Tsai, a witness designated by Gigastorage Taiwan testified that Gigastorage Taiwan determines the width of the groove on its CD-R discs by measuring the width of the groove at half the depth. CX-109C; Tsai Dep. Tr. 148-149.
100. Mark Tsai testified that the width of the groove, measured at half the depth of the groove, of the “shining dye” CD-R discs manufactured by Gigastorage Taiwan, is 590 nanometers. Tsai Dep. Tr. 148-149.
101. Mark Tsai testified that the width of the groove, measured at half the depth of the groove, of the phthalocyanine CD-Rs manufactured by Gigastorage Taiwan, is 610 nanometers. Tsai Dep. Tr. 149-150.

102. Mark Tsai testified that the width of the groove, measured at half the depth of the groove, of the CD-RWs manufactured by Gigastorage Taiwan, "is also between 590 and 600" nanometers. Tsai Dep. Tr. 151.
103. Princo Taiwan admitted in its second supplemental response to Philips' interrogatories that the CD-Rs and CD-RWs that it manufactures "have a radiation-sensitive layer in compliance with the Orange Book upon which it is possible to record information with a focused beam of radiation." CX-108C, p. 3.
104. Princo Taiwan admitted in its second supplemental response to Philips' interrogatories that the CD-Rs and CD-RWs that it manufactures "have a diffractive track in compliance with the Orange Book." CX-108C, p. 3.
105. Princo Taiwan admitted in its second supplemental response to Philips' interrogatories that the CD-Rs and CD-RWs that it manufactures "have a diffractive track with a width as specified in the Orange Book." CX-108C, p. 3.
106. Gigastorage Taiwan admitted in its second supplemental response to Philips' interrogatories that the CD-Rs and CD-RWs that it manufactures "have a radiation-sensitive layer in compliance with the Orange Book upon which it is possible to record information with a focused beam of radiation." CX-107C, p. 5.
107. Gigastorage Taiwan admitted in its second supplemental response to Philips' interrogatories that the CD-Rs and CD-RWs that it manufactures "have a diffractive track in compliance with the Orange Book." CX-107C, p. 5.
108. Gigastorage Taiwan admitted in its second supplemental response to Philips' interrogatories that the CD-Rs and CD-RWs that it manufactures "have a diffractive track

with a width as specified in the Orange Book.” CX-107C, p. 5.

109. As set forth in the Orange Book (Part II), “[i]n the CD-R system the disc contains recording material which shows a reflection decrease due to recording.” CX-163C, p. I-1, ¶ 1.2.
110. As set forth in the Orange Book (Part II), in a CD-R “[r]ecording takes place in the groove by locally heating up the sensitive layer with a laser spot.” CX-163C, p. Att-3, ¶ B1.
111. As set forth in the Orange Book (Part II), in a CD-R tracking is possible because “[a]n off-track position of the scanning spot results in a diffraction pattern that is asymmetrical in the radial direction of the disc.” CX-163C, p. Att-3.
112. As set forth in the Orange Book (Part III), “[i]n the CD-RW system the disc contains a recording material which shows a reflection decrease due to writing.” CX-162C, p. I-1, ¶ 1.2.
113. As set forth in the Orange Book (Part III), in a CD-RW “[r]ecording takes place in the groove by locally heating up the sensitive layer with a laser spot.” CX-162C, p. Att-3, ¶ C1.1.
114. As set forth in the Orange Book (Part III), in a CD-RW tracking is possible because “[a]n off-track position of the scanning spot results in a diffraction pattern that is asymmetrical in the radial direction of the disc.” CX-162C, p. Att-3, ¶ C1.2.

C. Validity

Enablement and Written Description

115. The one-spot push-pull tracking method, with its “baseball detector pattern” detector

described by Dr. Mansuripur, is but one of many possible diffraction tracking methods/patterns, depending on “what type of structure it is” causing the diffraction. Hesselink Tr. 2536-2537.

116. Dr. Hesselink testified that “[t]he baseball pattern is just one particular implementation that provides you with a means to carry out that particular detection, but that is by no means the only one, nor is it necessary to restrict [the ‘209 and ‘493 patents] only to that particular case, because that is not the case that it was solely limited to.” Hesselink Tr. 2541, 2611.
117. Claim 1 of the ‘209 patent does not require that a particular diffraction pattern be used to guide the write beam along the track. Hesselink Tr. 2533, 2536-2537.
118. Claim 11 of the ‘493 patent does not require that a particular diffraction pattern be used to guide the write beam along the track. Hesselink Tr. 537-38, 2533, 2536-2537.
119. U.S. Patent No. 3,956,582, which was cited in the specification of both the ‘209 and ‘493 patents, describes a diffractive track, but does not limit itself to a particular type of diffraction pattern. Hesselink Tr. 2537-2538; RX 1960, 3:1-35; CX-619C, ‘209/’493 Slide 5.
120. The system shown in the ‘582 patent is diffractive; the light is diffracted at the disk and produces 3 beams, 1 zero order and 2 first order beams. Mansuripur Tr. 1130.
121. Using standard values for a groove and beam consistent with those claimed in the ‘209 and ‘493 patents, one can easily determine, by using straightforward calculations, that an intensity distribution that is suitable for tracking will result from scanning the groove with a beam of radiation. Hesselink Tr. 2539-2541; CX-619C, ‘209/’493 Slides 7-8.

122. Using standard values for a groove and a beam consistent with those claimed in the '209 and '493 patents, but covering the groove with a material of different reflectivity than the lands, one can calculate that an intensity distribution that is suitable for tracking will result from scanning the groove with a beam of radiation; however the intensity distribution will be different from that from a groove with the same reflectivity as the lands. Hesselink Tr. 2539-2541.
123. U.S. Patent No. 4,491,940, ("Tinet") which has an application date of 1973, demonstrates that one-spot tracking was known at the time of the '209 and '493 inventions. Hesselink Tr. 2542-2544; CX-604, Fig. 1, 7:23-36; CX-619C, '209/'493 Slides 9-10.
124. The claims in Tinet relate to tracking with a particular disc structure. CX-604, 7:53-10:9.
125. Jacques Heemskerk testified that Philips became aware of a one-spot tracking method in 1972 or 1973 as a result of discussions with Thomson, Zenith and MCA. Heemskerk Dep. Tr. 78-79.
126. Dr. Mansuripur testified that the depth of the groove on the disc does not have to be λ over 8 for the disc to work; although λ over 8 is the optimal groove depth for push-pull tracking based on the baseball pattern, that diffractive tracking works with other groove depths. Mansuripur Tr. 1270-1271.

Nonobviousness

127. Dr. Hesselink testified that U.S. Patent No. 3,673,412 ("Olson") "definitely does not" teach a diffractive follow-on track. Hesselink Tr. 2544.
128. Olson does not explicitly mention diffraction. RX-68.
129. Olson does not teach diffractive follow-on tracks as "[t]he wavelengths of the grating is

- very much larger than the spot size. There would be no diffraction.” Hesselink Tr. 2549.
130. For the tracking system in Olson to work, “it is absolutely critical that there is no light distribution” perpendicular to the direction of the track due to any other cause, such as diffraction. Hesselink Tr. 2547-2548.
131. In Olson, the signal from the disc is measured by a single detector after which the signal is filtered based on the time variation of the signal, not the intensity distribution. Hesselink Tr. 2548-2549; RX-68, 8:26-30; CX-619C, ‘209/’493 Slide 15.
132. In Olson, “the detector measures all of the intensity on one large detector. So the error signal and the function of radial position is absolutely constant. Diffraction or no diffraction, it will not be able to use that diffraction in order to get a tracking error signal.” Hesselink Tr. 2550-2551; CX-619C, ‘209/’493 Slides 17-20.
133. In Olson, “[t]he reason that tracking works is because on the side of the data track, which is in the center here, there is a servo track, 36A and 36B.” Hesselink Tr. 2546; RX-68, 5:1-15; CX-619C, ‘209/’493 Slides 12-13.
134. In Olson, data is written in the data track in the center, between the servo tracks designated 36A and 36B in Figures 5 and 5a. Hesselink Tr. 2546-2547; RX-68, Figs. 5, 5a, 3:33-42.
135. As described in Olson, “[t]he servo tracks are sinusoidally patterns of dark and bright areas on the disc put down by photographic methods, such that when the disc is rotating or when the spot is scanning with respect to the disc, a time-dependent signal is developed.” Hesselink Tr. 2546; RX-68.
136. The fact that there is a time-dependent signal in Olson “is very significant” because

“[o]nly when there is relative motion is there going to be a signal that allows one to make a measurement of a tracking error signal and determine whether or not the spot is on the center of the data track. If this is stationary, there is no signal.” Hesselink Tr. 2546-2547; RX-68, 5:1-15.

137. In Olson, “[t]he only way we get a tracking error signal is by taking this time-varying signal and selecting out the 14 and 16 kHz portions and then taking an average value of it and subtracting out those two numbers.” Hesselink Tr. 2549.
138. In the ‘209 and ‘493 patents, it is critical that diffraction is in a direction perpendicular to the direction of the track in order for tracking to occur. Hesselink Tr. 2551-2552; CX-619C, ‘209/’493 Slides 18, 20.
139. Diffraction in a direction perpendicular to the grooves is required in order “to find a signal from the left or from the right in order to maintain the position of the spot with respect to the center of the groove.” Hesselink Tr. 2545; CX-619C, ‘209/’493 Slides 12-13.
140. Even if the photographic tracks in Olson were diffractive, the diffraction would occur along the length of the track, thus the intensity distribution from diffraction could not be used to keep the laser on the track. Hesselink Tr. 2550; CX-619C, ‘209/’493 Slides 18-20.
141. If the track described in Olson did cause diffraction, it could not be used for tracking since it would occur in the wrong direction. Hesselink Tr. 2544; RX-68; CX-619C, ‘209/’493 Slide 18.
142. While there is an overlap of the signals on the track described by Olson, because the spot

of light overlaps with both the left and right portions of the track, there is no overlap between the servo tracks themselves. Hesselink Tr. 25 47-2549; RX-68, 9:13-31; CX-619C, '209/'493 Slides 21-22.

143. In Olson, “[t]he data goes to a separate channel and has a different bandwidth. They cannot overlap. If they did, there would be very severe contamination between the data signal and the tracking signals.” Hesselink Tr. 2549.
144. In Olson, it is not possible for the data track to completely overlap with the servo tracks. Hesselink Tr. 2549, 2553-2555.
145. The description of the overlap in Olson states that, in the drawings, the servo and data tracks are shown to have distinct boundaries only for convenience of illustration and that these tracks are defined by “recorded signals” which will “overlap;” the description does *not* say that the servo tracks are moved toward the center of the data tracks. RX-68, 9:22-31, 10:75-11:3.
146. Dr. Hesselink testified that “there is no indication in the patent of Olson that gives you any hint that he says that” the servo tracks could be completely subsumed in the data track and “[t]here is no indication that one should move these tracks together.” Hesselink Tr. 2553-2554; RX-68; CX-619C, '209/'493 Slides 21-22.
147. Dr. Hesselink testified that, with respect to the servo tracks described in Olson, “[t]he spot cannot be wider than the track and the servo tracks in between. They cannot overlap and they must not overlap.... It just doesn't work if you overlap them.” Hesselink Tr. 2554-2555; RX-68; CX-619C, '209/'493 Slides 21-22.
148. Dr. Hesselink testified that, if one were to combine the tracks in Olson “there is another

very significant problem... If you are a little bit off the track towards the left, a portion of this beam could overlap the adjacent blue light ... [the] signal would go up ... the servo system [would] say[] move the spot to the left ... and it would be going [in] the wrong direction.” Hesselink Tr. 2554.

149. The language in Olson regarding “overlap” refers to the overlap of signals from the servo tracks. If the spot of radiation is in the center of the track in Olson, there are equal contributions from the overlap of the right and left servo tracks and thus the signals are the same. Hesselink Tr. 2555; RX-68; CX-619C, ‘209/’493 Slides 21-22.
150. In Olson, “the track has to include the servo tracks on the side, and [the light spot] must be smaller, because if it is larger than the combined width, you cannot make it into a servo system.” Hesselink Tr. 2556.
151. U.S. Patent No. 3,287,563 (“Clunis”) mentions recording only in the context of describing a method to write information on a blank medium that lacks a pre-groove or any other track. RX-67, 4:13-42, 54-55.
152. In Clunis, the data tracks are used to only guide the beam while reading information that has already been written on the disc. RX-67, 4:13-42, 54-55.
153. Because it is impossible to combine the servo tracks in Olson with the data track, it would not have been obvious to one of ordinary skill in the art to combine Olson with Clunis to get a groove that is used as a diffractive follow-on track in which information is recorded. RX-67, 4:54-55, RX-68, Figs. 5, 5a, 3:33-42; Hesselink Tr. 2598.
154. In response to the Examiner’s Action mailed on January 27, 1984, Philips amended the application for the ‘209 patent. CX-37, Paper No. 5.

155. In the May 1984 amendment, reference was made to the '582 patent for a "description of how diffractive indicia on a record carrier are detected." CX-37, Paper No. 5 at 10.
156. The '582 patent was "incorporated by reference in the present application." CX-37, Paper No. 5 at 10.
157. Philips took the position that incorporation by reference of the '582 patent satisfied "fully the description and enablement requirements of Section 112." CX-37, Paper No. 5 at 10.
158. In the May 1984 amendment, Philips distinguished over Olson as follows:

In particular, neither Olson nor Rabedeau disclose a diffractive follow-on track of the type defined by the claims. On the contrary, Olson's servo tracks are produced photographically and tracking is effected by comparing the amount of light transmitted by each of two servo tracks which are illuminated by a single light spot in the manner shown in Fig. 5 of Olson and described in columns 4 and 5.

CX-37, Paper No. 5 at 11.

159. In the May 1984 amendment, Philips further distinguished over Olson as not suggesting the limitation of claim 5 "requiring the follow-on track to be a groove formed in the record carrier body." CX-37, Paper No. 5 at 12.
160. In his Action dated September 14, 1984, the Examiner took the position that the specification did not provide adequate written description or enabling disclosure of amended claims 10-22. CX-37, Paper No. 6 at 2.
161. Issued claim 1 of the '209 patent is identical to claim 10 added by amendment dated May 24, 1984. CX-37, Paper No. 4 at 5.
162. The Examiner also rejected amended claims 10-22 "under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the

subject matter which the applicant regards as the invention.” CX-37, Paper No. 6 at 4.

163. Among the reasons given for rejecting claims 10-22 under 35 U.S.C. § 112, first paragraph, was the Examiner’s view that “[t]he choice of a scanning spot size has nothing to do with a disc shaped record carrier body, i.e., record playback depends on record playback apparatus and spot size is determined by such apparatus. Future events are not structure.” CX-37, Paper No. 6 at 4-5.
164. In its Appeal Brief to the Board, Philips further noted that the configuration of the claimed disc to include the diffractive follow-on track “makes it possible to precisely control the position of the write beam during the recording of the information.” CX-37, Applicant’s Appeal Brief at 6.
165. In its Appeal Brief to the Board, Philips again pointed out that the claims were supported by the specification, as follows:

As to the alleged lack of adequate written description and enabling disclosure, the application describes on pages 6 to 9 the construction and operation of the recording system illustrated in the drawing. Moreover, the specific embodiment of the record carrier provided with a diffractive follow-on track defined by claims 10 to 15 is described at the bottom of page 9 by reference to U.S. Patent No. 3,956,582. The last full paragraph on page 9 of the application, for example, states that the follow-on track may be: ‘a moulded groove track [which can] be followed with a radiation spot which is greater than the width of said track, as is described in U.S. Patent No. 3.956,582.

CX-37, Applicant’s Appeal Brief at 9.

166. In its Appeal Brief to the Board, Philips explained how the referenced ‘582 patent provides information on how to read an information track “by making use of light

diffraction.” The Brief stated:

Specifically, the ‘582 patent states that an information “block” or “pit” can be detected with the use of an objective having a lens with a pupil of a diameter such that only a portion of the higher order diffracted beams will be captured by the lens and projected onto a photodetector...On the other hand, when the light spot is incident on a diffractive pit, the lens will capture and project onto the photodetector only a portion of the diffracted light so that the level of the electrical signal at the output of the photodetector will decrease, indicating the presence of an information pit.

The ‘582 patent, thus, gives the theory underlying “diffractive read out.” It also discusses the relationships between the spot size, lens aperture and size of the optical structure required for diffractive read-out and in col. 4 gives examples of optical information structures that can be read by such techniques, including an information track comprised of spaced apart $\lambda/4$ deep pits.

CX-37, Applicant’s Appeal Brief at 9-10.

167. The Examiner’s Answer, dated June 11, 1985, also asserted that the “major embodiment (*i.e.* the one most discussed and the one shown in the figure) of the specification is actually incompatible with the system of 3,956,582,” because the specification of the ‘209 patent “describes a rather complex use of diffraction” using three beams while the ‘582 patent “is quite different.” CX-37, Paper No. 13 at 7-8.
168. The Examiner’s Answer concluded that the reference to the ‘582 patent in the specification did not overcome the 35 U.S.C. § 112 rejection because it “has only one beam . . . a read beam” and “[t]here is no follow-on track or even tracking.” CX-37, Paper No. 13 at 8.
169. The Examiner’s Answer asserted as an objection to the amended claims that the specification addresses many options other than the “molded groove” follow-on track and

that “[w]ith all the possibilities in the specification it seems that applicants have chosen one of the least disclosed.” CX-37, Paper No. 13 at 9-10.

170. The Examiner’s Answer also relied on the fact that “the appealed claims are the first claims to claim diffractive tracks in this series of six U.S. applications.” CX-37, Paper No. 13 at 11.

171. In its Reply Brief to the Board, Philips further noted the properties of the claimed follow-on track:

What is disclosed in the specification of the present application and its predecessors is a continuous, optically detectable “follow-on” track for guiding a write beam during recording of information. In addition to a description of the function and operation of the follow-on track, the application (and its predecessors) also gives several examples of specific structures for such a ‘follow-on’ track.

In all of the . . . embodiments, the follow-on track performs an identical function. It is used to guide the write beam so that the information is recorded in parallel tracks. All of this is clearly described, inter alia, on pages 4 to 9 of the specification.

CX-37, Applicant’s Reply Brief at 3.

172. Philips further explained in its Reply Brief that “[t]he ‘582 patent was cited for its teaching of how a follow-on track in the form of a groove is to be optically detected by taking advantage of the diffractive phenomenon.” CX-37, Applicant’s Reply Brief at 4.

173. As explained in Philips’ Reply Brief to the Board:

The ‘582 patent describes how a depression or pit, whose width has a certain relationship with respect to the diameter of the incident light spot and whose depth has a certain relationship to the wavelength of the incident light, will diffract the light . . . [a]s further explained in the referenced ‘582 patent, because of diffraction of light by the pit, its presence can be detecting by using a light collecting element, such

as an objective, with an aperture of a diameter such that most of the diffracted light will fall outside the pupil and be lost. With such an arrangement, when the light beam is incident on the pit some of the light will be diffracted and therefore the light collecting element will capture less of the light than will be captured by it when the light beam is incident on an adjacent, flat land.

Applicants submit that the description of the follow on tracks in this application and the description of diffractive read out in the referenced '582 patent provides all of the information that would be required to construct a diffractive follow-on track in the form of a groove.

CX-37, Applicant's Reply Brief at 4-5.

174. The Reply Brief to the Board also addressed alternative ways of tracking the follow-on track using both one beam (by reference to the '582 patent) or a three-beam system of the apparatus disclosed in Figure 1 of the '209 application. CX-37, Applicant's Reply Brief at 7-8.
175. In its Reply Brief to the Board, Philips defined what "diffractive" means as used in the specification and claims, as follows:

The terms "diffraction" and "diffracted wave" are defined in McGraw-Hill Dictionary of Scientific and Technical Terms as: "diffractive wave [PHYS] A wave whose front has been changed in direction by an obstacle or other nonhomogeneity in a medium, other than by reflection or refraction. diffraction [PHYS] Any redistribution in space of the intensity of waves that results from the presence of an object causing variations of either the amplitude or phase of the waves; found in all types of wave phenomena.

CX-37, Applicant's Reply Brief at 9.

176. In its decision the Board of Patent Appeals and Interferences treated claim 10 -- issued claim 1 -- as "illustrative of the issues before us." CX-37, Paper No. 17 at 2.

177. The Board refused to sustain the Examiner's rejection of claims 10-15 under 35 U.S.C. § 112, second paragraph, holding "that the claims particularly point out and distinctly claim the invention as required by 35 U.S.C. § 112, second paragraph." CX-37, Paper No. 17 at 4.
178. In refusing to sustain the Examiner's § 112, second paragraph rejection, the Board held that "the scanning spot of radiation in claim 10 is an integral part of the claimed recording of information on the "claimed record carrier body" "for recording thereon with a write beam of radiation." CX-37, Paper No. 17 at 4.
179. The Board also found that the Examiner had failed to establish "that the disclosure of the application as originally filed does not reasonably convey to the artisan that the inventor had possession at the time of the later claimed subject matter." CX-37, Paper No. 17 at 5.
180. The Board refused to sustain the Examiner's rejection based on the alleged failure "to comply with the enablement clause of the first paragraph of 35 U.S.C. § 112." CX-37, Paper No. 17 at 5.
181. With respect to a "groove formed in the record carrier body" in amended claim 13, issued claimed 5, it was found to have "ample support" in the specification as originally filed. "Therefore we will not sustain the rejection of the claims under 35 U.S.C. § 112 based on a lack of adequate written description." CX-37, Paper No. 17 at 5.
182. The standard applied by the Board in declining to sustain the Examiner's enablement rejection was whether the Examiner "had a reasonable basis for questioning the sufficiency of the disclosure." CX-37, Paper No. 17 at 6.
183. Considering the Examiner's apparent problem "with the diffractive follow-on track and

the adequacy of its disclosure,” the Board found that the Examiner had not even met his initial burden to establish a reasonable basis for questioning the adequacy of the disclosure. CX-37, Paper No. 17 at 6.

184. The Board found the disclosure enabling, including Figure 1 and the incorporation by reference of the ‘582 patent, which it described as employing “a diffractive read-out technique.” CX-37, Paper No. 17 at 7.
185. In declining to sustain the Examiner’s rejection, the Board noted that the ‘582 patent “has only one beam.” CX-37, Paper No. 17 at 7.
186. The Patent and Trademark Office considered Olson during the prosecution of the ‘209 patent, and the ‘209 patent issued over the Olson reference. CX-37, Paper No. 3 at 4.

Objective Indicia

187. The development of recordable Compact Disc technology led to the publishing of the Orange Book which describes the optical signal characteristics, physical arrangement, writing methods, and testing conditions for CD-R (Orange Book Part II) and CD-RW (Orange Book Part III) discs. CX-282C , p. 1; Mons Tr. 417-419, 429-436.
188. The Orange Book’s technical specifications for CD-R and CD-RW products promote both forward and backward compatibility, *i.e.* ensuring interoperability among existing and future discs and drives. McCarthy Tr. 2017.
189. The precursor to the Orange Book, called the Blue Book, was not successful in part because of its failure to allow for backward compatibility with existing CD players and CD-ROM drives. Mons Tr. 435-436.
190. Since Philips began licensing the technology in the patents in suit for the manufacture of

CD-R and CD-RW discs, there have been approximately 100 companies that have chosen to enter into such a license. Beune, Tr. 2341.

191. Dozens of companies are currently licensed under Philips' patents-in-suit to manufacture CD-R discs, and more than one dozen companies have licensed the patents-in-suit to manufacture CD-RW discs. CX-382; CX-383.
192. Brian Wieghaus, Philips' general manager for optical licensing in North America, testified: "On a worldwide basis, there's approximately 5 billion CD-R discs manufactured each year. In the United States, there's over 2 billion consumed each year. They're pervasive, you know, throughout our society. They're used both in the home, for people to store information off of their computer, and also businesses widely use them, again to store information from personal computers." Wieghaus Tr. 276, 290.
193. Many manufacturers of CD-Rs and CD-RWs are not licensed. Beune Tr. 2384-2385. As detailed in this Initial Determination, Respondents practice the patents-in-suit.

IV. THE '401 PATENT

A. Claim Construction

1. The term "record carrier" as used in claim 1 of the '401 patent refers to the physical disc itself. *See* Hesselink Tr. 506, 545; CX-14, 1:16-22 (an example of a record carrier).
2. The term "fixed bit frequency" as used in claim 1 of the '401 patent refers to the fact that the bits representing the recorded information occur as a set number of bits over a given period. Hesselink Tr. 545.
3. "A power spectrum with a substantially zero level at a predetermined frequency" as used in claim 1 of the '401 patent means that the digitally coded information stored on the disc

should have a region in its power spectrum where a clock signal can be located such that it does not interfere with the data that is being readout or recorded. Hesselink Tr. 547; CX-14, Fig. 4; Carasso Dep. Tr. 114-116.

4. “[S]ubstantially parallel elongated tracks each having a periodic undulation in a direction transverse thereto at said predetermined frequency” as used in claim 1 of the ‘401 patent describes regular physical modulations of the track in a direction transverse to the track at a frequency at which the power spectrum of the recorded information is substantially zero. Hesselink Tr. 547-548; CX-14 Fig. 7a-7f.
5. The periodic undulation described in claim 1 of the ‘401 patent can be in the form of a wobble in the radial direction of the track. Hesselink Tr. 548; CX-14, Fig. 7c.
6. “[S]o that during scanning of any portion of a track” as used in claim 1 of the ‘401 patent means that, because the wobble is part of the pregroove itself, it occurs throughout the track and can thus provide a clock signal at any portion of the track, that is, a continuous clock signal. Hesselink Tr. 548-549.
7. “[S]o that during scanning a beam of radiation is produced therefrom which is periodically modulated at said predetermined frequency” as used in claim 1 of the ‘401 patent means that when the regular physical undulation in the shape of the wobbled track is scanned with a beam of radiation, it produces a periodic signal in time derived from the undulation of the track. Hesselink Tr. 548-549.
8. “[S]uch modulation constituting a clock signal” as used in claim 1 of the ‘401 patent refers to the fact that the signal generated from the undulating track can be used as a clock signal to synchronize the recording of information on the disc. Hesselink Tr. 548-550.

9. “[A] radiation-sensitive layer provided on said tracks, said layer being adapted to be modified by said scanning beam so as to record said digitally coded information on said tracks” as used in claim 1 of the ‘401 patent refers to a recordable or rewritable layer which undergoes an optically detectable change if exposed to suitable radiation. Hesselink Tr. 551-552; CX-14, 5:46-50; *see generally*, CX-593C, ‘209 Patent Illustration Slide 3.
10. Claim 2 of the ‘401 patent claims “[a] record carrier according to claim 1, wherein said record carrier is disc-shaped and said tracks are substantially concentric about a center of rotation of said disc, the periodic undulation of said tracks being in the radial direction with respect to such center of rotation.” CX-14, 17:29-33.
11. Claim 2 of the ‘401 patent is dependent on claim 1 and further specifies that the record carrier is disc-shaped, the tracks are substantially concentric about a center of rotation, and the periodic undulation of the tracks is in a radial direction with respect to the center of rotation of the disc. Hesselink Tr. 564-565; CX-14, 17:29-33.
12. The periodic radial undulation of the tracks described in claim 2 of the ‘401 patent refers to a track with a radial wobble. Hesselink Tr. 565-566; CX-14, Fig. 7C.
13. Claim 3 of the ‘401 patent claims “[a] record carrier according to claim 1, wherein said record carrier is disc-shaped and said tracks are successive turns of a continuous spiral about a center of rotation of said disc, the periodic undulation of said tracks being in the radial direction with respect to such center of rotation.” CX-14, 17:34-18:3.
14. Claim 3 of the ‘401 patent is dependent on claim 1 and further specifies that the record carrier is disc-shaped, the tracks are successive turns of a continuous spiral, and the

- periodic undulation of the tracks is in a radial direction with respect to the center of rotation of the disc. Hesselink Tr. 567; CX-14, 17:34-18:3.
15. Claim 3 of the '401 patent is identical to claim 2 except for the provision in claim 3 that the tracks are successive turns of a continuous spiral. CX-14, 17:29-18:3.
 16. The term "periodic" as used in claim 1 of the '401 patent means occurring at regular intervals. Hesselink Tr. 552-559.
 17. Dr. Mansuripur testified that "[i]n physics and technology, we have to say that the period is constant, but we understand there is a range within which that period can vary." Mansuripur Tr. 1148.
 18. If the frequency of the signal reflected from the disc never changed, it could not be used to synchronize recording or control the rotational speed of the disc as described in the '401 patent. Thus, no person of ordinary skill would understand periodic to be identically repeating in this context. Hesselink Tr. 556-557, 581-582.
 19. There is no disagreement between the parties that "substantially zero" is not equal to zero. Mansuripur Tr. 1150-1151.
 20. Claim 1 of the '401 patent requires that the tracks have a transverse undulation with a frequency at which the power spectral density of the digitally coded user information written on the disc is substantially zero, not equal to zero. Hesselink Tr. 558; CX-14, 17:8-28.
 21. "Substantially zero" as used in claim 1 of the '401 patent means that the power spectral density of the digitally encoded user data must be sufficiently small at the frequency of the periodic track undulation that it is possible to obtain a usable clock signal to control

- the rotational speed of the disc and record digitally encoded data on the disc. Hesselink Tr. 559; Carasso Dep. Tr. 114-116.
22. The '401 patent does not require that the wobble frequency be placed at a point where the power spectral density of the modulation scheme for the recorded data is equal to zero; rather it needs to be located at a frequency at which the power spectral density is sufficiently small that there is no interference with the reading or writing of data. Hesselink Tr. 760-761.
23. By identifying signals of a frequency below $.2F_0$ as appropriate for the location of control signals, Figure 4 and the accompanying specification of the '401 patent demonstrate that the power spectral density of the recorded signal need not be zero at the clock frequency. Hesselink Tr. 559; CX-14, Fig. 4, 8:16-38.
24. The specification of the '401 patent explains:
- The invention is based on the recognition that in the case of digital recording it is possible to prerecord a frequency which is in synchronism with the bit frequency of the data signal to be recorded on the record carrier, which frequency can be detected, both during information reading and writing, without any significant interference with said data signal and without loss of storage capacitor, so that a correctly synchronized and reliable clock signal is always available.
- CX-14, 2:38-46.
25. The periodic undulation of the track in the '401 patent occurs at a spatial frequency which has a direct, linear relationship with the frequency of the variations in the light reflected from the track as the track passes underneath the beam of light. Hesselink Tr. 548-549.
26. In the '401 patent, the frequency of the variations in the light reflected from the periodic undulations of the track constitutes a clock signal for synchronizing recording on or

reading from the disc. Hesselink Tr. 549-551, 560-561.

27. In the '401 patent, claim 1 merely requires that a disc be configured to behave in a particular way "during scanning," but does not require that the disc be so used in order to practice the claim. Hesselink Tr. 561; CX-14, 17:8-28.
28. Dr. Hesselink testified that he can test for a wobble signal and the extraction of such a signal without the use of a recorder or player. Hesselink Tr. 2597.
29. In the prosecution of the '401 patent, the examiner cited U.S. Patent 3,941,460 ("Watson") and 4,223,347 ("Bouwhuis") as prior art patents having tracks with periodic undulations. CX-38, Paper No. 5 at 4; Hesselink Tr. 555-556.
30. In both Watson and Bouwhuis, the undulation of the track "change[d] as a function of the radius on the center of the disc" and thus did not repeat identically. Hesselink Tr. 555-556; RX-98; RX-122.

B. Infringement Determination

31. Data recorded on CD-R and CD-RW discs is encoded via EFM modulation. Hesselink Tr. 615-616.
32. EFM stands for "Eight to Fourteen Modulation" and is a way of encoding digital data such that eight bits are turned into 14 bits when they are recorded on a disc. Hesselink Tr. 616; CX-15, 2:21-26.
33. Data is recorded on CD-R and CD-RW discs at a fixed bit frequency of 4.3218 MHz. Hesselink Tr. 560; CX-163C, p. I-4, ¶ 1.4.1; CX-162C, p. I-4, ¶ 1.4.1.

34. The power spectral density of data recorded in EFM (“Eight-to-Fourteen Modulation”) format is substantially zero below 200 kHz. Hesselink Tr. 562; CX-73C; CX-593C, ‘401 Illustration Slides 21-22.
35. With EFM, the information signal lies in the range of 200 to 700 kHz and thus is not interfered with by signals around 22 kHz. Hesselink Tr. 562; CX-593C, ‘401 Illustration Slides 21-23.
36. The CD-R discs manufactured by Princo have a periodic undulation (or “wobble”) in the radial direction. Hesselink Tr. 562-567; CX-64C, p. 8; *see generally* CX-593C, ‘401 Illustration Slide 24.
37. The CD-RW discs manufactured by Princo have a periodic undulation (or “wobble”) in the radial direction. Hesselink Tr. 562-567; CX-63C, p. 8; *see generally* CX-593C, ‘401 Illustration Slide 24.
38. The CD-Rs manufactured by Gigastorage have a periodic undulation (or “wobble”) in the radial direction. Hesselink Tr. 562-567; CX-62C, p. 8; *see generally* CX-593C, ‘401 Illustration Slide 24.
39. The CD-RWs manufactured by Gigastorage have a periodic undulation (or “wobble”) in the radial direction. Hesselink Tr. 562-567; CX-61C, p. 8; *see generally* CX-593C, ‘401 Illustration Slide 24.
40. The wobble frequency, and thus the clock frequency, of the CD-R discs manufactured by Princo is 22.05 +/- 1 kHz. Hesselink Tr. 562; CX-64C, p. 6, 12.
41. The wobble frequency, and thus the clock frequency, of the CD-RW discs manufactured by Princo is 22.05 +/- 1 kHz. Hesselink Tr. 562; CX-63C, p. 6, 12.

42. The wobble frequency, and thus the clock frequency, of the CD-R discs manufactured by Gigastorage is 22.05 +/- 1 kHz. Hesselink Tr. 562; CX-62C, p. 6, 12.
43. The wobble frequency, and thus the clock frequency, of the CD-RW discs manufactured by Gigastorage is 22.05 +/- 1 kHz. Hesselink Tr. 562; CX-61C, p. 6, 12.
44. The wobble signal coming from the CD-Rs and CD-RWs discs manufactured by Princo and Gigastorage tested at Dr. Mansuripur's request showed an average frequency of approximately 88 kHz because the discs were tested at four times ("4x") normal speed. Mansuripur Tr. 1154.
45. If the Princo and Gigastorage CD-R and CD-RW discs, which Dr. Mansuripur had tested, had been tested at standard (1x) speed, the average wobble frequency would have been 22.05 kHz. Mansuripur Tr. 1154-1156.
46. The specification of the '401 patent discloses use of a phase-locked loop for recovering a clock signal from the wobble signal. Mansuripur Tr. 1274; CX-14, 10:44-55, Fig. 6B.
47. A phase-locked loop will produce from the Princo and Gigastorage CD-R and CD-RW discs tested by Dr. Mansuripur a clock signal with a frequency of 22.05 kilohertz plus/minus 50 hertz, in that range. Mansuripur Tr. 1279.
48. With respect to the '401 patent, Dr. Mansuripur defines a clock signal having a range of plus/minus 50 hertz as a periodic clock signal. Mansuripur Tr. 1147-1148.
49. The signals derived from the wobble of the CD-Rs and CD-RWs manufactured by Princo and Gigastorage constitute a clock signal. Hesselink Tr. 563-564.
50. The frequency of the clock signal in the CD-R discs manufactured by Princo varies as the speed of the disc varies, thus the frequency of the clock signal can be used to maintain a

constant linear velocity and synchronize recording or reading of data on the discs.

Hesselink Tr. 563-564; -64C, p. 13; *see generally*, CX-593C, '401 Illustration Slide 25.

51. The frequency of the clock signal in the CD-RW discs manufactured by Princo varies as the speed of the disc varies, thus the frequency of the clock signal can be used to maintain a constant linear velocity and synchronize recording or reading of data on the discs.

Hesselink Tr. 563-564; CX-63C, p. 13; *see generally*, CX-593C, '401 Illustration Slide 25.

52. The frequency of the clock signal in the CD-R discs manufactured by Gigastorage varies as the speed of the disc varies, thus the frequency of the clock signal can be used to maintain a constant linear velocity and synchronize recording of data on the discs.

Hesselink Tr. 563-564; CX-62C, p. 13; *see generally*, CX-593C, '401 Illustration Slide 25.

53. The frequency of the clock signal in the CD-RW discs manufactured by Gigastorage varies as the speed of the disc varies, thus the frequency of the clock signal can be used to maintain a constant linear velocity and synchronize recording of data on the discs.

Hesselink Tr. 563-564; CX-61C, p. 13; *see generally*, CX-593C, '401 Illustration Slide 25.

54. Principles of Digital Audio states that, in a CD-R, “[t]he wobble allows the recorder to control disc CLV (constant linear velocity) rotation speed (a task accomplished with Red Book discs from the prerecorded data.)” CX-586, p. 282.

55. Dr. Mansuripur testified that the frequency-modulated wobble coming off the Princo and Gigastorage CD-R and CD-RW discs that Dr. Mansuripur had tested “can go into

- electronic circuitry and give rise to two other signals.” Mansuripur Tr. 1157.
56. The wobble signal is usually given to a filter and then to a phase locked loop to derive a more or less constant frequency for velocity control. Mansuripur Tr. 1297.
 57. The specification of the ‘401 patent provides for “a band pass filter for filtering a signal of a frequency determined by the period of the periodic track modulation out of the detected radiation” and used as a clock signal. CX-14, 3:57-64; *see also, e.g.*, CX-14, 4:9-18, 10:39-56.
 58. It is the average frequency of the wobble signal that is used for controlling the velocity of the spinning disk. Mansuripur Tr. 1297-1298.
 59. The encoder used by Gigastorage and Princo to create the stampers that they use to manufacture CD-Rs and CD-RWs “generates Wobble signals that carry ATIP information specified in the CD Blue Book and Orange Book.” CX-596, p. GT 004681; Sun Dep. Tr. 134, 137, 140.
 60. The encoder used by Gigastorage and Princo to create the stampers that they use to manufacture CD-Rs and CD-RWs generate a “wobble signal” of “22.05 kHz +/- 1 kHz by FM modulation.” CX-596, p. GOT 004681; Sun Dep. Tr. 131-133, 134-137.
 61. Princo Taiwan admitted in its second supplemental response to Philips’ interrogatories that the CD-Rs and CD-RWs that it manufactures “have a track that has a wobble.” CX-108C, p. 4.
 62. Princo Taiwan admitted in its second supplemental response to Philips’ interrogatories that, in the CD-Rs and CD-RWs that it manufactures, it is possible that “the wobble may be used to reproduce a clock signal at a predetermined frequency when scanned by a

beam of radiation.” CX-108C, p. 4.

63. Princo Taiwan admitted in its second supplemental response to Philips’ interrogatories that, in the CD-Rs and CD-RWs that it manufactures, it is possible that “if the wobble is used to reproduce a clock signal, the frequency of the clock signal may be varied by varying the velocity of the discs.” CX-108C, p. 4.
64. Gigastorage Taiwan admitted in its second supplemental response to Philips’ interrogatories that the CD-Rs and CD-RWs that it manufactures “have a track that has a wobble.” CX-107C, p. 5.
65. Gigastorage Taiwan admitted in its second supplemental response to Philips’ interrogatories that, in the CD-Rs and CD-RWs that it manufactures, it is possible that “the wobble may be used to reproduce a clock signal at a predetermined frequency when scanned by a beam of radiation.” CX-107C, p. 5.
66. Gigastorage Taiwan admitted in its second supplemental response to Philips’ interrogatories that, in the CD-Rs and CD-RWs that it manufactures, it is possible that “if the wobble is used to reproduce a clock signal, the frequency of the clock signal may be varied by varying the velocity of the discs.” CX-107C, pp. 5-6.
67. W.L. Sun testified that the frequency of the light reflected from the wobble in Princo’s CD-Rs is between 21.05 and 23.05 kHz. Sun Dep. Tr. 130-131.
68. The CD-R and CD-RW discs that Princo Taiwan manufactures “comply with the relevant Orange Book standards.” CX-106C, p. 4. The CD-R and CD-RW discs that Gigastorage Taiwan manufactures “comply with the relevant Orange Book standards.” CX-98C, p. 4.

69. As set forth in the Orange Book (Part II), a CD-R has a pre-groove which is the “guidance track in which clocking and time code information is stored by means of an FM modulated wobble.” CX-163C, p. I-4.
70. As set forth in the Orange Book (Part II), “the CD-R disc contains a spiral shaped groove in the sensitive layer. This groove is not a perfect spiral, but is wobbled in order to obtain motor control and timing information.” CX-163C, p. Att-3.
71. As set forth in the Orange Book (Part II), “[b]y means of the groove wobble frequency (the carrier frequency), the CD-R disc contains motor control information.” CX-163C, p. IV-1, ¶ IV.
72. As set forth in the Orange Book (Part II), the Nominal CD Speed is defined as the “CLV that will result in an average EFM bitclock frequency of 4.3218 MHz or in an average pre-groove wobble frequency of 22.05 kHz.” CX-163C, p. I-4, ¶ 1.4.1.
73. As set forth in the Orange Book (Part II), CD-Rs utilize EFM modulation. CX-163C, p.VI..X-1, ¶VI.
74. As set forth in the Orange Book (Part III), a CD-RW has a pre-groove which is the “guidance track in which clocking and time code information is stored by means of an FM modulated wobble.” CX-162C, p. I-5.
75. As set forth in the Orange Book (Part III), “the CD-RW disc contains a spiral shaped groove. This groove is not a perfect spiral, but is wobbled in order to produce motor control and timing information.” CX-162C, p. Att-3, ¶ C1.1.
76. As set forth in the Orange Book (Part III), “[b]y means of the groove wobble frequency (the carrier frequency), the CD-RW disc contains motor control information.” CX-162C,

p. IV-1, ¶ IV.

77. As set forth in the Orange Book (Part III), the Nominal CD Speed is defined as the “CLV that will result in an average EFM bitclock frequency of 4.3218 MHz or in an average pre-groove wobble frequency of 22.05 kHz.” CX-162C, p. I-4, ¶ 1.4.1.
78. As set forth in the Orange Book (Part III), CD-RWs utilize EFM modulation. CX-162C, p.VI - X-1, ¶VI.

C. Validity

Nonobviousness

79. It was well-known in the prior art to have an intermittent clock signal by writing data in the track, often in the form of headers, at certain locations. Hesselink Tr. 2557; CX-14, 1:50-55.
80. The predominant prior art method of controlling the rotational speed and synchronizing recording on a recordable disc used pits pre-recorded on the disc from which a clock signal could be derived. Hesselink Tr. 541-542; CX-14, 1:15–2:18; Carasso Dep. Tr. 42-43.
81. The prior art method of using pre-recorded pits to provide a clock signal provided an intermittent signal that was less accurate because it provided motor control information only at certain locations on the disc. Hesselink Tr. 541-544; CX-14, 1:15–2:18; Carasso Dep. Tr. 99-100.
82. The prior art method of using pre-recorded pits to provide a clock signal caused difficulties in recording data on the disc using data encoding schemes like EFM that require continuously recorded signals, since the pre-recorded pits necessarily interrupt

- such signals. Hesselink Tr. 541-54; CX-14, 1:15-2:18.
83. Although an intermittent signal can be used in combination with a phase-locked loop to get a clock signal, that solution is still unreliable, is complicated to implement and does not allow all of the information area to be utilized up to the end because of the need to reserve space to account for inaccuracies in the clock signal. Hesselink Tr. 2557-2558; CX-14, 1:66-2:14; CX-619C, '401 Slides 3, 5.
84. The '401 patent specifically refers to prior solutions that used intermittent clock signals and the problems associated with them and states that "[i]t is the object of the invention to provide a record carrier. . . which does not present the above problems." CX-14, 2:20-23.
85. Using a track wobble to generate a clock signal is an elegant solution because the clock is continuously available on every portion of the disc, and it does not interfere with the data recorded on the disc. Hesselink Tr. 2558; CX-619C, '401 Slides 4-5.
86. U.S. Patent 4,363,116 ("Kleuters") relied on by Respondents as prior art to the '401 patent, describes "an intermittent clock. The intermittent clock consists of a synchronization portion, an address portion, and a data portion where you can write information." Hesselink Tr. 2559; RX-65, Figs. 1 and 3, 8:5-9; CX-619C, '401 Slide 6.
87. Kleuters describes the principal embodiment with reference to its Figs. 1-3 as having a spiral track which is divided into sectors, each sector having a sector address, including a synchronizing portion followed by an address portion, and a continuous track portion in which data is written. RX-65, 7:33-47 and 8:3-16.
88. In Kleuters, the "intermittent clock is simply not a continuous clock. . . You might have

maybe 128 different clock locations around the circumference; whereas in the case of a continuous track you have a signal everywhere.” Hesselink Tr. 2559.

89. In Kleuters, the data needed for synchronization is recorded in the form of pits and lands in the data track and thereby takes up space in the track because no other information can be recorded there. Hesselink Tr. 2559; CX-619C, ‘401 Slides 3 and 6.
90. Kleuters further provides that in situations in which the distance between sector addresses is too large, additional synchronization information may need to be pre-recorded in the track to provide for correction of the clock signal. RX-65, 10:5-25, Figs. 6a, 6b; Hesselink Tr. 2560; CX-619C, ‘401 Slide 7.
91. The patent application that led to the Kleuters patent is specifically cited in the “Description of the Related Art” in the ‘401 patent in which the problems associated with the clocking methods used in the prior art are enumerated. CX-14, 1:49-50; RX-65, cover page.
92. The ‘401 patent also describes the purported solution described in the Kleuters reference of supplying additional synchronization areas in the information areas, but states that, while this solution may mitigate the described disadvantages, it does not eliminate them and, further, not every information area is fully utilized, thus reducing the storage capacity of the disc. CX-14, 2:8-15.
93. Kleuters describes the possibility of using a wobbled track for tracking purposes. RX-65, 9:26-63; Hesselink Tr. 2560-2561; CX-619C, ‘401 Slide 8.
94. Kleuters teaches away from using a wobbled track to generate a clock signal because it discloses a wobbled track but still relies on headers and synchronization areas to generate

- an intermittent clock signal. Hesselink Tr. 2561; RX-65, 9:26-63.
95. The article “Ten Billion Bits on a Disk” (“Bulthuis”), relied upon by Respondents as prior art to the ‘401 patent, “only discloses a method for storing synchronization information as a modulated relief pattern prerecorded in the headers” In this respect, Bulthuis is similar to Kleuters. Hesselink Tr. 2562; CX-589; CX-619C, ‘401 Slides 9-10.
 96. Kleuters was one of the named authors of “Ten Billion Bits on a Disc.” CX-589, p. 2.
 97. The tracks described in Bulthuis are straight. Hesselink Tr. 2563; CX-619C, ‘401 Slides 9-10; CX-589, Figs. 2, 3.
 98. In the electron microscope image shown in Bulthuis, the slight variations in the track in the header region do not indicate a wobble, but rather are the slightly rounded off edge indicating the presence of the header structure which has been pre-recorded into the track. Hesselink Tr. 2564; CX-589, Figs. 2-4; CX-619C, ‘401 Slides 10-11.
 99. If the electron microscope images in Bulthuis did indicate the presence of a wobble, it would be on the order of fifty times longer than the diameter of the pit, and therefore not visible in the images included in the article. Hesselink Tr. 2564.
 100. In Bulthuis, “[t]here is no indication that there should be anything but straight tracks. Hesselink Tr. 2565.
 101. Figure 4 in Bulthuis shows a header structure followed by straight tracks. CX-589, Fig. 4.
 102. Marino Carasso is one of the two inventors of the ‘401 patent and co-authored the article entitled “Ten Billion Bits on a Disk” relied on by Respondents and which was published in the IEEE Spectrum in 1979. CX-589; Carasso Dep. Tr. 33; CX-14, cover page.

103. Mr. Carasso worked on format of the recordable optical disc demonstrated by Philips in 1978 and described in Bulthuis. Carasso Dep. Tr. 30-31.
104. Mr. Carasso testified that the disc demonstrated in 1978 and described in Bulthuis had “an empty groove, spiral groove with headers ... [t]he headers were the – was digital information which was bit to bit, like digital information on compact disc, for example and the header contained information amongst others for synchronizing clock, the phase locked loop of the clock.” Carasso Dep. Tr. 33, 42-43.
105. The recordable optical disc demonstrated by Philips in 1978 and described in Bulthuis did not have a wobbled track. Carasso Dep. Tr. 145-146, 155-156.
106. Bulthuis adds nothing to the teaching of Kleuters and in fact discloses less information than Kleuters. Hesselink Tr. 2565; CX-619C, ‘401 Slide 12.
107. Both Bulthuis and Kleuters disclose a track of which one portion contains address and synchronization areas in the form of pits prerecorded in the track. Mansuripur Tr. 1299-1301.
108. Kleuters discloses the address and synchronization information disclosed by Bulthuis, as well as additional information, including use of a wobbled track for performing radial tracking only. Mansuripur Tr. 1301-1302.
109. Kleuters is directed to providing a clock, but does not put the clock into the wobbled track; instead, Kleuters discloses and claims placing the clock in synchronization areas and other areas interspersed among the user data on the data track. Mansuripur Tr. 1303-1304.
110. Both Bulthuis and Kleuters disclose header structures which have a synchronization area

- and an address area interspersed among the user data on the data track and in which no data can be recorded. Hesselink Tr. 2565; CX-619C, '401 Slide 12; CX-589; RX-65; Mansuripur Tr. 1286.
111. Unlike Kleuters, Bulthuis does not describe the use of a wobble for any purpose. Hesselink Tr. 2565; RX-65, 9:26-63; CX-589.
112. Both Bulthuis and Kleuters disclose an intermittent clock, which was identified in the '401 patent as an unsatisfactory means of generating a clock signal and created problems which the '401 patent sought to avoid. Hesselink Tr. 2565; CX-14, 2:20-23; CX-619C, '401 Slide 12.
113. None of the prior art relied on by Respondents teaches the use of a wobbled track to provide clocking information during recording so that user information can be recorded without interruption by such information. CX-169C; RX-65; CX-589.
114. Dr. Hesselink testified that "I found absolutely no way of thinking of any hint that you could use [Kleuters and Bulthuis] to then do something completely different in order to generate the claims of the '401." Hesselink Tr. 2599.
115. The asserted claims of the '401 patent would not have been obvious to one of ordinary skill in the art in light of Kleuters and Bulthuis. Hesselink Tr. 2599.
116. Yonezawa has no pre-groove for guiding the write-beam; rather, as the data is being written on a blank disc, the data itself is laid down in a wobbled pattern, resulting in a wobbled data track. RX-73, 5:47-68.
117. Yonezawa does not disclose a pre-groove or track onto which information is recorded or that can be used during recording. RX-73.

118. Yonezawa does not teach use of a wobbled track to provide a clock signal. Rather, during playback of the recorded data, the data track is used for radial tracking purposes but not to generate a clock signal. RX-73, 7:35-40.
119. Yokozawa does not disclose a pre-groove or track onto which information is recorded or that can be used during recording of information. RX-71.
120. In Yokozawa, the “wobbling signals ... serve to rock the information track in a direction orthogonal to the lengthwise direction during the recoding of the information.” RX-71, 5:61-65.
121. The wobble recorded into the data track in Yokozawa is used during reading for radial tracking only, not for producing a clock signal. RX-71, 3:28-41.
122. Kleuters corresponds to priority application 7802859 filed in The Netherlands on March 16, 1978. RX-65, cover page.)
123. The laid open application corresponding to Kleuters Netherlands application is cited as related art in the ‘401 patent specification. CX-14, 1:44-50.
124. The Kleuters UK patent application (2 016 744 A), which also corresponds to the Kleuters Netherlands priority application, was cited in the prosecution of the ‘401 patent and discussed extensively by the Examiner and the applicant. CX-8, Paper Nos. 17, 18 , 25, 26 and 27; CX-8, Paper Nos. 32-35; CX-38, Paper Nos. 5-8.
125. In an Office Action dated August 29, 1989, the Examiner rejected claims 39-44 as obvious over U.S. Patent No. 4,363,116 (“Kleuters”), U.S. Patent No. 4,238,843 (“Carasso-843”) and U.S. Patent No. 4,392, 219 (“Yokozawa”). CX-38, Paper No. 5 at 3-4.

126. In the same August 29, 1989, Office Action, the Examiner relied upon Yokozawa as “teaching . . . a wobbling optical information track, i.e. with “periodic undulations’.” CX-38, Paper No. 5 at 4.
127. In the August 29, 1989 Office Action, the Examiner concluded that “[i]t would have been obvious to one of ordinary skill in the art to further modify Kleuters . . . and utilize a wobbling optical information track, i.e., with ‘periodic undulations.’” Further finding the “obvious benefit” of such a combination to be “more precise tracking . . . as is taught by Yokozawa.” CX-38, Paper No. 5 at 4.
128. Unlike Bulthuis, Yokozawa employs a wobble, which it uses for radial tracking. *Compare* RX-71, 2:13-29 *with* CX-589C, Fig. 4.
129. In response to the August 29, 1989 Office Action Philips distinguished over Kleuters, on the ground that the clock signal of Kleuters was included “with address information provided in portions of the track which are reserved solely for that purpose and in which no other information is to be recorded.” CX-38, Paper No. 6 at 4.
130. All three of the references cited in the Office Action dated August 29, 1989 derived “the clock signal from portions of the track reserved for that purpose and on which no other information is recorded,” so that there is no suggestion in Kleuters, Yokozawa or Carasso-843 “whereby a synchronizing clock signal and the information to be synchronized thereby are both at the same position on a recording track.” CX-38, Paper No. 6 at 5.
131. Philips further pointed out in its response to the August 29, 1989 Office Action that two other references not applied by the Examiner, U.S. Patent No. 3,931,460 (“Watson”) and

U.S. Patent No. 4,223,347 (“Bouwhuis”), disclosed “optical information tracks having periodic undulations,” but that “neither suggests employing such undulations to record a synchronizing clock signal for the information to be recorded or reproduced.” CX-38, Paper No. 6 at 5.

132. In December 1989 the Examiner again rejected the claims over Kleuters and Carasso-383, noting that “one of ordinary skill in the art would employ the clock included in the data signal during reproduction rather than resorting to an additional clock.” CX-38, Paper No. 7 at 1.
133. In responding to the December 20, 1989 Office Action, Philips again pointed out that, in Kleuters, the clock was provided by areas of the track in which “no information is recorded,” so that “these areas reduce the information capacity.” CX-38, Paper No. 8 at 2-3.
134. In responding to the December 20, 1989 Office Action, Philips pointed out that the combination of Kleuters and Carasso ‘843 “does not lead to the use of a track modulation for the clock generation in the areas intended for recording.” CX-38, Paper no. 8 at 3.
135. The ‘401 patent issued over Kleuters and other cited art that disclosed use of a track wobble for tracking. CX-38, Paper No. 10 at 1.

Best Mode

136. Marino Carasso is one of the two inventors of U.S. Patent No. 4,972,401. CX-14, cover page.
137. Mr. Carasso testified that there is no one best mode of practicing the invention disclosed in the ‘401 patent, rather “what is an optimum there is depending on the modulation

scheme. It is depending on a lot of other factors, but there is -- so there is not one optimum” Carasso Dep. Tr. 146.

138. The specification of the ‘401 patent does not suggest that there is any one optimal frequency at which to place the clock signal, instead it describes at length “how one can use the information about the” particular data “encoding technique to determine where to place . . . the wobble frequency such that it doesn’t interfere with the data reading. . . .” Hesselink Tr. 760; CX-14, 7:42-9:8.

139. During his deposition, Mr. Carasso was questioned about clock frequency. Mr. Carasso testified in part:

Q. 1.1 fo to what?

A. 1.1 fo to 1.3 in those experiments at that time.

Q. You thought that was at that time when you did those experiments the best way – the best range to place it?

MS PFEIFFER: Objection to form.

A. No, but we said – we said that that was a range where we were successful in making the system with the electronics and with the know-how and especially electronics and know-how and phase locked loops at that moment.

Carasso Dep. (JX-1C) Tr. 146-147.

140. Mr. Carasso did not testify that $1.1f_0$ to $1.3f_0$ was the best mode that he knew of at the time of the invention, rather he testified that “[$1.1f_0$ to $1.3f_0$] was a range where we were successful in making the system with the electronics and with the know-how and especially electronics and know-how and phase-locked loops at that moment.” Carasso Dep. Tr. 146-47.

141. Mr. Carasso did not testify that, at the time of the invention, he knew of any better way of practicing the invention disclosed in the '401 patent than was described in the patent.

Carasso Dep. Tr. 1-164.

142. When asked how the system that he reduced to practice was configured, Mr. Carasso testified that “[t]hat system was configured with all kinds of frequencies, because we had test discs. It was not the product proposal at that moment. We tested it at different frequencies” Carasso Dep. Tr. 145.

V. THE '856 PATENT

A. Claim Construction

1. An “optical disc record carrier having a radiation-sensitive surface for recording information in a pattern of spiral or concentric tracks thereon” as used in claim 1 of the '856 patent refers to a disc which has a track in it in the form of a continuous spiral which is concentric with the center of the disc. Hesselink Tr. 569.
2. “Which information may be recorded or read by scanning such tracks with a radiation beam which produces radiation therefrom” as used in claim 1 of the '856 patent means that when scanned with a spot of radiation, light is returned from the tracks that can be used for the purpose outlined in this claim. Hesselink Tr. 569.
3. “[E]ach of said tracks has a periodic modulation of its position in a direction transverse thereto” as used in Claim 1 of the '856 patent means that the tracks have a modulation in a direction perpendicular to the direction of the track, which occurs at regular intervals. Hesselink Tr. 569-570, 579; CX-593C, '856 Illustration Slides 2-3.
4. The term “periodic” as used in Claim 1 of the '856 patent means occurring at regular

intervals. Hesselink Tr. 578-579.

5. Claim 1 of the '856 patent states that the "periodic clock signal" is then "modulated with a digital position signal" but does not state that this additional modulation must be periodic. CX-15; 6:68-7:6.
6. The phrase "without occupying any portion of the track" in Claim 1 of the '856 patent refers to the entire track and indicates that no portion of the track is occupied by the periodic transverse modulation. Hesselink Tr. 577-578; CX-593C, '856 Patent Illustration Slides 12-14.
7. Limiting the phrase "without occupying any portion of the track" to portions of the track "designated" for recording user information ignores the distinction, which is described in the '856 patent, between the '856 and previously known addressing methods in which synchronization areas were pre-recorded in the track and constantly interrupted the stream of recorded data. Hesselink Tr. 577-578; CX-15, 1:57-2:25; CX-593C, '856 Patent Illustration Slides 12-14.
8. In order to record EFM-encoded information on a disc, the information recording area must be uninterrupted. Hesselink Tr. 577-578; CX-15, 2:15-25.
9. Pre-recording address information in the track itself does not allow for the recording of EFM data since EFM data depends on a continuous, uninterrupted, stream of data. Hesselink Tr. 577-578; CX-15, 2:14-25.
10. An object of the addressing method described in the '856 patent is to enable the recording of EFM-encoded data on an optical disc, to determine which part of the disc is being scanned by the light beam. CX-15, 2:28-33.

11. “[T]hat each of said tracks has a periodic modulation. . . which. . . generates a periodic clock signal in the radiation therefrom having a substantially constant frequency corresponding to the velocity of scanning of said tracks, the frequency of said clock signal only varying in accordance with variations in said scanning velocity” as used in Claim 1 of the ‘856 patent means that the clock signal that is derived from the radiation that impinges on the track produces a signal that has a substantially constant frequency which corresponds to how fast the track moves with respect to the optical stylus. Hesselink Tr. 571; CX-15, 6:65-7:3.
12. Claim 1 of the ‘856 patent specifically states that the periodic clock signal has only a “substantially constant” frequency. Hesselink Tr. 578-579; CX-15, 7:1-2.
13. “[I]n that the frequency of said clock signal is modulated in accordance with a digital position signal which identifies the relative positions of said tracks on said record carrier” as used in Claim 1 of the ‘856 patent means that the clock signal is frequency modulated to identify the relative locations on the track. Hesselink Tr. 571-572; CX-15, 7:5-8; CX-593C, ‘856 Illustration Slides 5-7.
14. The periodic track modulation of Claim 1 of the ‘856 patent which serves as a clock signal acts as a carrier frequency onto which digital position information is frequency modulated. Hesselink Tr. 572-573.
15. Figure 1 of the ‘856 patent demonstrates that position information is encoded into the wobble via frequency modulation. Hesselink Tr. 572; CX-15, Fig. 1; CX-593C, ‘856 Patent Illustration Slide 4.
16. The ‘856 specification describes use of a “frequency modulator” for modulating the

wobble with a position-information signal. CX-15, 3:65-4:1.

17. The '856 specification describes a disc in which there is spiral groove with a position-information signal as having "a radial frequency-modulated undulation (wobble)." CX-15, 4:39-47; *see also, e.g.*, CX-15, 3:65-4:1, 4:9-14, 4:59-65, 5:53.
18. As described in the '856 specification, the focused laser shines on the track, is modulated by the wobble on the disc and reflected back up to the detector where it is filtered to remove the user data, leaving the wobble signal "which consists of a clock signal and a position information [signal], both of them modulated into the wobble signal."
Mansuripur Tr. 1178.
19. The '856 specification describes the use of a demodulator which extracts address information from the wobble signal. Mansuripur Tr. 1157; CX-15, Fig. 5.
20. The '856 specification discloses recovering the position-information signal "by means of an FM demodulation circuit," indicating that modulation is used in modulating the wobble with the position-information signal. CX-15, 5:62-64; 6:31-35.
21. "The mean value of the instantaneous frequency" of the wobble is employed as the measurement signal for controlling the scanning velocity of the disc. CX-15, 5:20-30.
22. The '856 specification provides that:

If the frequency band used for scanning-velocity control and the frequency spectrum of the position-information signal are adapted to one another in such a way that hardly any frequency components of this frequency spectrum are situated within the velocity control frequency band, the applied FM modulation of the low frequency radial wobble will not affect the controlled scanning velocity.

CX-15, 5:48-55; *see also* CX-15, 6:51-58.

23. In Claim 1 of the '856 patent, although the frequency of the periodic track modulation that generates a clock signal is frequency-modulated in accordance with a digital position signal, the average frequency of the clock signal remains unchanged. Hesselink Tr. 572-573.
24. Claim 3 of the '856 patent claims “[a] record carrier as claimed in either of claims 1 and 2, wherein the digital position signal which is generated at any position in said track pattern indicates the time from the beginning of said track pattern to such track position when scanning is effected at a velocity corresponding to the frequency of said clock signal.” CX-15, 7:17-22.
25. Claim 3 of the '856 patent is dependent on Claim 1 and further provides that the digital position signal at any portion of the track indicates the time required to scan from the beginning of the track to that portion when the track is scanned at a velocity which results in the corresponding clock signal frequency. Hesselink Tr. 576, CX-15, 7:17-22; CX-593C, '856 Illustration Slide 7.
26. Claim 4 of the '856 patent claims “[a] record carrier as claimed in either of claims 1 and 2, wherein said track modulation is in the form of a periodic wobble in the radial displacement of each of said tracks, the frequency of such wobble being modulated by said digital position signal.” CX-15, 7:23-27.
27. Claim 4 of the '856 patent is dependent on Claim 1 and further provides that the track modulation is in the form of a periodic wobble with the frequency of the wobble being modulated with a digital position signal via FM modulation. Hesselink Tr. 576-577; CX-593C, '856 Illustration Slide 8.

28. The specification of the '856 patent discloses the use of FM modulation to encode a digital position signal. Hesselink Tr. 2571-2574; CX-15, 4:39-5:3.
29. An FM modulated signal does not repeat identically, but it is understood by one of ordinary skill in the art to constitute a periodic signal. Hesselink Tr. 579, 2574.
30. The specification of the '856 patent describes the use of a clock signal that is FM modulated in accordance with a digital position information signal which, though occurring at regular intervals, does not repeat identically. Hesselink Tr. 579-581; CX-15, 4:39-47.
31. Frequency modulation of a carrier signal is a specific process that is well-known in the art and is not equivalent to a mere change in frequency. Hesselink Tr. 571-573, 583.
32. Hans Kablau testified that "the wobble, even if modulated by FM modulation, still is a periodic signal." Kablau Dep. Tr. 205.
33. Frequency modulation is defined as "[m]odulation, in which the instantaneous frequency of the modulated wave differs from the carrier frequency by an amount proportional to the instantaneous value of the modulating wave." Hesselink Tr. 579-580, 2566; CX-593C, '856 Illustration Slides 15-16; CX-619C, '856 Slide 3.
34. A carrier can be frequency modulated with a digital signal by changing the frequency of the carrier such that one frequency represents the logical value "1" and another frequency represents the logical value "0;" this method is known as continuous phase frequency shift keying. Hesselink Tr. 2567; CX-619C, '856 Slide 3.
35. Continuous phase frequency shift keying is also frequency modulation and has long been well known in the art. Hesselink Tr. 2567; '856 Slide 3.

36. Frequency shift keying is a form of frequency modulation. Mansuripur Tr. 1344.
37. Dr. Hesselink testified that the beauty of the '856 patent approach is that by using a biphasic modulating signal, there is always an equal number of 1s and 0s in this code, so that the average value of the frequency modulated signal, the mean frequency, will always be equal to the carrier signal, and that is exactly what is needed for velocity control.
Hesselink Tr. 2567.
38. Due to the '856 patent's simultaneous use of biphasic encoding and frequency modulation, the mean frequency of the FM modulated signal, regardless of where you are on the track, is always 22.05 kHz, because there is always an equal number of 0s and 1s in that digital signal address. Hesselink Tr 2567-2568; '856 Slide 5.
39. The use of biphasic encoding and frequency modulation means that "when you scan at the nominal velocity you're going to get the center frequency," and of 22.05 kHz and the "instantaneous frequency contains only two values." Hesselink Tr. 2568; '856 Slide 5.
40. A periodic signal, which occurs at regular intervals, will have a distribution around the carrier frequency that corresponds to the deviation of that signal from a perfect sine wave.
Hesselink Tr. 2567-2568; CX-619C, '856 Slide 4.
41. There is a "little bit of slop", if you will, that is allowed around the center frequency that is an indication of how close this is to a pure sine wave. Hesselink Tr. 2567-2568.
42. In CD-R and CD-RW discs, "the average frequency of the FM modulated signal, regardless of where you are on the track, is always 22.05 kilohertz" when scanned at the nominal velocity. Hesselink Tr. 2568; CX-619C, '856 Slide 5.
43. There are only two distinct instantaneous frequencies at which the track is modulated in

- CD-R and CD-RW discs, 21.05 kHz and 23.05 kHz. There are no frequencies that occur in between. Hesselink Tr. 2568-2569; CX-619C, '856 Slide 5.
44. In a CD-R or CD-RW disc, the instantaneous frequency of the wobble is 21 kHz for three or six cycles and then for three or six cycles more it is 23 kHz. Hesselink Tr. 2579.
 45. Therefore, in a CD-R or CD-RW disc, the wobble does repeat identically for a certain number of periods even though frequency modulated in accordance with a digital position signal. Hesselink Tr. 2579.
 46. Dr. Mansuripur uses the same definition of periodic in interpreting the claims of the '856 patent as he used in interpreting the claims of the '401 patent. *Compare* Mansuripur Tr. 1146-1149 with Mansuripur Tr. 1179-1181.
 47. The specification of the '856 patent does not require that the radial wobble repeat identically or have a constant frequency, but it describes an acceptable frequency variation of +/- 1.5 kHz around the radial wobble frequency of 22.05 kHz. Hesselink Tr. 580-581; CX-15, 4:65-5:3.
 48. If the frequency of the wobble never changed, it would be impossible to encode in that frequency the sort of position information described in the '856 patent. Hesselink Tr. 581.
 49. As described in the '856 specification, it is the "mean value" of the instantaneous frequency that is used as a clock signal for controlling the scanning velocity of the disc. CX-15, 5:28-48.
 50. The specification of the '856 patent describes using the average frequency of the clock signal coming from the disc, which it states is approximately 22 kHz, comparing it to a

- reference frequency, and taking the difference between the two in order to control the motor that is rotating the disc. CX-15, 4:65-5:3, 5:25-38; Hesselink Tr. 2569-2570; CX-619C, '856 Slide 6.
51. In CD-R and CD-RW discs, the frequency of the track undulation, which constitutes the clock signal, has an instantaneous frequency of either 21.05 kHz or 23.05 kHz. Hesselink Tr. 573; *see generally*, CX-593C, '856 Patent Illustration Slides 5-7.
 52. Philips and Respondents agree that the term "periodic" allows for variations so long as the variations are consistent with the acceptable tolerances of the application. Hesselink Tr. 2572-2573.
 53. Using Respondents' proposed requirement that the periodic signal be limited to a bandwidth of +/- 50 Hz, it would be impossible to encode information or use the signal for velocity control. Hesselink Tr. 2572.
 54. Dr. Mansuripur testified that "[i]f you want to use the signal, for example, the address signal into that clock, then you have to modulate it outside the bandwidth of plus/minus 50 hertz. If you do modulate it into the bandwidth of plus/minus 50 hertz, what happens is that it will become mixed up with the noise and vibrations and other variations. So it's like deliberately adding noise to the system." Mansuripur Tr. 1380.
 55. Dr. Mansuripur testified that a CD player system would not be able to use information that was "frequency-modulated into a signal with a bandwidth of plus or minus 100 hertz." Mansuripur Tr. 1380.
 56. Because of inertia, there are physical limitations on how frequently a motor can adjust the rotational speed of the spinning disc; for a CD, the rotational speed can be adjusted on the

- order of about 20 to 30 times per second. Hesselink Tr. 2570; CX-619C, '856 Slide 7.
57. In light of these physical constraints on the frequency at which the rotational speed of the disc can be controlled, the specification of the '856 patent notes that "satisfactory results . . . have been obtained with a wobble frequency of approximately 22 kHz, a bit frequency of the position information signal of approximately 3000 bits/second, and a velocity-control clock signal bandwidth of approximately 100 Hz" (i.e. +/- 50 Hz). Hesselink Tr. 2570; CX-15, 5:56-61; CX-619C, '856 Slide 7.
58. The 100 Hz (or +/- 50 Hz) bandwidth limitation applies to the velocity-control clock signal, which the '856 specification states is the average frequency or the "mean value of the instantaneous frequency." CX-15, 5:25-32; Hesselink Tr. 2570; CX-619C, '856 Slide 6.
59. That the instantaneous frequency is not limited to a bandwidth of 100 Hz is made clear by the '856 specification's description of a preferred embodiment consistent with the CD standard which has "a radial wobble causing frequency components near 22 kHz in the read signal with a frequency excursion of 1.5 kHz." CX-15, 4:65-5:3; CX-619C, '856 Slide 6.
60. "The ['856] patent says very clearly that it is the average velocity at 22.05 [kHz] that has a bandwidth of plus or minus 50 Hz." Hesselink Tr. 2570.
61. Dr. Mansuripur agrees that it is the mean value of the instantaneous frequencies that is used as the velocity control clock and that this mean frequency is 22.05 kHz. Mansuripur Tr. 1297; 1163; 1178.
62. It would not be possible to usefully frequency modulate the clock signal on a CD-R or

- CD-RW within the bandwidth of +/- 50 Hz. Hesselink Tr. 2571.
63. Dr. Mansuripur admitted that if one were to modulate an information signal within the +/- 50 Hz bandwidth, it would not be possible to recover the information. Mansuripur Tr. 1275.
64. As described in the specification of the '856 patent, the acceptable bandwidth for frequency modulation of the clock signal is +/- 1.5 kHz, which is even broader than the plus or minus 1 kHz used in CD-R and CD-RW discs. Hesselink Tr. 2570-2572; CX-15, 4:65-5:3; CX-619C, '856 Slide 6.
65. The instruction manual for the ATIP encoder used by Princo and Gigastorage states that the deviation of the wobble signal is +/- 1 kHz, which is well within the +/- 1.5 kHz tolerance described in the specification of the '856 patent. CX-596, GOT 004681; Hesselink Tr. 2572; CX-619C, '856 Slide 10.
66. Accepting Respondents' argument that the bandwidth of the instantaneous clock frequency must be limited to plus or minus 50 Hz would not allow for frequency modulation of the signal and thus the system would not work. Hesselink Tr. 2573.
67. Claim 1 of the '856 patent requires only that a disc be configured to have certain properties from which the signals therein described can be derived when scanned with a beam of radiation. Hesselink Tr. 583-584.
68. No player or recorder is required for a disc to satisfy the requirements of claim 1 of the '856 patent. Hesselink Tr. 583.
69. Determining time "is just a matter of multiplying the address with the velocity of the disc. So if the disc is moving at a certain velocity and if you take the address, which is a

distance, and divide it by the velocity, then you get the time information.” Mansuripur Tr. 1192.

70. In an Office Action dated April 22, 1988, the Examiner rejected claims on the ground that “Itonaga [U.S. Patent No. 4,716,560] teaches all applicant’s claimed features recited in claim 1 except the ‘digital positioning-information signal’.” and that, since a digital position signal “is well known in the recording art, the ‘position indicating signal’ taught by Itonaga . . . is considered as an obvious equivalent to the claimed ‘digital positioning-information signal’.” CX-39, Paper No. 4, at 5-6.
71. In response to the April 22, 1988 Office Action, Philips explained that the “radial displacement” of each track from the center of the optical disc record carrier of the invention is “modulated so it varies as the disc is rotated” thereby producing “a substantially constant frequency track ‘wobble,’” which “can be detected during recording or reading of information on the tracks, thereby producing a periodic clock signal which can be used to control the velocity of disc rotation and track scanning so as to effectively synchronize the recording/reading process with the pre-recorded tracks on the disc.” CX-39, Paper No. 6 at 13.
72. Noting that “[s]uch track modulation. . . is known in the prior art,” Philips described “[t]he improvement achieved by the present invention” as using “the track modulation to additionally provide continuous track position or address identification without having to interrupt the recording or reading of information on the track.” CX-39, Paper No. 6 at 13.
73. Specifically, in response to the Office Action dated April 22, 1988, Philips stated that the advantage of the invention of the ‘856 patent over the prior art is that it avoids “periodic

interruption of the recording or reading of information on a track in order to record or read track address or position” by “*frequency modulating the periodic track ‘wobble’ clock signal with a digital signal providing track address identification.*” CX-39, Paper No. 6 at 13-14 (emphasis added).

74. Philips further noted that the “frequency band” of the digital position signal used to frequency modulate the periodic track wobble could be chosen so as to have “hardly any effect on detection of the mean clock signal frequency utilized for velocity control.” CX-39, Paper No. 6 at 14.
75. In response to the Office Action dated April 22, 1988, Philips also distinguished over , U.S. Patent No. 4,363,116 (“Kleuters”) as providing “no suggestion of frequency modulating the periodic undulation of a track in accordance with track address information, to thereby avoid the necessity of interrupting the recording or reading of information on the track in order to provide track address identification.” CX-39, Paper No. 6 at 16.
76. In response to the Office Action dated April 22, 1988, Philips described U.S. Patent No. 4,716,460 (“Itonaga”) -- consistent with Respondents’ position in this investigation -- as disclosing “modulation of the width of a tracking servo groove on a record carrier in order to record a digital address signal . . . which is read during reading of signals recorded in the groove.” CX-39, Paper No. 6 at 16.
77. Philips distinguished over Itonaga as not providing any suggestion of “periodic modulation of the recording tracks to provide a clock signal for controlling the record or read operation, and modulation of the frequency of such clock signal with a track position

- digital information signal.” CX-39, Paper No. 6 at 16.
78. In an Office Action dated July 27, 1988, the Examiner rejected claims 9-12 (issued claims 1-4) over Carasso-843, de Haan and Kleuters or Itonaga. CX-39, Paper No. 8 at 2, Paper No. 12 at 1-2.
79. In the Office Action dated July 27, 1988, the Examiner rejected Philips’ argument that Carasso-843, Kleuters, de Haan or Itonaga were distinguishable because they required “interruption of the recorded information during recording and reproducing address information while applicants’ disc avoid [sic] such interruption requirement” because, in the Examiner’s view, the claimed invention “does not exclude the interruption” and the “claims do not recite that a track modulation is to additionally provide continuous track position or address identification without having to interrupt the recording or reading of the information track.” CX-39, Paper No. 8 at 5.
80. Philips amended the claims in response to the Office Action dated July 27, 1988 to “more clearly specify that the track modulation provides indication of track scanning speed and track position without interruption of the recording or reading of information on the tracks.” CX-39, Paper No. 9 at 6.
81. In its response to the Examiner’s further rejection based on 35 U.S.C. § 112, Philips further explained that “detection of the clock and position information signals provided by the track, without interruption of reading/recording of information thereon, is achieved by the present invention because neither of the latter two signals are recorded on the track, as is the information to be recorded, but are instead provided by a radial undulation of the track position on the record carrier,” which “leaves all portions of the track

available for reading/recording of information.” CX-39, Paper No. 16 at 3.

82. In its response to the Examiner’s rejection based on 35 U.S.C. § 112, Philips made clear that the claimed “track undulation is at a *mean* frequency which constitutes the clock signal,” that it is this mean frequency that “is modulated by the position signal.” CX-39, Paper No. 16 at 3.
83. In a further amendment, Philips took the position that “the novelty of claim 15 does not relate to modulation” of the radiation beam that is scanned across the track “but rather to use of a scanning beam to read an FM clock signal already recorded on the record carrier and which includes speed control and position signals.” CX-39, Paper No. 21 at 1-2.
84. In another amendment, in February 1990, Philips clarified “an erroneous use of the term ‘mean’ in referring to the clock signal frequency,” as follows:

In the claimed record carrier and associated apparatus the clock signal has a frequency corresponding to the track scanning velocity, which is substantially constant. *Consequently, the clock frequency is also substantially constant and only changes in accordance with variation in scanning velocity. However, such frequency is modulated by a digital position signal identifying track position. The clock signal is therefore the mean frequency of the resulting frequency modulated signal.* This is explained in the specification

CX-39, Paper No. 23 at 2 (emphasis added).

85. In its response to the Examiner’s rejection based on 35 U.S.C. ¶112, Philips made clear that the claimed “track undulation is at a mean frequency which constitutes the clock signal,” and that it is this mean frequency that “is modulated by the position signal.” CX-39, Paper No. 16 at 3.

B. Infringement Determination

86. In CD-R and CD-RW discs, the average frequency of the track undulation is 22.05 kHz. Hesselink Tr. 573; CX-70C.
87. In CD-R and CD-RW discs, frequency modulation of the track wobble causes deviations from the average frequency of less than five percent. Hesselink Tr. 573-574.
88. On a CD-R or CD-RW, the wobble does not take up any portion of the track. Hesselink Tr. 574-575; *see generally*, CX-593C, '856 Patent Illustration Slide 12.
89. On a CD-R or CD-RW, the radial displacement constituting the wobble is very small compared with the width of the track and does not affect the ability to record data in the track at any point on the track. Hesselink Tr. 574-575; RX-67C; RX-69C; *see generally*, CX-593C, '856 Patent Illustration Slide 12.
90. The encoding of position information through frequency modulation of the track wobble does not interfere with the recording of information at any point on the track. Hesselink Tr. 575; *see generally*, CX-593C, '856 Patent Illustration Slide 12.
91. The average frequency of the track modulation in a CD-R or CD-RW disc is used for velocity control, thus if the average frequency of the track modulation were not constant, it could not be used for velocity control. Hesselink Tr. 2569; CX-619C, '856 Slides 5-6.
92. The CD-Rs and CD-RWs manufactured by Princo and Gigastorage have clock signals that are frequency modulated at +/- 1 kHz, yet still provide velocity control. Hesselink Tr. 2569-2570.
93. The Reference Book Principles of Digital Audio states that in a CD-R, "the 22.05 kHz groove wobble excursion is frequency modulated with a +/- 1 kHz signal; this is used to

create an absolute time clocking signal (called ATIP for Absolute Time in Pregroove).”

CX-586, p. 282-283.

94. The encoder used by Gigastorage and Princo to create the stampers that they use to manufacture CD-Rs and CD-RWs “generates Wobble signals that carry ATIP information specified in the CD Blue Book and the Orange Book.” CX-596, p. GOT 004681.
95. The encoder used by Gigastorage and Princo to create the stampers that they use to manufacture CD-Rs and CD-RWs generate a wobble signal of “22.05 kHz +/- 1 kHz by FM modulation.” CX-596, p. GOT 004681.
96. The CD-Rs manufactured by Princo contain a wobble that is frequency modulated in accordance with a digital position signal which identifies the relative positions on the tracks of the discs. Hesselink Tr. 583-586; CX-64C, p. 7; *see generally*, CX-593C, ‘856 Patent Illustration Slides 18-19.
97. The CD-RWs manufactured by Princo contain a wobble that is frequency modulated in accordance with a digital position signal which identifies the relative positions on the tracks of the discs. Hesselink Tr. 583-586; CX-63C, p. 7; *see generally*, CX-593C, ‘856 Patent Illustration Slides 18-19.
98. The CD-Rs manufactured by Gigastorage contain a wobble that is frequency modulated in accordance with a digital position signal which identifies the relative positions on the tracks of the discs. Hesselink Tr. 583-586; CX-62C, p. 7; *see generally*, CX-593C, ‘856 Patent Illustration Slides 18-19.
99. The CD-RWs manufactured by Gigastorage contain a wobble that is frequency modulated in accordance with a digital position signal which identifies the relative positions on the

tracks of the discs. Hesselink Tr. 583-586; CX-61C, p. 7; *see generally*, CX-593C, '856 Patent Illustration Slides 18-19.

100. The CD-Rs manufactured by Princo encode position information in terms of minutes, seconds, and frames, which represent the time required to get to that particular position on the disc when scanning the track from the beginning of the program area at a velocity corresponding to the clock signal. Hesselink Tr. 585-587; CX-64C, p. 7, 14-15.
101. The CD-RWs manufactured by Princo encode position information in terms of minutes, seconds, and frames, which represent the time required to get to that particular position on the disc when scanning the track from the beginning of the program area at a velocity corresponding to the clock signal. Hesselink Tr. 585-587; CX-63C, p. 7, 14-15.
102. The CD-Rs manufactured by Gigastorage encode position information in terms of minutes, seconds, and frames, which represent the time required to get to that particular position on the disc when scanning the track from the beginning of the program area at a velocity corresponding to the clock signal. Hesselink Tr. 585-587; CX-62C, p. 7, 14-15.
103. The CD-RWs manufactured by Gigastorage encode position information in terms of minutes, seconds, and frames, which represent the time required to get to that particular position on the disc when scanning the track from the beginning of the program area at a velocity corresponding to the clock signal. Hesselink Tr. 585-587; CX-61C, p. 7, 14-15.
104. All of the limitations of claim 1 of the '856 patent are found in the CD-R discs manufactured by Princo. Furthermore, the track modulation in these discs is in the form of a periodic wobble of the tracks in the radial direction. Hesselink Tr. 566-567, 583-84, 587; CX-64C, p. 8.

105. Princo Taiwan admitted in its second supplemental response to Philips' interrogatories that, in the CD-Rs and CD-RWs that it manufactures, "position information is included in the wobble of the track." CX-108C, p. 4.
106. Gigastorage Taiwan admitted in its second supplemental response to Philips' interrogatories that, in the CD-Rs and CD-RWs that it manufactures, "position information is included in the wobble of the track." CX-107C, p. 6.
107. W.L. Sun testified that Princo uses the Kenwood DA 3080 generator "to put the signals into the CD that we had manufactured" and that "if the Kenwood generator can, if the Kenwood generator has ATIP information encoded into it and then output, and then the output will contain it." Sun Dep. Tr. 134, 137, 140.
108. The encoder used by Gigastorage and Princo to create the stampers that they use to manufacture CD-Rs and CD-RWs "generates Wobble signals that carry ATIP information specified in the CD Blue Book and Orange Book." CX-596, p. GOT 004681.
109. The CD-R and CD-RW discs that Princo Taiwan manufactures "comply with the relevant Orange Book standards." CX-106C, p. 4. The CD-R and CD-RW discs that Gigastorage Taiwan manufactures "comply with the relevant Orange Book standards." CX-98C, p. 4.
110. As set forth in the Orange Book (Part II), CD-Rs have a radial track wobble with a "carrier frequency" of 22.05 kHz and "analog modulation" in the form of frequency modulation. CX-163C, p. IV-1, ¶ IV.1.
111. As set forth in the Orange Book (Part II), "by means of ATIP (Absolute Time in Pre-groove, modulating the carrier frequency), the CD-R disc contains time-code information." CX-163C, p. IV-1, ¶ IV.

112. As set forth in the Orange Book (Part II), in CD-Rs “[t]he ATIP time-code increases monotonically throughout the disc.” CX-163C, p. IV-1, ¶ IV.
113. As set forth in the Orange Book (Part III), CD-RWs have a radial track wobble with a “carrier frequency” of 22.05 kHz and “analog modulation” in the form of frequency modulation. CX-162C, p. IV-1, ¶ IV.1.
114. As set forth in the Orange Book (Part III), “by means of ATIP (Absolute Time in Pre-groove, modulating the carrier frequency), the CD-RW disc contains time-code information.” CX-162C, p. IV-1, ¶ IV.
115. As set forth in the Orange Book (Part III), in CD-RWs “[t]he ATIP time-code increases monotonically throughout the disc.” CX-162C, p. IV-1, ¶ IV.

C. Validity

116. U.S. Patent No. 4,716,560 (“Itonaga”), cited by Respondents as prior art to the ‘856 patent, does not disclose any method for encoding data in the track. Hesselink Tr. 2574-2575; RX-74.
117. Itonaga was considered in the prosecution of the ‘856 patent. CX-15, cover page.
118. Itonaga does not say how to encode the 0’s and 1’s in order to get the address into the track width. Mansuripur Tr. 1338.
119. Itonaga does not mention or suggest any motivation to use frequency modulation. Hesselink Tr. 2575; RX-74.
120. Itonaga discloses width modulation of a track. Hesselink Tr. 2575; RX-74, Fig. 5.
121. Whenever there is a square wave such as that described in Itonaga, “you have an infinite number of frequencies that are needed in order to describe [it].” Hesselink Tr. 2575; CX-

619C, '856 Slide 13.

122. If the system described in Itonaga were an encoding technique, the width would vary and “would continuously change, which would have very significant and severe consequences for the operation of the system.” Hesselink Tr. 2575-2576; CX-619C, '856 Slide 13.
123. Calculating the power spectral density of the Itonaga waveform demonstrates that there are strong frequency components in the region where there is velocity control which would interfere with the operation of the system. Hesselink Tr. 2576; CX-619C, '856 Slide 13.
124. Because the average value of the Itonaga signal is not constant, were one to use Itonaga to encode address information, “[t]he average value of the signal would depend on the address, which is a highly unusable approach to doing velocity control.” Hesselink Tr. 2576.
125. The existence of multiple peaks in the Itonaga power spectral density demonstrates that there is no frequency modulation, since frequency modulation would result in only one peak. Hesselink Tr. 2576; CX-619C, '856 Slides 13-14.
126. The asserted claims of the '856 patent would not have been obvious to one of ordinary skill in the art in light of Itonaga. Hesselink Tr. 2577.
127. Itonaga teaches away from using frequency modulation, as the '856 patent does, by providing a completely different method for encoding address information. Hesselink Tr. 12578; '856 Slides 13-15.
128. Itonaga uses a digital approach in which the address would directly represent a digit, an approach that is incompatible with the analog method of frequency modulation in the

- '856 patent. Hesselink Tr. 2578; '856 Slide 15.
129. The German patent application corresponding to U.S. Patent No. 4,972,401 ("Carasso"), cited by Respondents as prior art to the '856 patent, is specifically discussed in the "Description of the Related Art" in the '856 patent. CX-15, 1:58-61; CX-14, cover page.
130. The German patent application discussed in the "Description of the Related Art" has the same parent application serial number as Carasso, 110,063. CX-15, 1:58-61; CX-14, cover page.
131. The '856 patent describes Carasso as having a track "provided with information recording areas between which synchronization areas are interposed," the synchronization areas containing "position information in the form of the address of the adjacent information recording area," i.e., a track which still uses a header structure to convey the address information. CX-15, 2:2-9.
132. The '856 patent recognizes the problems associated with attempting to record EFM encoded data using the disc described in the Carasso reference stating it "has the disadvantage that the information recording areas are constantly interrupted by synchronization areas. This is a drawback in particular when EFM-encoded information is to be recorded on the record carrier such because such recording of such information requires an uninterrupted information recording area." CX-15, 2:14-21.
133. There is no motivation to combine Itonaga with Carasso. Hesselink Tr. 2577.
134. Carasso and Itonaga cannot be combined. Hesselink Tr. 2577.
135. Combining Itonaga with the periodically varying signal in Carasso would not result in frequency modulation. Hesselink Tr. 2577; CX-619C, '856 Slide 15.

136. Dr. Hesselink testified that if you take the periodically varying signal in Carasso and “you combine that with this Itonaga signal, you get nonsense.” Hesselink Tr. 2577.
137. If you would superimpose the width modulation of Itonaga on the wobble of Carasso, you would get some signal that would have a large number of frequency components that could not be used for velocity control. Hesselink Tr. 2577; CX-619C, ‘856 Slide 15.
138. Dr. Hesselink testified that “Itonaga describes a width modulation approach that is incompatible with the Carasso approach.” Hesselink Tr. 2599.
139. The asserted claims of the ‘856 patent would not have been obvious to one of ordinary skill in the art in light of Itonaga and Carasso. Hesselink Tr. 2577-2578.
140. The examiner initially rejected claims over Itonaga during the prosecution of the ‘856 patent, but Philips distinguished Itonaga stating: “nothing therein suggests periodic modulation of the recording tracks to provide a clock signal for controlling the record or read operation, and modulation of the frequency of such clock signal with a track position digital information signal.” CX-39, Paper No. 6 at 16.
141. In response to a further rejection based on 35 U.S.C. ¶112, *see* Paper No. 15, Philips pointed out the support in the specification that made clear “that the reading or recording of an information signal is effected concurrently with detection of the signal produced by the radial wobble of the track, and that such signal includes a frequency component which is the constant frequency clock signal and modulation of such component to provide the position information signal.” CX-39, Paper No. 16 at 2-3.
142. In its response to the Examiner’s further rejection based on 35 U.S.C. ¶112, Philips further explained that “detection of the clock and position information signals provided

by the track, without interruption of reading/recording of information thereon, is achieved by the present invention because neither of the latter two signals are recorded on the track, as is the information to be recorded, but are instead provided by a radial undulation of the track position on the record carrier,” which “leaves all portions of the track available for reading/recording of information.” CX-39, Paper No. 16 at 3.

143. In a further response to a further rejection dated October 2, 1989, *see* Paper No. 17, Philips further amended the claims, and stressed the invention’s avoiding “the necessity to interrupt information recording areas of the track in order to provide areas thereon for recording of velocity and position data,” and pointed out that “it was not previously recognized that by modulating the frequency of such transverse modulation of track position it is possible to further include the track position information, thereby entirely freeing all portions of the track for recording of information.” CX-39, Paper No. 18 at 6.
144. The ‘856 patent issued over Kleuters, Itonaga, de Haan and Carasso ‘843. CX-39, Paper No. 29 at 1.

Best Mode

145. The inventors in the ‘825 patent were attempting to solve the problem that emerged after the development of ATIP, that errors such as flaws in the disc sometimes resulted in a phase difference such that, after recording, the absolute time code in the recorded information did not match the ATIP position signal encoded in the track. Hesselink Tr. 588, 590, 592; CX-17, 9:56-10:16; Raaijmakers Dep. Tr. 115-16.
146. The ‘825 patent teaches the use of a synchronization signal with the ATIP signal to correct for any such phase differences so that the time signal in the recorded information

- signal (the subcode Q channel of the EFM encoded user data) matches the ATIP signal encoded in the wobble of the pregroove. Hesselink Tr. 590, 592; CX-17, 10:65-11:9; Raaijmakers Dep. Tr. 115-16; CX-149C, p. PH 004801.
147. The phenomenon of phase differences between the ATIP code and the recorded Q-Subcode is sometimes referred to as “Q-Subcode Drift.” Raaijmakers Dep. Tr. 115.
148. The ‘825 patent describes a technique whereby the sync code in the ATIP signal is compared to and synchronized with the sync signal in the subcode Q channel time code of the EFM data code that is being recorded on the disc to ensure that the address recorded in the subcode Q channel matches the address information encoded in the ATIP signal. Raaijmakers Dep. Tr. 112, 115-16; Mansuripur Tr. 1360.
149. The problem of Q-Subcode Drift did not emerge until after the inventors of the ‘856 patent had developed the initial ATIP system and it had been “given over to other engineers for further developments and tests.” Raaijmakers Dep. Tr. 115.
150. At the time that the ‘856 patent was filed, the use of sync codes as a means of indicating the start of a new type of information, such as position-information codes, was well known in the art. CX-39; CX-15; Raaijmakers Dep. Tr. 117.
151. Wim Raaijmakers did not testify that he had determined by October 1986, that ATIP synchronization signals were the best way of “embedding position information in the wobble of a track on a disc.” Raaijmakers Dep. Tr. 82.
152. Synchronization codes are not claimed in the ‘856 patent. CX-15, 6:60-8:67; Mansuripur Tr. 1176-1177.
153. The specification of the ‘856 patent states that “[t]his position-information signal I_p may

be used inter alia for locating the track portion in which an information signal to be recorded is to be stored. Locating this portion falls beyond the scope of the present invention and is therefore not described in further detail.” CX-15, 5:62-6:4.

154. Mr. Raaijmakers never testified that ATIP synchronization signals were the best mode of practicing the invention claimed in the ‘856 patent. Raaijmakers Dep. Tr. 1-127.

VI. THE ‘825 PATENT

A. Claim Construction

1. Claim 1 of the ‘825 patent claims “[a]n optically readable and inscribable record carrier comprising: a recording layer for recording an information pattern of optically detectable recording marks, the record carrier having a servo track wherein a portion for information recording includes a periodic track modulation different from the information pattern, the periodic track modulation having a modulation frequency indicative of a position-information signal comprising position-code signals alternating with position-synchronization signals.” CX-17, 18:42-51.
2. “[A]n optically readable and inscribable record carrier” as used in claim 1 of the ‘825 patent refers to a medium that can be read and on which information can be recorded. Hesselink Tr. 588.
3. “[A] recording layer for recording an information pattern of optically detectable recording marks” as used in claim 1 of the ‘825 patent refers to a medium in which one, by radiating the medium, can change the optical properties of the material. Hesselink Tr. 588.
4. “The record carrier having a servo track wherein a portion for information recording

includes a periodic track modulation different from the information pattern” as used in claim 1 of the ‘825 patent means that you have a regularly occurring variations in the track unlike the data that is being laid down in the track. Hesselink Tr. 588, 598-599; *see generally*, CX-593C, ‘825 Patent Illustration Slide 2.

5. “[T]he periodic track modulation having a modulation frequency indicative of a position-information signal comprising position-code signals alternating with position-synchronization signals” as used in claim 1 of the ‘825 patent means that the track variation is frequency modulated with a signal identifying the position on the track which alternates with a signal that synchronizes this position-information signal. Hesselink Tr. 588-589, 598-599; CX-17, Fig. 2.
6. Dr. Mansuripur testified that the language in claim 1 of the ‘825 patent that “the periodic track modulation having a modulation frequency indicative of a position-information signal” “is one way to describe FM modulation.” Mansuripur Tr. 1341-1342; CX-17, 18:48-51.
7. Dr. Mansuripur interpreted “periodic” to have the same meaning when used in the ‘825 patent as when used in the ‘401, and ‘856 patents. Mansuripur Tr. 1197.
8. Dr. Mansuripur interpreted “periodic” to have the same meaning “across the board,” regardless of the specific patent claim or specification language or prosecution history. Mansuripur Tr. 1197.
9. Claim 1 of the ‘825 patent describes the “periodic track modulation” as further having a “modulation frequency indicative of a position-information signal,” but does not indicate that the “modulation frequency” is also periodic. CX-17, 18:48-51.

10. Claim 2 of the '825 patent claims "[a]n optically readable inscribable record carrier as described in claim 1, characterized in that the position-code signals are biphasemark-modulated signals and the position-synchronization signals have signal waveforms different from the biphasemark-modulated signal." CX-17, 18:52-57.
11. Claim 2 of the '825 patent is dependent on claim 1 of the '825 patent. Hesselink Tr. 593; CX-17, 18:53-58.
12. "[C]haracterized in that the position-code signals are biphasemark-modulated signals" as used in Claim 2 of the '825 patent refers to an encoding scheme whereby a "zero" is indicated by a pattern that does not change over two bits and a "one" is indicated by a pattern that has a transition within that same two-bit period. Hesselink Tr. 593-594; CX-17, 6:7-16; *see generally*, CX-593C, '825 Patent Illustration Slide 5.
13. Claim 2 of the '825 patent requires that the "position synchronization signals have signal wave forms different from the biphasemark modulated signal." This means that the data is encoded in a way that violates the rules of biphasemark encoding by, for example, having a pattern that does not change over three bits. Hesselink Tr. 593-594; CX-17, 6:7-21; *see generally*, CX-593C, '825 Patent Illustration Slide 5.
14. Claim 4 of the '825 patent claims "[a] record carrier as in either claim 1 or claim 2, characterized in that the periodic t[r]ack modulation has a period between 54×10^{-6} meters, and 64×10^{-6} meters and a distance between starting positions of the track portions includes the position-synchronization signal corresponding to 294 times an average of the period of the track modulation." CX-17, 18:64-19:2.
15. Claim 4 of the '825 patent, as recited in its text, is dependent on either claim 1 or claim 2.

Hesselink Tr. 594; CX-17, 18:64-19:2.

16. “[C]haracterized in that the periodic tack [sic] modulation has a period between 54×10^{-6} meters, . . . and 64×10^{-6} meters” as used in claim 4 of the ‘825 patent simply means that the period of the undulation of the pre-groove has a length that is between 54×10^{-6} meters, and 64×10^{-6} meters. Hesselink Tr. 594-595; CX-17, 18:64-19:2.
17. The length of the period of a pre-groove undulation or wobble can be calculated by dividing the nominal scanning velocity at which a CD-R or CD-RW disc is typically scanned, 1.2 to 1.4 meters/second, by the average frequency of the periodic undulation (or wobble) on a CD-R disc, which is 22.05 kHz. This length is between 54×10^{-6} meters, and 64×10^{-6} meters. Hesselink Tr. 594-595; CX-17, 18:64-19:2; *see generally*, CX-593C, ‘825 Patent Illustration Slide 6.
18. “[A]nd a distance between starting positions of the track portions includes the position-synchronization signal corresponding to 294 times an average of the period of the track modulation” as used in claim 4 of the ‘825 patent means that the distance along the track between starting positions of frames (which begin with the starting position of a synchronization signal) is 294 times the average period of the frequency of the track modulation, or wobble. Hesselink Tr. 594-596; CX-17, 18:64-19:2, Fig. 1; *see generally*, CX-593C, ‘825 Patent Illustration Slide 7.
19. The average number of wobble periods between the starting positions of synchronization signals (and thus the starting position of address frames) can be easily calculated by taking the average frequency of the periodic wobble on a CD-R or CD-RW disc, which is 22.05 kHz at the nominal scanning velocity, and dividing it by the frame rate, which is

75/second at the nominal scanning velocity. The average number of wobbles between the starting positions of synchronization signals is thus 294. Hesselink Tr. 595-596; *see generally*, CX-593C, '825 Patent Illustration Slide 7.

20. Claim 5 of the '825 patent claims "[a] record carrier as claimed in any of the claims 1 or 2, characterized in that the position-code signal is indicative of elapsed time at a nominal scanning velocity to cover a distance between a beginning of the track and a position where the track provides track modulation corresponding to the position where the track provides track modulation corresponding to the position-code signal." CX-17, 19:3-10.
21. Claim 5 of the '825 patent, as recited in its text, is dependent on either claim 1 or claim 2. Hesselink Tr. 596; CX-17, 19:3-10.
22. "[C]haracterized in that the position-code signal is indicative of elapsed time at a nominal scanning velocity to cover a distance between a beginning of the track and a position where the track provides track modulation corresponding to the position where the track provides track modulation corresponding to the position-code signal," as used in Claim 5 of the '825 patent, means that the position code signal represents the elapsed time at a designated scanning velocity to scan the distance from a beginning of the track to the position where the position code is located on the track. Hesselink Tr. 596; *see generally*, CX-593C, '825 Patent Illustration Slide 8.
23. Although there is a typographical error in Claim 5, that does not impede the ability of one of ordinary skill in the art to read and interpret the claim. Hesselink Tr. 596.
24. Claim 6 of the '825 patent claims "[a] record carrier as claimed in claim 5, characterized in that the position-code signal is modulated in conformity with a position-information

- code which comprises at least a portion similar to an absolute-time code contained in an EFM-modulated signal in conformity with the CD-standard.” CX-17, 19:11-16.
25. Claim 6 of the ‘825 patent is dependent on Claim 5. Hesselink Tr. 597; CX-17, 19:11-16.
26. “[C]haracterized in that the position-code signal is modulated in conformity with a position-information code which comprises at least a portion similar to an absolute-time code contained in an EFM-modulated signal in conformity with the CD-standard,” as used in Claim 6 of the ‘825 patent, means that the position-code signal represents the time in minutes, seconds and frames, as it is represented in the CD standard. Hesselink Tr. 597; CX-17, 6:32-51; *see generally*, CX-593C, ‘825 Patent Illustration Slide 9.
27. Dr. Hesselink testified that “what you do is you take the disc, and ... you measure the topology of the wobble. And from that topology, I can derive every element that we have discussed in this suit. I can find position signals. I can find the clock signal. I can find the auxiliary signals. I can find the distinguishing indicia.” Hesselink Tr. 2596.
28. In its Amendment dated June 11, 1990, Philips pointed out on behalf of the ‘825 patent Applicants that “[t]he relationship between the location of position of recorded time-synchronization signals relative to position of pre-recorded position-synchronization signals” -- which resolved the “subcode Q drift problem described in the specification is demonstrated and described in the specification. CX-40, Paper No. 6 at 22.
29. Philips’ Amendment dated June 11, 1990 thus pointed out the importance of the use of synchronization codes to resolve the problem created by the lack of synchronization between the EFM subcode Q address codes expressed in minutes, seconds and frames and the ATIP address codes expressed in minutes, seconds and frames, which the ‘825 patent

discloses as being frequency modulated into the wobble of the blank disc, and “submitted that the distinguishing features of the claims will be appreciated” upon “consideration of the foregoing.” CX-40, Paper No. 6 at 22.

B. Infringement Determination

30. The CD-Rs manufactured by Princo have a periodic track modulation with position-code signals alternating with position synchronization signals. Hesselink Tr. 600; CX-64C, p. 6-8; *see generally*, CX-593C, ‘825 Patent Illustration Slide 13.
31. The CD-RWs manufactured by Princo have a periodic track modulation with position-code signals alternating with position synchronization signals. Hesselink Tr. 600; CX-63C, p. 6-8; *see generally*, CX-593C, ‘825 Patent Illustration Slide 13.
32. The CD-Rs manufactured by Gigastorage have a periodic track modulation with position-code signals alternating with position synchronization signals. Hesselink Tr. 600; CX-62C, p. 6-8; *see generally*, CX-593C, ‘825 Patent Illustration Slide 13.
33. The CD-RWs manufactured by Gigastorage have a periodic track modulation with position-code signals alternating with position synchronization signals. Hesselink Tr. 600; CX-61C, p. 6-8; *see generally*, CX-593C, ‘825 Patent Illustration Slide 13.
34. In a CD-R or CD-RW disc, the instantaneous frequency of the wobble is 21 kHz for three or six cycles and then 23 kHz for three or six cycles or more. Hesselink Tr. 2579.
35. Therefore, in a CD-R or CD-RW disc, the wobble is periodic even under the “identically repeating” definition espoused by Respondents because it does repeat identically for a certain number of periods even though modulated in accordance with a digital position signal. Hesselink Tr. 2579.

36. The synchronization signal used in CD-R and CD-RW discs has three high values followed by a low/high transition and then three low values if the bit preceding the sync signal is a "0". Hesselink Tr. 593-594; *see generally*, CX-593C, '825 Patent Illustration Slide 5.
37. The synchronization signal used in CD-R and CD-RW discs has three low values followed by a high/low transition and then three high values if the bit preceding the sync signal is a "1". Hesselink Tr. 593-594; *see generally*, CX-593C, '825 Patent Illustration Slide 5.
38. The position-code signals in the CD-Rs manufactured by Princo are biphasemark modulated and they alternate with synchronization signals that are not encoded in accordance with the rules of the biphasemark encoding technique. Hesselink Tr. 600-601; CX-64C, p. 6-7; CX-79C; *see generally*, CX-593C, '825 Patent Illustration Slide 13.
39. The position-code signals in the CD-RWs manufactured by Princo are biphasemark modulated and they alternate with synchronization signals that are not encoded in accordance with the rules of the biphasemark encoding technique. Hesselink Tr. 600-601; CX-63C, p. 6-7; CX-79C; *see generally*, CX-593C, '825 Patent Illustration Slide 13.
40. The position-code signals in the CD-Rs manufactured by Gigastorage are biphasemark modulated and they alternate with synchronization signals that are not encoded in accordance with the rules of the biphasemark encoding technique. Hesselink Tr. 600-601; CX-62C, p. 6-7; CX-79C; *see generally*, CX-593C, '825 Patent Illustration Slide 13.
41. The position-code signals in the CD-RWs manufactured by Gigastorage are biphasemark modulated and they alternate with synchronization signals that are not encoded in

- accordance with the rules of the biphasemark encoding technique. Hesselink Tr. 600-601; CX-61C, p. 6-7; CX-79C; *see generally*, CX-593C, '825 Patent Illustration Slide 13.
42. The CD-Rs manufactured by Princo have an average wobble frequency of 22.05 kHz when scanned at the nominal scanning speed of 1.2 to 1.4 m/s; therefore, the period of the wobble on the CD-Rs manufactured by Princo is between 54×10^{-6} meters and 64×10^{-6} meters. Hesselink Tr. 601; CX-64C, pp. 6, 14.
43. The CD-RWs manufactured by Princo have an average wobble frequency of 22.05 kHz when scanned at the nominal scanning speed of 1.2 to 1.4 m/s; therefore, the period of the wobble on the CD-Rs manufactured by Princo is between 54×10^{-6} meters and 64×10^{-6} meters. Hesselink Tr. 601; CX-63C, pp. 6, 14.
44. The CD-Rs manufactured by Gigastorage have an average wobble frequency of 22.05 kHz when scanned at the nominal scanning speed of 1.2 to 1.4 m/s; therefore, the period of the wobble on the CD-Rs manufactured by Gigastorage is between 54×10^{-6} meters and 64×10^{-6} meters. Hesselink Tr. 601; CX-62C, pp. 6, 14.
45. The CD-RWs manufactured by Gigastorage have an average wobble frequency of 22.05 kHz when scanned at the nominal scanning speed of 1.2 to 1.4 m/s; therefore, the period of the wobble on the CD-Rs manufactured by Gigastorage is between 54×10^{-6} meters and 64×10^{-6} meters. Hesselink Tr. 601; CX-61C, pp. 6, 14.
46. Hans Kablau testified that "if the disc is rotated at a certain speed such that the resulting wobble frequency is 22.05 kilohertz, then that speed should be within 1.2 to 1.4 meters per second." Kablau Dep. Tr. 199.

47. The CD-Rs manufactured by Princo have a frame rate of 75 Hz when scanned at a velocity corresponding to a clock signal of 22.05 kHz, so that the distance between the starting positions of two address frames, and thus the distance between synchronization signals, corresponds to 294 times the average period of the track wobble. Hesselink Tr. 595-596, 601; CX-64C, pp. 6, 10.
48. The CD-RWs manufactured by Princo have a frame rate of 75 Hz when scanned at a velocity corresponding to a clock signal of 22.05 kHz, so that the distance between the starting positions of two address frames, and thus the distance between synchronization signals, corresponds to 294 times the average period of the track wobble. Hesselink Tr. 595-596, 601; CX-63C, pp. 6, 10.
49. The CD-Rs manufactured by Gigastorage have a frame rate of 75 Hz when scanned at a velocity corresponding to a clock signal of 22.05 kHz, so that the distance between the starting positions of two address frames, and thus the distance between synchronization signals, corresponds to 294 times the average period of the track wobble. Hesselink Tr. 595-596, 601; CX-62C, pp. 6, 10.
50. The CD-RWs manufactured by Gigastorage have a frame rate of 75 Hz when scanned at a velocity corresponding to a clock signal of 22.05 kHz, so that the distance between the starting positions of two address frames, and thus the distance between synchronization signals, corresponds to 294 times the average period of the track wobble. Hesselink Tr. 595-596, 601; CX-61C, pp. 6, 10.
51. The position-code signals in the CD-R discs manufactured by Princo are indicative of a time code that corresponds to the playing time from the beginning of the track when the

- disc is scanned at the nominal scanning velocity. Hesselink Tr. 602; CX-64C, pp. 14-15.
52. The position-code signals in the CD-RW discs manufactured by Princo are indicative of a time code that corresponds to the playing time from the beginning of the track when the disc is scanned at the nominal scanning velocity. Hesselink Tr. 602; CX-63C, pp. 14-15.
53. The position-code signals in the CD-R discs manufactured by Gigastorage are indicative of a time code that corresponds to the playing time from the beginning of the track when the disc is scanned at the nominal scanning velocity. Hesselink Tr. 602; CX-62C, pp. 14-15.
54. The position-code signals in the CD-RW discs manufactured by Gigastorage are indicative of a time code that corresponds to the playing time from the beginning of the track when the disc is scanned at the nominal scanning velocity. Hesselink Tr. 602; CX-61C, pp. 14-15.
55. The position-information code on the CD-R discs manufactured by Princo is in the form of minutes, seconds, and frames, which is the same as the absolute-time code contained in an EFM-modulated signal in conformity with the CD-standard. Hesselink Tr. 602; CX-64C, pp. 14-15, 17-18; *see generally*, CX-593C, '825 Patent Illustration Slide 9.
56. The position-information code on the CD-RW discs manufactured by Princo is in the form of minutes, seconds, and frames, which is the same as the absolute-time code contained in an EFM-modulated signal in conformity with the CD-standard. Hesselink Tr. 602; CX-63C, pp. 14-15, 17-18; *see generally*, CX-593C, '825 Patent Illustration Slide 9.
57. The position-information code on the CD-R discs manufactured by Gigastorage is in the

form of minutes, seconds, and frames, which is the same as the absolute-time code contained in an EFM-modulated signal in conformity with the CD-standard. Hesselink Tr. 602; CX-62C, pp. 14-15, 17-18; *see generally*, CX-593C, '825 Patent Illustration Slide 9.

58. The position-information code on the CD-RW discs manufactured by Gigastorage is in the form of minutes, seconds, and frames, which is the same as the absolute-time code contained in an EFM-modulated signal in conformity with the CD-standard. Hesselink Tr. 602; CX-61C, pp. 14-15, 17-18; *see generally*, CX-593C, '825 Patent Illustration Slide 9.
59. Princo Digital Disc GmbH is a subsidiary of Princo Corporation and is in charge of European sales for Princo. SX-3C, p. 5.
60. In litigation between Philips' Dutch parent, Koninklijke Philips Electronics, N.V. and Princo's German subsidiary, Princo Digital Disc GmbH, in the High Court of Justice, Chancery Division, Patents Court of the United Kingdom, Princo's German subsidiary admitted that each of the CD-Rs manufactured by Princo Taiwan "has the following features
 - a) It is an optically readable record carrier of the inscribable type.
 - b) It comprises a recording layer intended for recording an information pattern of optically detectable recording marks.
 - c) The record carrier is provided with a servo track.
 - d) The servo track, in an area intended for information recording, exhibits a periodic track modulation which can be distinguished from the information pattern.

- e) The frequency of the said track modulation is modulated.
- f) The frequency of the said track modulation is modulated in conformity with a position-information signal.
- g) The said position-information signal comprises position-code signals which alternate with position-synchronisation signals.
- h) The position-code signals are biphase-mark-modulated signals.
- i) The position-synchronisation signals have signal waveforms which differ from the biphase-mark-modulated signal.
- j) The said position-code signal indicate the time needed at the nominal scanning velocity to cover the said distance between the beginning of the track and the position where the track exhibits the track modulation corresponding to the said position-code signal.
- k) The said position-code signal is modulated in conformity with a position-information code which comprises at least a portion similar to an absolute-time code contained in an EFM-modulated signal in conformity with the CD-standard.”

CX-81, pp. 1-2.

- 61. In the UK litigation between Koninklijke Philips Electronics, N.V. and Princo Digital Disc GmbH, the patent at issue is the European equivalent of the ‘825 patent. CX-534C, p. 1; CX-80; CX-29.
- 62. Princo Taiwan admitted in its second supplemental response to Philips’ interrogatories that, in the CD-Rs and CD-RWs that it manufactures, “position information is included in the wobble of the track.” CX-108C, p. 4.
- 63. Princo Taiwan admitted in its second supplemental response to Philips’ interrogatories that, in the CD-Rs and CD-RWs that it manufactures, “synchronization information is included in the wobble of the track.” CX-108C, p. 4.

64. Gigastorage Taiwan admitted in its second supplemental response to Philips' interrogatories that, in the CD-Rs and CD-RWs that it manufactures, "position information is included in the wobble of the track." CX-107C, p. 6.
65. Gigastorage Taiwan admitted in its second supplemental response to Philips' interrogatories that, in the CD-Rs and CD-RWs that it manufactures, "synchronization information is included in the wobble of the track." CX-107C, p. 6.
66. In the encoder used by Gigastorage and Princo to create the stampers that they use to manufacture CD-Rs and CD-RWs "the biphas-modulated data is FM-modulated in the FM modulator using a 22.05 kHz signal, and output as a complete Wobble signal." CX-596, p. GOT 004682.
67. The CD-R and CD-RW discs that Princo Taiwan manufactures "comply with the relevant Orange Book standards." CX-106C, p. 4. The CD-R and CD-RW discs that Gigastorage Taiwan manufactures "comply with the relevant Orange Book standards." CX-98C, p. 4.
68. As set forth in the Orange Book (Part II), "by means of ATIP (Absolute Time in Pre-groove, modulating the carrier frequency), the CD-R disc contains time-code information." CX-163C, p. IV-1, ¶ IV.
69. As set forth in the Orange Book (Part II), a CD-R has a pre-groove which is "not a perfect spiral but is wobbled with:
- a typical amplitude of 30 nanometers,
 - a spatial period of 54 to 64 micrometers."
- CX-163C, p. I-5, ¶ 1.4.1.

70. As set forth in the Orange Book (Part II), in CD-Rs “[t]he ATIP time-code increases monotonically throughout the disc.” CX-163C, p. IV-1, ¶ IV.
71. As set forth in the Orange Book (Part II), in CD-Rs “[t]he format of the ATIP time information is identical to the time encoding in Subcode-Q” used in the CD-standard. CX-163C, p. IV-2, ¶ IV.4.
72. As set forth in the Orange Book (Part II), in CD-Rs the carrier frequency of 22.05 kHz has a “deviation” of 1kHz +/- 10%. CX-163C, p. IV-1, ¶ IV.2.
73. As set forth in the Orange Book (Part II), in CD-Rs each frame of the ATIP signal starts with a 4 bit synchronization signal followed by 24 bits of the ATIP signal. CX-163C, p. IV-1, ¶ IV.3, and Fig. IV.3-2.
74. As set forth in the Orange Book (Part II), in CD-Rs the ATIP signal is digitally modulated using biphasemark modulation. CX-163C, p. IV-1, ¶ IV.1.
75. As set forth in the Orange Book (Part II), in CD-Rs, “[f]or synchronization of the ATIP data the Biphasemark code rules are violated.” CX-163C, p. IV-1, ¶ IV.3.1.
76. As set forth in the Orange Book (Part III), “by means of ATIP (Absolute Time in Pre-groove, modulating the carrier frequency), the CD-RW disc contains time-code information.” CX-162C, p. IV-1, ¶ IV.
77. As set forth in the Orange Book (Part III), a CD-RW has a pre-groove which is “not a perfect spiral but is wobbled with:
- a typical amplitude of 30 nanometers,
 - a spatial period of 54 to 64 micrometers.”
- CX-162C, p. I-6, ¶ 1.4.1.

78. As set forth in the Orange Book (Part III), in CD-RWs “[t]he ATIP time-code increases monotonically throughout the disc.” CX-162C, p. IV-1, ¶ IV.
79. As set forth in the Orange Book (Part III), in CD-RWs “[t]he format of the ATIP time information is identical to the time encoding in Subcode-Q” used in the CD-standard. CX-162C, p. IV-2, ¶ IV.4.
80. As set forth in the Orange Book (Part III), in CD-RWs the carrier frequency of 22.05 kHz has a “deviation” of 1 kHz +/- 10%. CX-162C, p. IV-1, ¶ IV.2.
81. As set forth in the Orange Book (Part III), in CD-RWs each frame of the ATIP signal starts with a 4 bit synchronization signal followed by 24 bits of the ATIP signal. CX-162C, p. IV-1, ¶ IV.3, and Fig. IV.3-2.
82. As set forth in the Orange Book (Part III), in CD-RWs the ATIP signal is digitally modulated using biphasemark modulation. CX-162C, p. IV-1, ¶ IV.1.
83. As set forth in the Orange Book (Part III), in CD-RWs, “[f]or synchronization of the ATIP data the Biphasemark code rules are violated.” CX-162C, p. IV-1, ¶ IV.3.1.

C. Validity

84. U.S. Patent No. 4,942,565 (“Lagadec”) does not disclose frequency modulation. Hesselink Tr. 2580-2581; CX-619C, ‘825 Slide 4; RX-177.
85. The Lagadec patent utilizes a digital, rather than an analog, method for encoding position information. Hesselink Tr. 2580; CX-619C, ‘825 Slide 4; RX-177.
86. In the Lagadec patent, both the “0” and “1” have the same wave form during the first five cycles. Mansuripur Tr. 1350.

87. In the Lagadec patent, the instantaneous frequency of the "0" and "1" are the same for the first five cycles. Mansuripur Tr. 1350.
88. Dr. Hesselink testified that, using the Lagadec patent, "[t]he average value of the frequency changes as the address changes, because if you get more "1"s in your address code, you're going to get more low-frequency components in your average signal. So this is not desirable." Hesselink Tr. 2581; CX-619C, '825 Slide 4; RX-177.
89. The "Definition of Modulation and Preamble" depicted in Roger Lagadec's September, 1986, proposal to Philips ("the Lagadec proposal") is the same as that disclosed in the Lagadec patent. *Compare* CX-147C, p. PH 004598 with RX-177, Figs. 4b, 5a, 5b.
90. The Lagadec proposal rejected the notion of using an analog method, noting that "[i]t is possible to investigate 'analog' modulation methods. It is preferred (sic), however, to handle the problem as one of data transmission. Therefore, a binary signal allowing good data extraction will be defined." CX-147C, p. 2.
91. The Lagadec proposal specified that it was not intended to modulate the analog sinusoidal wobble earlier proposed by Philips; rather the conclusion of the proposal was that "[a] band-limited data signal can replace the sinusoidal wobble signal proposed by Philips, and carry absolute time." CX-147C, p. 6.
92. The frequency component associated with the preamble described in the Lagadec patent occurs in the region where velocity control takes place and thus interferes with the velocity control. Hesselink Tr. 2581; CX-619C, '825 Slide 4; RX-177.
93. The approach described in the Lagadec patent does not leave room for error detection encoding in the system. Hesselink Tr. 2581; CX-619C, '825 Slide 4; RX-177.

94. Because the approach in the Lagadec patent has only one area in the code where a distinction is made between a "1" and a "0," the measurement is prone to errors and decoding is difficult to carry out. Hesselink Tr. 2581-2582; CX-619C, '825 Slide 4; RX-177.
95. The power spectral density of the approach disclosed in the Lagadec patent demonstrates that this approach generates strong low-frequency components. Hesselink Tr. 2584; CX-619C, '825 Slide 7.
96. The low-frequency components generated by the approach disclosed in the Lagadec patent interfere with the velocity control of the disc. Hesselink Tr. 2581.
97. The low-frequency components cannot be filtered out of the Lagadec patent because those components are necessary to encode the position information. Hesselink Tr. 2583-2584; CX-619C, '825 Slide 7.
98. The asserted claims of the '825 patent would not have been obvious to one of ordinary skill in the art in light of the Lagadec patent. Hesselink Tr. 2584, 2599.
99. Dr. Mansuripur contradicted himself at trial as to whether Lagadec shows frequency modulation (*compare* Mansuripur Tr. 1199 -- "a form of FM" -- *with* 1339 -- overnight Lagadec becomes definitely "FM").
100. You really couldn't use that approach in order to devise the system that is described in the patent, "so that Lagadec teaches away from the '825 patent". Hesselink Tr. 2586.
101. U.S. Patent No. 4,907,216 ("Rijnsburger") does not disclose frequency modulation. Hesselink Tr. 2582-2583; RX-66.

102. Dr. Hesselink testified that Rijnsburger discloses an approach using “three different signals, again three different frequencies, one at 22 kilohertz, one at 11 kilohertz, and now one at 3.6 kilohertz. This is not frequency modulation.” Hesselink Tr. 2582.
103. The low-frequency component in Rijnsburger occurs in the region where velocity control takes place and thus interferes with the velocity control. Hesselink Tr. 2582; CX-619C, ‘825 Slide 5; RX-66.
104. The average frequency of the signal in Rijnsburger changes as the position changes. Hesselink Tr. 2582; CX-619C, ‘825 Slide 5; RX-66.
105. The approach described in Rijnsburger does not leave room for error detection encoding in the system. Hesselink Tr. 2582; CX-619C, ‘825 Slide 5; RX-177.
106. The power spectral density of the signal disclosed in Rijnsburger demonstrates that it does not produce the same results as a frequency-modulated signal. Hesselink Tr. 2582-2583; CX-619C, ‘825 Slide 6.
107. Filtering out those frequency components in Rijnsburger that cause interference would also filter out the encoded data. Hesselink Tr. 2583; CX-619C, ‘825 Slide 6.
108. The asserted claims of the ‘825 patent would not have been obvious to one of ordinary skill in the art in light of Rijnsburger. Hesselink Tr. 2584, 2599.
109. Dr. Hesselink testified that “You really couldn’t use that approach in order to devise the system that is described in the patent,” so that Rijnsburger teaches away from the ‘825 patent. Hesselink Tr. 2586.
110. Both the Lagadec patent and Rijnsburger generate broad power spectra that do not look like frequency-modulated signals. Hesselink Tr. 2584; CX-619C, ‘825 Slide 8.

111. The power spectral density of a frequency modulated signal such as that disclosed in the '825 patent has a very narrow bandwidth around a central frequency with nothing at low frequencies or high frequencies. Hesselink Tr. 2584; CX-619C, '825 Slide 8; CX-71C.
112. Roger Lagadec specifically considered and rejected the use of frequency modulation to encode position information. Hesselink Tr. 2585; CX-147C, p. 2.
113. Frequency modulation was well known at the time of the Lagadec and Rijnsburger patents but neither used FM modulation to encode position information. Hesselink Tr. 2586.
114. Neither the Rijnsburger nor the Lagadec approaches could be used to devise the system described in the '825 patent. Hesselink Tr. 2586.
115. Nothing in the Lagadec or Rijnsburger references suggest that one should use FM modulations to encode digital position information. Hesselink Tr. 2585.
116. Dr. Hesselink testified that "modulation frequency indicative of a position information signal, this is not described in Lagadec. It's not described in Rijnsburger. There is no indication that this is frequency modulation. It doesn't produce the same result, and it is not the same physical process, and it cannot be used for the purposes described in the patent." Hesselink Tr. 2599.
117. Dr. Hesselink testified that "there is no motivation to think that on the basis of either Lagadec or Rijnsburger waveforms one would then use FM modulation in order to solve their problem." Hesselink Tr. 2585.

118. The asserted claims of the '825 patent would not have been obvious to one of ordinary skill in the art even were one motivated to combine Rijnsburger with the Lagadec patent. Hesselink Tr. 2585, 2599.

VII. The '764 PATENT

A. Claim Construction

1. “[S]uccessive address codes specifying addresses of successive track portions at which said address codes are located” as used in Claim 20 of the '764 patent means that a portion of the auxiliary signal consists of information regarding the locations at which the codes are present on the track. Hesselink Tr. 628.
2. “[A]uxiliary codes, arranged among said address codes, specifying control data for use by a recording device in recording an information signal on said track” as used in Claim 20 of the '764 patent refers to codes that comprise information that the recorder needs in order to be able to physically write the data on the disc; such as the required laser intensity, the location of the beginning of the lead-in area, and the location of the beginning of the program area. Hesselink Tr. 620-621.
3. Figure 7 of the '764 patent demonstrates how auxiliary codes are arranged among the address codes such that, as in the lead-in area of a CD-R or CD-RW, an auxiliary code occurs after every nine address codes. Hesselink Tr. 629; CX-16, 5:10-17, Fig. 7.
4. The auxiliary codes comprise control data for controlling the recording process, and the recording device is adapted to control the recording process in dependence on the extracted auxiliary code. Hesselink Tr. 630; CX-16, 2:6-13.

5. “[S]aid auxiliary codes having identifying indicia which distinguishes them from said address codes” as used in Claim 20 of the ‘764 patent means that certain features of the auxiliary codes identify them as different from the address codes. Hesselink Tr. 633; CX-16, Fig. 6, 7:5-63.
6. The “address codes” in Claim 20 do not mention the possibility of using time codes. CX-16, 14:20-23.
7. While the specification does indeed discuss the use of time codes, it clearly presents them as but one possible embodiment of the claimed invention, stating that “address codes may comprise, for example, a time code.” CX-16, 5:16-19.
8. Claim 20 does not use the word “periodic.” CX-16, 14:17-29.
9. Claim 22 of the ‘764 patent claims “[t]he record carrier as claimed in claim 20, wherein said address codes and said auxiliary codes are arranged in said auxiliary signal such that there are codes at equidistant locations on said track, said address codes indicating distances, as measured in the track direction, between locations at which they are located and a specific reference position, whereby a clock signal can be derived from said auxiliary signal which is in synchronism with the codes at equidistant locations on said track.” CX-16, 14:34-43.
10. Claim 22 of the ‘764 patent is dependent on Claim 20” Hesselink Tr. 634; CX-16, 14:34-43.
11. “[W]herein said address codes and said auxiliary codes are arranged in said auxiliary signal such that there are codes at equidistant locations on said track ... whereby a clock signal can be derived from said auxiliary signal which is in synchronism with the codes at

equidistant locations on said track” as used in Claim 22 of the ‘764 patent means that there are codes in the auxiliary signal that occur at regular intervals and that since these codes occur at regular intervals, they can be used as a clock signal. Hesselink Tr. 634-635.

12. In a CD-R or CD-RW disc, the codes occur at regular intervals of 75 times per second. The synchronization code that occurs at the beginning of each code can thereby be used as a clock signal since it occurs at a known, predetermined frequency. Hesselink Tr. 634-635.
13. “[S]aid address codes indicating distances, as measured in the track direction, between locations at which they are located and a specific reference position” as used in Claim 22 of the ‘764 patent means that the address codes indicate the distance from a position on the disc that has been designated as a reference position. Hesselink Tr. 635-636.
14. In a CD-R or CD-RW disc, the start of the program area, which is designated 00:00:00, is the reference position for all of the address codes on the disc” Hesselink Tr. 635-636; CX-16, 6:1-18; *see generally*, CX-593C, ‘764 Patent Illustration Slide 8.
15. Claim 22 does not use the word “periodic.” CX-16, 14:34-43.
16. Claim 23 of the ‘764 patent claims “[t]he record carrier as claimed in claim 22, wherein said address codes include absolute time codes specifying said distances as playing time of said record carrier from said reference position.” CX-16, 14:44-47)
17. Claim 23 of the ‘764 patent is dependent upon Claim 22. CX-16, 14:44-47.
18. Claim 23 does not use the word “periodic.” CX-16, 14:44-47.

19. Claim 24 of the '764 patent claims "[t]he record carrier as claimed in claim 20, wherein said track is transversely modulated such that there is a periodic excursion of said track transverse to the track direction, said excursion having a frequency in conformity with said auxiliary signal." CX-16, 14:48-52.
20. Claim 24 of the '764 patent is dependent upon Claim 20. Hesselink Tr. 637; CX-16, 14:48-52.
21. "[W]herein said track is transversely modulated such that there is a periodic excursion of said track transverse to the track direction, said excursion having a frequency in conformity with said auxiliary signal" as used in Claim 24 of the '764 patent means that there is a regularly spaced deviation of the track from a straight line in a direction transverse to the track that is frequency modulated in accordance with an auxiliary signal. Hesselink Tr. 637, 646.
22. In CD-Rs and CD-RWs, the auxiliary signal is encoded by frequency modulation of the 22.05 kHz wobble such that the frequency of an individual wobble is either 21.05 or 23.05 kHz, corresponding to a zero or one respectively, while the average wobble frequency remains 22.05 kHz. Hesselink Tr. 636-638.
23. In CD-Rs and CD-RWs, the auxiliary signal is encoded into the track in the manner described in the '825 patent for encoding the digital position signal. Hesselink Tr. 636.
24. The '764 patent cites to the '825 to describe the particulars of a preferred track modulation scheme:

FIGS. 1*a*, *b*, *c* and *d* show possible embodiments of a record carrier 1 of an inscribable type as described, for example, in Netherlands Patent Application NL-A-8800152 corresponding to U.S. Pat. No.

4,999,825. * * * The auxiliary signal is recorded in the track 4 by means of a preformed track modulation, suitably in the form of a sinusoidal track excursion as shown in FIG 1c.

CX-16, 3:40-43, 4:17-20.

25. The '856, '825, and '764 patent all refer to a "periodic" signal that is modulated.
Hesselink Tr. 780.
26. If the frequency of the wobble in the '856, '825 and '764 patents was identically repeating it would be a completely nonfunctional system. Hesselink Tr. 780-781.
27. If "periodic" meant "identically repeating" as Respondents contend, the track modulation could not be used for speed control, address information or auxiliary codes. The track would contain no information and "would really be useless for the applications" described in the '764 patent. Hesselink Tr. 646-647.
28. Claim 25 of the '764 patent claims "[t]he record carrier as claimed in claim 20, wherein said track portions are substantially concentric about a common center of rotation, and said address codes indicate the addresses of said track portions in relation to a reference position which is at a predetermined radial distance from said center of rotation." CX-16, 14:53-58.
29. Claim 25 of the '764 patent is dependent upon claim 20. Hesselink Tr. 638; CX-16, 14:53-58.
30. "[W]herein said track portions are substantially concentric about a common center of rotation, and said address codes indicate the addresses of said track portions in relation to a reference position which is at a predetermined radial distance from said center of rotation" as used in Claim 25 of the '764 patent means that the track mainly has a

common center of rotation and that the track portion from which the address codes are referenced is located at a predetermined distance from the center of rotation of the disc. Hesselink Tr. 638; CX-16, 5:40-69, Figs. 4-5; *see generally*, CX-593C, '764 Illustration Slides 11-12.

31. Claim 25 does not use the word "periodic." CX-16, 14:53-58.
32. Claim 26 of the '764 patent claims "[t]he record carrier as claimed in claim 25, wherein said auxiliary codes specify a track portion at a radial distance from said reference position at which a table of contents should be recorded on said record carrier." CX-16, 14:59-62.
33. Claim 26 of the '764 patent is dependent upon Claim 25. Hesselink Tr. 639, CX-16, 14:59-62.
34. "[W]herein said auxiliary codes specify a track portion at a radial distance from said reference position at which a table of contents should be recorded on said record carrier" as used in Claim 26 of the '764 patent means that the auxiliary codes indicate a track position at a given radial distance from the reference position described in Claim 25 where a table of contents should be recorded. Hesselink Tr. 639-640; *see generally*, CX-593C, '764 Illustration Slides 12-13.
35. Claim 26 does not use the word "periodic." CX-16, 14:59-62.
36. Claim 27 of the '764 patent claims "[t]he record carrier as claimed in claim 26, wherein the track portion at which the table of contents should be recorded is closer to said center of rotation than is said reference position." CX-16, 14:63-66.
37. Claim 27 of the '764 patent is dependent upon Claim 26. CX-16, 14:63-66.

38. “[W]herein the track portion at which the table of contents should be recorded is closer to said center of rotation than is said reference position” as used in Claim 27 of the ‘764 patent simply means that the table of contents should be recorded at a point closer to the center of the disc than the reference position described in Claim 25. Hesselink Tr. 640; *see generally*, CX-593C, ‘764 Illustration Slides 12-13.
39. The reference position on a CD-R or CD-RW disc is at the start of the program area, which is a radial distance of 25 mm from the center of the disc. Hesselink Tr. 640; CX-16, 5:61-69.
40. Claim 27 does not use the word “periodic.” CX-16, 14:63-66.
41. Claim 28 of the ‘764 patent claims “[t]he record carrier as claimed in claim 25, wherein said auxiliary codes specify a track portion at a radial distance from said reference position at which a lead-out signal indicating the end of said information signal must commence in order to be completed before the end of said track.” CX-16, 14:67-15:4.
42. Claim 28 of the ‘764 patent is dependent upon Claim 25. CX-16, 14:67-15:4.
43. “[W]herein said auxiliary codes specify a track portion at a radial distance from said reference position at which a lead-out signal indicating the end of said information signal must commence in order to be completed before the end of said track” as used in Claim 28 of the ‘764 patent means that the auxiliary codes indicate a position on the disc at a radial distance from the reference position in Claim 25 where one must start recording the lead-out signal in order for it to be completed before the end of the disc. Hesselink Tr. 640-641; *see generally*, CX-593C, ‘764 Illustration Slides 12, 15.

44. On CD-R and CD-RW discs, the lead-out signal is typically a 90-second sequence and the lead-out area indicates where the user must begin recording this sequence in order for it to be completed before the end of the disc. Hesselink Tr. 640-641.
45. Claim 28 does not use the word “periodic.” CX-16, 14:67-15:4.
46. Claim 29 of the ‘764 patent claims “[t]he record carrier as claimed in claim 20, wherein said auxiliary codes specify the location of the track portion at which a table of contents should be recorded on said record carrier.” CX-16, 15:5-8.
47. Claim 29 of the ‘764 patent is dependent up on Claim 20. CX-16, 15:5-8.
48. “[W]herein said auxiliary codes specify the location of the track portion at which a table of contents should be recorded on said record carrier” as used in Claim 29 of the ‘764 patent means that the auxiliary codes indicate a track position where a table of contents should be recorded. Hesselink Tr. 641; *see generally*, CX-593C, ‘764 Illustration Slides 13-14.
49. In CD-R and CD-RW discs, the auxiliary codes specify that the table of contents should be recorded in the lead-in area of the disc. Hesselink Tr. 639-641; *see generally*, CX-593C, ‘764 Patent Illustration Slide 13.
50. Claim 29 does not use the word “periodic.” CX-16, 15:5-8.
51. Claim 30 of the ‘764 patent claims “[t]he record carrier as claimed in claim 29, wherein said auxiliary codes also specify the location of the track portion at which a lead-out signal indicating the end of said information signal must commence in order to be completed before the end of said track.” CX-16, 15:9-13.
52. Claim 30 of the ‘764 patent is dependent upon Claim 29. CX-16, 15:9-13.

53. “[W]herein said auxiliary codes also specify the location of the track portion at which a lead-out signal indicating the end of said information signal must commence in order to be completed before the end of said track” as used in Claim 30 of the ‘764 patent means that the auxiliary codes indicate a position on the disc where one must start recording the lead-out signal in order for it to be completed before the end of the disc. Hesselink Tr. 640-641; *see generally*, CX-593C, ‘764 Illustration Slide 15.
54. Claim 30 does not use the word “periodic.” CX-16, 15:9-13.
55. Claim 31 of the ‘764 patent claims “[t]he record carrier as claimed in claim 20, wherein said auxiliary codes specify the location of the track portion at which a lead-out signal indicating the end of said information signal must commence in order to be completed before the end of said track.” CX-16, 15:14-16:3.
56. Claim 31 of the ‘764 patent is dependent upon Claim 20. CX-16, 15:14-16:3.
57. Claim 31 should be interpreted in the same way as Claim 30, but as further limiting Claim 20 rather than Claim 29. Hesselink Tr. 640-641.
58. Claim 31 does not use the word “periodic.” CX-16, 15:14-16:3.
59. Claim 32 of the ‘764 patent claims “[t]he record carrier as claimed in claim 20, wherein said address codes are and said auxiliary codes have the same data format.” CX-16, 16:4-6.
60. Claim 32 of the ‘764 patent is dependent upon Claim 20. CX-16, 16:4-6.
61. “[W]herein said address codes and said auxiliary codes have the same data format” as used in Claim 32 means that the arrangement of data in the auxiliary codes is the same as the arrangement of data in the address codes. Hesselink Tr. 642-643.

62. As described in the '764 specification, each frame contains a sync code which consists of eight channel bits which is followed by 76 channel bits that provide information about minutes, seconds and frames and error correction. This same format is used for both auxiliary codes and address codes. Hesselink Tr. 642; CX-16, 4:44-5:31, Figs 2-3; *see generally*, CX-593C, '764 Patent Illustration Slides 16-17.
63. Claim 32 does not use the word "periodic." CX-16, 16:4-6.
64. Claim 33 of the '764 patent claims "[t]he record carrier as claimed in claim 32, wherein said auxiliary codes are distinguishable from said address codes in that said auxiliary codes comprise bit combinations which do not occur in said address codes." CX-16, 16:7-10.
65. Claim 33 of the '764 patent is dependent upon Claim 32. CX-16, 16:7-10.
66. "[W]herein said auxiliary codes are distinguished from said address codes in that said auxiliary codes comprise bit combinations which do not occur in said address codes" as used in Claim 33 of the '764 patent means that although the auxiliary codes and address codes have the same format, there are differences in certain bits that allow the two to be distinguished from one another. Hesselink Tr. 643.
67. As described in the '764 specification, auxiliary codes are encoded such that the leading most significant bits in the code contain values that cannot represent valid address codes so that they can be immediately distinguished as auxiliary codes and recognized to carry control information rather than position information. CX-16, 7:7-39; Hesselink Tr. 631-633; *see generally*, CX-593C, '764 Illustration Slide 19.
68. Claim 33 does not use the word "periodic." CX-16, 7-10.

69. Claim 34 of the '764 patent claims "[t]he record carrier as claimed in claim 20, wherein said auxiliary codes are distinguishable from said address codes in that said auxiliary codes comprise bit combinations which do not occur in said address codes." CX-16, 16:11-14.
70. Claim 34 of the '764 patent is dependent upon Claim 20. CX-16, 16:11-14.
71. Claim 34 should be interpreted in the same way as Claim 33, but as further limiting Claim 20 rather than Claim 32. CX-16, 16:11-14; Hesselink Tr. 643-644.
72. Claim 34 does not use the word "periodic." CX-16, 16:11-14.
73. Synchronization codes are not auxiliary codes as defined in the '764 patent. Hesselink Tr. 2586-2589.
74. Dr. Mansuripur equates "auxiliary codes" as claimed in Claim 20 of the '764 patent and disclosed in the '764 patent specification with synchronization codes. *See, e.g.*, Mansuripur Tr. 1353, 1358.
75. The '764 patent describes the auxiliary codes as specific control codes needed for recording data and having a specific format. Hesselink Tr. 644.
76. Dr. Hesselink testified that the auxiliary code described in the '764 patent "is a specific code that has a specific meaning. Namely, it specifies control data for use by a device in recording an information signal on said track." Hesselink Tr. 2587; CX-16, 14:24-29.
77. Auxiliary codes have the same FM modulated signal in the wobble as an address code and have the same format of 8 channel bits for the synchronization code followed by 76 channel bits for minutes, seconds, frames, and error correction" Hesselink Tr. 642, 644-

645; CX-16, 4:44-5:31, Figs 2-3; *see generally*, CX-593C, '764 Patent Illustration Slides 16-17.

78. The term "auxiliary code" as used in the '764 patent does not merely include all codes that are different from address codes. Hesselink Tr. 644-645.
79. The '764 patent explicitly distinguishes between auxiliary codes and synchronization codes by, for example, describing a "suitable auxiliary signal comprising code signals 12 which alternate with synchronized signals 11" and further that "[t]he synchronized signals 11 are selected in such a way that they can be distinguished from the code signals 12." CX-16, 4:44-46, 59-61; Hesselink Tr. 2587; CX-619C, '764 Slide 3.
80. The specification of the '764 patent further describes how address codes and auxiliary codes can be placed in the code signals 12 by stating that "Fig. 3 shows a suitable format of 38-bit code words 17 represented by the code signals 12." CX-16, 4:65-66.
81. The specification goes on to state that "[p]referably, the 38-bit code words ... comprise address codes AC and auxiliary codes HC which can be distinguished from each other." CX-16, 5:6-10.
82. In the '764 patent, the auxiliary codes are described as being encoded in the code words 12, not in the synchronization signals 11. CX-16, Fig. 2, 4:44-46.
83. The '764 patent explicitly distinguishes between auxiliary codes and synchronization codes by, for example, describing an alternative embodiment for which it is possible to distinguish auxiliary codes from address codes by providing that "the code signals representing the address codes and the code signals representing the auxiliary codes are preceded by different synchronization signals." CX-16, 6:64-7:1; CX-619C, '764 Slide 6.

84. The synchronization signals as described in the '764 patent have a unique structure that makes them different from the information-carrying bits. CX-16, 4:59-61; Hesselink Tr. 2588.
85. Synchronization codes have no information associated with them and cannot be read. Hesselink Tr. 2588.
86. As disclosed in the '764 patent, auxiliary codes contain specific information that the recording device, having been adapted to control the recording process in dependence on auxiliary codes, can extract and use for controlling the recording process. CX-16, 2:7-12; Hesselink Tr. 2588-2589.
87. The '764 patent explicitly distinguishes between auxiliary codes and synchronization codes by, for example, stating in the specification that "it should be possible for the auxiliary codes and the address codes to be distinguished from one another. This can be achieved, for example, if the code signals representing the address codes and the code signals representing the auxiliary codes are preceded by different synchronization signals." CX-16, 6:64-7:1; CX-619C, '764 Slide 6.
88. The '764 specification describes encoding auxiliary code signal using biphasemark modulation so that a code bit signifying "0" is represented by "two bits of the same logic value" and a code bit signifying "1" is represented by "two ... bits of different logic values." CX-16; 4:44-64; CX-619C, '764 Slide 8; Hesselink Tr. 2590-2591.
89. Under the rules of biphasemark modulation, "the maximum number of successive bits of the same logic value is two at most." CX-16; 4:55-59; Hesselink Tr. 2590-2591; CX-619C, '764 Slide 8.

90. The '764 specification states that the synchronized code signals are chosen in such a way they can be distinguished from the code signals; this is accomplished by establishing that the synchronization codes violate the biphasemark modulation rules in that "the maximum number of successive bits of the same logic value in the synchronized signals is selected to be three." CX-16; 4:59-64; Hesselink Tr. 2590-2591; CX-619C, '764 Slide 8.
91. Because the synchronization codes are recorded such that they violate the encoding rules for the auxiliary signal, they cannot be read and cannot contain any information. Hesselink Tr. 2591.
92. Synchronization codes are analogous to quotation marks in that they indicate the beginning and end of a portion of text, but do not themselves have any content. Hesselink Tr. 2591-2592; CX-619C, '764 Slide 9.
93. The PTO initially rejected the application leading to the '764 patent in light of U.S. Patent No. 4,375,088 ("de Haan"), but stated that, despite having sync areas, de Haan "does not disclose the use of an auxiliary signal." CX-41, Paper no. 5, p. 3-4; CX-619C, '764 Slides 10-11; RX-77.
94. De Haan describes a synchronization area "compris[ing] two portions, namely an indication portion 10 and an address portion 11. The address portion 11 contains all the information required for controlling the recording process." RX-77, 7:1-8, Fig. 1c; CX-619C, '764 Slide 11.

95. A player is not required for a disc to infringe the asserted claims of the '764 patent. Hesselink Tr. 650-651.
96. The asserted claims of the '764 patent describes information that is physically encoded onto a disc in the shape of the wobble on the disc. It is possible to measure that wobble without a player and decode the information contained on the disc. Hesselink Tr. 651.
97. Dr. Hesselink testified that "what you do is you take the disc, and ... you measure the topology of the wobble. And from that topology, I can derive every element that we have discussed in this suit. I can find position signals. I can find the clock signal. I can find the auxiliary signals. I can find the distinguishing indicia." Hesselink Tr. 2596.
98. The asserted claims of the '764 patent only require "that the disc is configured to achieve certain results." Hesselink Tr. 2596; CX-16.
99. Dr. Hesselink testified that "[i]t is not necessary to actually put this in a player. All the information about the disc that is under contention here is located in the wobble." Hesselink Tr. 2596; CX-16.

B. Infringement Determination

100. The CD-Rs manufactured by Princo have a preformed recording track in the form of a groove which is transversely modulated using frequency modulation in accordance with an auxiliary signal. Hesselink Tr. 652-653; CX-64C, pp. 6-7; CX-79C; CX 593C, '764 Patent Illustration Slide 24.
101. The CD-RWs manufactured by Princo have a preformed recording track in the form of a groove which is transversely modulated using frequency modulation in accordance with

an auxiliary signal. Hesselink Tr. 652-653; CX-63C, pp. 6-7; CX-79C; CX 593C, '764 Patent Illustration Slide 24.

102. The CD-Rs manufactured by Gigastorage have a preformed recording track in the form of a groove which is transversely modulated using frequency modulation in accordance with an auxiliary signal. Hesselink Tr. 652-653; CX-62C, pp. 6-7; CX-79C; CX 593C, '764 Patent Illustration Slide 24.
103. The CD-RWs manufactured by Gigastorage have a preformed recording track in the form of a groove which is transversely modulated using frequency modulation in accordance with an auxiliary signal. Hesselink Tr. 652-653; CX-61C, pp. 6-7; CX-79C; CX 593C, '764 Patent Illustration Slide 24.
104. The auxiliary signal modulated into the CD-Rs manufactured by Princo comprises successive address codes specifying addresses of successive track portions at which said address codes are located as well as auxiliary codes, arranged among these address codes, that specify control data for use by a device in recording an information signal on the disc. Hesselink Tr. 652-653; CX-64C, p. 14-15, 17; CX-78C.
105. The auxiliary signal modulated into the CD-RWs manufactured by Princo comprises successive address codes specifying addresses of successive track portions at which said address codes are located as well as auxiliary codes, arranged among these address codes that specify control data for use by a recording device in recording an information signal on the disc. Hesselink Tr. 652-653; CX-63C, p. 14-15, 17; CX-78C.
106. The auxiliary signal modulated into the CD-Rs manufactured by Gigastorage comprises successive address codes specifying addresses of successive track portions at which said

address codes are located as well as auxiliary codes, arranged among these address codes, that specify control data for use by a recording device in recording an information signal on the disc. Hesselink Tr. 652-653; CX-62C, p. 14-15, 17; CX-78C.

107. The auxiliary signal modulated into the CD-RWs manufactured by Gigastorage comprises successive address codes specifying addresses of successive track portions at which said address codes are located as well as auxiliary codes, arranged among these address codes, that specify control data for use by a recording device in recording an information signal on the disc. Hesselink Tr. 652-653; CX-61C, p. 14-15, 17; CX-78C.
108. The auxiliary codes in the CD-Rs manufactured by Princo have identifying indicia which distinguishes them from the address codes. Hesselink Tr. 652-653; CX-64C, p. 7, 17-18; CX-78C; CX-79C; '764 Patent Illustration Slide 24.
109. The auxiliary codes in the CD-RWs manufactured by Princo have identifying indicia which distinguishes them from the address codes. Hesselink Tr. 652-653; CX-63C, p. 7, 17-18; CX-78C; CX-79C; '764 Patent Illustration Slide 24.
110. These auxiliary codes in the CD-Rs manufactured by Gigastorage have identifying indicia which distinguishes them from the address codes. Hesselink Tr. 652-653; CX-62C, p. 7, 17-18; CX-78C; CX-79C; '764 Patent Illustration Slide 24.
111. These auxiliary codes in the CD-RWs manufactured by Gigastorage have identifying indicia which distinguishes them from the address codes. Hesselink Tr. 652-653; CX-61C, p. 7, 17-18; CX-78C; CX-79C; '764 Patent Illustration Slide 24.

112. The CD-Rs manufactured by Princo have address codes and auxiliary codes arranged such that there are codes at equidistant locations on the track. Hesselink Tr. 654-655; CX-64C, p. 10, 17-18; *see generally* CX-593C, '764 Patent Illustration Slide 25-26.
113. The CD-RWs manufactured by Princo have address codes and auxiliary codes arranged such that there are codes at equidistant locations on the track. Hesselink Tr. 654-655; CX-63C, p. 10, 17-18; *see generally* CX-593C, '764 Patent Illustration Slide 25-26.
114. The CD-Rs manufactured by Gigastorage have address codes and auxiliary codes arranged such that there are codes at equidistant locations on the track. Hesselink Tr. 654-655; CX-62C, p. 10, 17-18; *see generally* CX-593C, '764 Patent Illustration Slide 25-26.
115. The CD-RWs manufactured by Gigastorage have address codes and auxiliary codes arranged such that there are codes at equidistant locations on the track. Hesselink Tr. 654-655; CX-61C, p. 10, 17-18; *see generally* CX-593C, '764 Patent Illustration Slide 25-26.
116. The address codes in the CD-Rs manufactured by Princo indicate distances as measured in the track direction between locations at which the codes are located and a specific reference position. Hesselink Tr. 654-656; CX-64C, p. 15; CX-76C.
117. The address codes in the CD-RWs manufactured by Princo indicate distances as measured in the track direction between locations at which the codes are located and a specific reference position. Hesselink Tr. 654-656; CX-63C, p. 15; CX-76C.

118. The address codes in the CD-Rs manufactured by Gigastorage indicate distances as measured in the track direction between locations at which the codes are located and a specific reference position. Hesselink Tr. 654-656; CX-62C, p. 15; CX-76C.
119. The address codes in the CD-RWs manufactured by Gigastorage indicate distances as measured in the track direction between locations at which the codes are located and a specific reference position. Hesselink Tr. 654-656; CX-61C, p. 15; CX-76C.
120. In the CD-Rs manufactured by Princo, because the codes in the auxiliary signal are located at equidistant locations on the track, they can be used to derive a clock signal; using these codes, a clock can be derived having a frequency of 75 Hz. Hesselink Tr. 656; CX-64C, p. 10; *see generally* CX-593C, '764 Patent Illustration Slide 26.
121. In the CD-RWs manufactured by Princo, because the codes in the auxiliary signal are located at equidistant locations on the track, they can be used to derive a clock signal; using these codes, a clock can be derived having a frequency of 75 Hz. Hesselink Tr. 656; CX-63C, p. 10; *see generally*, CX-593C, '764 Patent Illustration Slide 26.
122. In the CD-Rs manufactured by Gigastorage, because the codes in the auxiliary signal are located at equidistant locations on the track, they can be used to derive a clock signal; using these codes, a clock can be derived having a frequency of 75 Hz. Hesselink Tr. 656; CX-62C, p. 10; *see generally*, CX-593C, '764 Patent Illustration Slide 26.
123. In the CD-RWs manufactured by Gigastorage, because the codes in the auxiliary signal are located at equidistant locations on the track, they can be used to derive a clock signal; using these codes, a clock can be derived having a frequency of 75 Hz. Hesselink Tr. 656; CX-61C, p. 10; *see generally*, CX-593C, '764 Patent Illustration Slide 26.

124. The CD-Rs manufactured by Princo include absolute time codes that specify distances as playing time from a reference position. Hesselink Tr. 656-657; CX-64C, p. 15; CX-76C.
125. The CD-RWs manufactured by Princo include absolute time codes that specify distances as playing time from a reference position. Hesselink Tr. 656-657; CX-63C, p. 15; CX-76C.
126. The CD-Rs manufactured by Gigastorage include absolute time codes that specify distances as playing time from a reference position. Hesselink Tr. 656-657; CX-62C, p. 15; CX-76C.
127. The CD-RWs manufactured by Gigastorage include absolute time codes that specify distances as playing time from a reference position. Hesselink Tr. 656-657; CX-61C, p. 15; CX-76C.
128. The track on the CD-R discs manufactured by Princo is transversely modulated such that there is a periodic excursion transverse to the track direction which has a frequency in conformity with the auxiliary signal. Hesselink Tr. 659-660; CX-64C, pp. 6-8.
129. The track on the CD-RW discs manufactured by Princo is transversely modulated such that there is a periodic excursion transverse to the track direction which has a frequency in conformity with the auxiliary signal. Hesselink Tr. 659-660; CX-63C, pp. 6-8.
130. The track on the CD-Rs manufactured by Gigastorage is transversely modulated such that there is a periodic excursion transverse to the track direction which has a frequency in conformity with the auxiliary signal. Hesselink Tr. 659-660; CX-62C, pp. 6-8.

131. The track on the CD-RWs manufactured by Gigastorage is transversely modulated such that there is a periodic excursion transverse to the track direction which has a frequency in conformity with the auxiliary signal. Hesselink Tr. 659-660; CX-61C, pp. 6-8.
132. The track portions on the CD-Rs manufactured by Princo are substantially concentric about a common center of rotation. Hesselink Tr. 660; CX-64C, p. 3.
133. The track portions on the CD-RWs manufactured by Princo are substantially concentric about a common center of rotation. Hesselink Tr. 660; CX-63C, p. 3.
134. The track portions on the CD-Rs manufactured by Gigastorage are substantially concentric about a common center of rotation. Hesselink Tr. 660; CX-62C, p. 3.
135. The track portions on the CD-RWs manufactured by Gigastorage are substantially concentric about a common center of rotation. Hesselink Tr. 660; CX-61C, p. 3.
136. The address codes in the CD-Rs manufactured by Princo indicate the addresses of the track portions in relation to a reference position which is at a predetermined radial distance from said center of rotation. Hesselink Tr. 660; CX-64C, p. 15, 20-21; CX-76C; *see generally* CX-593C, '764 Patent Illustration Slides 30-31.
137. The address codes in the CD-RWs manufactured by Princo indicate the addresses of the track portions in relation to a reference position which is at a predetermined radial distance from said center of rotation. Hesselink Tr. 660; CX-63C, p. 15, 20-21; CX-76C; *see generally* CX-593C, '764 Patent Illustration Slides 30-31.
138. The address codes in the CD-Rs manufactured by Gigastorage indicate the addresses of the track portions in relation to a reference position which is at a predetermined radial

- distance from said center of rotation. Hesselink Tr. 660; CX-62C, p. 15, 20-21; CX-76C; *see generally* CX-593C, '764 Patent Illustration Slides 30-31.
139. The address codes in the CD-RWs manufactured by Gigastorage indicate the addresses of the track portions in relation to a reference position which is at a predetermined radial distance from said center of rotation. Hesselink Tr. 660; CX-61C, p. 15, 20-22; CX-76C; *see generally* CX-593C, '764 Patent Illustration Slides 30-31.
140. The predetermined radial distance of the reference position on a CD-R or CD-RW disc is the start of the program area, which is located approximately 25 millimeters from the center of the disc. Hesselink Tr. 660.
141. The auxiliary codes in the CD-Rs manufactured by Princo specify a track portion at a radial distance from the start of the program area at which a table of contents should be recorded, which is the same as the start position of the lead-in area of the disc. Hesselink Tr. 661-663; CX-64C, p. 14, 17, 21-22.
142. The auxiliary codes in the CD-RWs manufactured by Princo specify a track portion at a radial distance from the start of the program area at which a table of contents should be recorded, which is the same as the start position of the lead-in area of the disc. Hesselink Tr. 661-663; CX-63C, p. 14, 17-18, 21-22.
143. The auxiliary codes in the CD-Rs manufactured by Gigastorage specify a track portion at a radial distance from the start of the program area at which a table of contents should be recorded, which is the same as the start position of the lead-in area of the disc. Hesselink Tr. 661-663; CX-62C, p. 14, 17, 20-21.

144. The auxiliary codes in the CD-RWs manufactured by Gigastorage specify a track portion at a radial distance from the start of the program area at which a table of contents should be recorded, which is the same as the start position of the lead-in area of the disc.
Hesselink Tr. 661-663; CX-61C, p. 14, 17-18, 21-22.
145. In the CD-Rs manufactured by Princo, the lead-in area, where the table of contents is recorded, is closer to the center of the disc than is the start of the program area. Hesselink Tr. 664; CX-64C, p. 14, 20-22.
146. In the CD-RWs manufactured by Princo, the lead-in area, where the table of contents is recorded, is closer to the center of the disc than is the start of the program area. Hesselink Tr. 664; CX-63C, p. 14, 20-21.
147. In the CD-Rs manufactured by Gigastorage, the lead-in area, where the table of contents is recorded, is closer to the center of the disc than is the start of the program area.
Hesselink Tr. 664; CX-62C, p. 14, 20-21.
148. In the CD-RWs manufactured by Gigastorage, the lead-in area, where the table of contents is recorded, is closer to the center of the disc than is the start of the program area. Hesselink Tr. 664; CX-61C, p. 14, 20-21.
149. The auxiliary codes in the CD-Rs manufactured by Princo specify a track portion at a radial distance from the start of the program area at which a lead-out signal must commence in order to be completed before the end of the track. Hesselink Tr. 664; CX-64C, p. 14, 21-22.
150. The auxiliary codes in the CD-RWs manufactured by Princo specify a track portion at a radial distance from the start of the program area at which a lead-out signal must

- commence in order to be completed before the end of the track. Hesselink Tr. 664; CX-63C, p. 14, 21-22.
151. The auxiliary codes in the CD-Rs manufactured by Gigastorage specify a track portion at a radial distance from the start of the program area at which a lead-out signal must commence in order to be completed before the end of the track. Hesselink Tr. 664; CX-62C, p. 14, 21-22.
 152. The auxiliary codes in the CD-RWs manufactured by Gigastorage specify a track portion at a radial distance from the start of the program area at which a lead-out signal must commence in order to be completed before the end of the track. Hesselink Tr. 664; CX-61C, p. 14, 21-22.
 153. The auxiliary codes in the CD-Rs manufactured by Princo specify the location of the track portion at which a table of contents should be recorded, which is the same as the start position of the lead-in area of the disc. Hesselink Tr. 664-665; CX-64C, p. 14, 20-21.
 154. The auxiliary codes in the CD-RWs manufactured by Princo specify the location of the track portion at which a table of contents should be recorded, which is the same as the start position of the lead-in area of the disc. Hesselink Tr. 664-665; CX-63C, p. 14, 20-21.
 155. The auxiliary codes in the CD-Rs manufactured by Gigastorage specify the location of the track portion at which a table of contents should be recorded, which is the same as the start position of the lead-in area of the disc. Hesselink Tr. 661-663; CX-62C, p. 14, 20-21.

156. The auxiliary codes in the CD-RWs manufactured by Gigastorage specify the location of the track portion at which a table of contents should be recorded, which is the same as the start position of the lead-in area of the disc. Hesselink Tr. 661-663; CX-61C, p. 14, 20-21.
157. The auxiliary codes in the CD-R and CD-RW discs manufactured by Princo and Gigastorage specify the location of the track portion at which a lead-out signal must commence in order to be completed before the end of the track. Hesselink Tr. 665.
158. The auxiliary codes in the CD-R and CD-RW discs manufactured by Princo and Gigastorage specify the location of the track portion at which a lead-out signal must commence in order to be completed before the end of the track. Hesselink Tr. 665.
159. The address codes and the auxiliary codes in the CD-Rs manufactured by Princo have the same data format. Hesselink Tr. 666; CX-64C, p. 7, 17-18; CX-79C; *see generally*, CX-593C, '764 Patent Illustration Slides 38-39.
160. The address codes and the auxiliary codes in the CD-RWs manufactured by Princo have the same data format. Hesselink Tr. 666; CX-63C, p. 7, 17-18; CX-79C; *see generally*, CX-593C, '764 Patent Illustration Slides 38-39.
161. The address codes and the auxiliary codes in the CD-Rs manufactured by Gigastorage have the same data format. Hesselink Tr. 666; CX-62C, p. 7, 17-18; CX-79C; *see generally*, CX-593C, '764 Patent Illustration Slides 38-39.
162. The address codes and the auxiliary codes in the CD-RWs manufactured by Gigastorage have the same data format. Hesselink Tr. 666; CX-61C, p. 7, 17-18; CX-79C; *see generally*, CX-593C, '764 Patent Illustration Slides 38-39.

163. The auxiliary codes in the CD-Rs manufactured by Princo comprise bit combinations that do not occur in the address codes. Hesselink Tr. 667; CX-64C, p. 17-18.
164. The auxiliary codes in the CD-RWs manufactured by Princo comprise bit combinations that do not occur in the address codes. Hesselink Tr. 667; CX-63C, p. 17-18.
165. The auxiliary codes in the CD-Rs manufactured by Gigastorage comprise bit combinations that do not occur in the address codes. Hesselink Tr. 667; CX-62C, p. 17-18.
166. The auxiliary codes in the CD-RWs manufactured by Gigastorage comprise bit combinations that do not occur in the address codes. Hesselink Tr. 667; CX-61C, p. 17-18.
167. Princo Taiwan admitted in its second supplemental response to Philips' interrogatories that, in the CD-R and CD-RW discs that it manufactures, "control information is included in the wobble of the track." CX-108C, p. 5.
168. Gigastorage Taiwan admitted in its second supplemental response to Philips' interrogatories that, in the CD-R and CD-RW discs that it manufactures, "control information is included in the wobble of the track." CX-107C, p. 6.
169. The encoder used by Gigastorage and Princo to create the stampers that they use to manufacture CD-Rs and CD-RWs "can output the optimum recording power, lead-in area start time and last possible lead-out start time for the preset format. . . in addition to the ATIP time information." CX-596, p. GOT 004681.
170. The encoder used by Gigastorage and Princo to create the stampers that they use to manufacture CD-R and CD-RW discs encodes "[a]t a rate of one in every 10 ATIP start

time cycles, the optimum recording power, lead-in area start time and last possible lead-out start time.” CX-596, p. GOT 004682.

171. Mark Tsai testified that when Gigastorage Taiwan makes the stampers that it uses to manufacture CD-R and CD-RW discs, it is necessary to input ATIP information when the stamper is “cut” such as the start of the lead in area and start of the lead out area. Tsai Dep. Tr. 138-139.
172. Dr. Hesselink relied in part on tests performed by Dr. Chernoff of ASM laboratory. Hesselink Tr. 657, 669, 687.
173. Dr. Hesselink identified the tasks of “significant importance” that Dr. Chernoff was instructed to carry out and took extensive efforts to ensure Dr. Chernoff did these tasks correctly. The undiscussed tasks Dr. Chernoff performed did not require supervision. Hesselink Tr. 705.
174. The measurements taken by Dr. Chernoff were “standard measurements in the industry.” Hesselink Tr. 669, 678, 685.
175. Dr. Hesselink did not need to supervise Dr. Chernoff in person because Dr. Chernoff used “standard approaches, standard techniques,” and “standard analysis of the data.” Hesselink Tr. 677- 685, 789-794.
176. It is standard procedure in the industry to employ an assistant such as Dr. Chernoff to take measurements of this type. Hesselink Tr. 771.
177. Dr. Chernoff is highly qualified and has a strong professional reputation in his field. Hesselink Tr. 684, 772.

178. Dr. Hesselink was very familiar with the type of equipment Dr. Chernoff used to take the measurements - which was standard industry equipment - and made an extensive effort to ensure that Dr. Chernoff's equipment was adequate for the job. Hesselink Tr. 685, 689, 682, 771-772; CX-592.
179. Dr. Hesselink provided Dr. Chernoff with an extensive test protocol to calibrate his atomic force microscope. After Dr. Chernoff took the test measurements, the two men discussed the results, and were satisfied the machine was working properly. Hesselink Tr. 687-688.
180. After receiving Dr. Chernoff's results, Dr. Hesselink reviewed and compiled the raw data to make it user friendly. Hesselink Tr. 678-679.
181. Dr. Hesselink independently checked Dr. Chernoff's results. In order to verify some of Dr. Chernoff's results, Dr. Hesselink used an EFM technique. The EFM technique is more than adequate to take such measurements. In order to verify other results, Dr. Hesselink used methods that were more accurate than the methods used by Dr. Chernoff. In all instances, Dr. Hesselink's verification efforts were sufficient to guarantee the reliability of Dr. Chernoff's work. Hesselink Tr. 680-684.
182. Dr. Chernoff created his visual diagrams, including CX-67C, using an "industry standard approach, widely accepted by scientists, engineers, and laypersons around the world." Hesselink Tr. 693.
183. The software used to generate visualization diagrams is irrelevant to the substantive content of the diagrams. Hesselink Tr. 691.

184. The colors used in Dr. Chernoff's visual displays are irrelevant to the substantive content contained therein. Hesselink Tr. 691, 693.
185. Dr. Hesselink and Dr. Chernoff discussed the procedure for removing the protective layer from the discs at "great length." Hesselink Tr. 697-698.
186. Dr. Chernoff properly followed "standard procedure" to remove the protective covering of the discs. Hesselink Tr. 697-98.
187. The cutting implement used to remove the protective cover was used at the perimeter of the disc so that it could not damage the area where the measurements were taken. This is "standard procedure." Hesselink Tr. 697-698, 700.
188. The exact details as to how the protective layer was removed is irrelevant to the accuracy of the data. Hesselink Tr. 704.
189. Dr. Hesselink's visual examination of CX-67C supports the conclusion that the mechanical method of removing the protective cover caused no damage to the areas of the disc where the measurements were taken. Hesselink Tr. 706-707.
190. To avoid the risk that measurements would be skewed by damage to the disc due to the removal of the protective cover, measurements were taken at different areas - a method that allowed Dr. Hesselink to determine that the measurements were accurate and the discs were undamaged. Hesselink Tr. 785-786.
191. Although there may have been some damage done to the disc when the protective cover was removed, the damaged portion was not measured by Dr. Chernoff. "The elaborate and precise calibration process that" Dr. Hesselink and Dr. Chernoff undertook ensured

that “the areas in which [they] made the measurements, the groove structure was not altered in any way.” Dr. Hesselink was able to verify this fact. Hesselink Tr. 706-707.

192. The CD-R and CD-RW discs that Princo Taiwan manufactures “comply with the relevant Orange Book standards.” CX-106C, p. 4. The CD-R and CD-RW discs that Gigastorage Taiwan manufactures “comply with the relevant Orange Book standards.” CX-98C, p. 4.
193. As set forth in the Orange Book (Part II), in CD-R discs the extra information codes specify parameters such as indicative optimum writing power, reference speed, disc type, the start position of the lead-in area, and start position of the lead-out area. CX-163C, p. IV-4 - IV-7, ¶¶ IV.4.1 - IV.4.6.
194. As set forth in the Orange Book (Part II), in CD-R discs each extra information code is “followed by nine ATIP frames encoded with timecode information.” CX-163C, p. IV-3, ¶ IV.4.
195. As set forth in the Orange Book (Part II), in CD-R discs, the ATIP frame frequency is 75 Hz. CX-163C, p. IV-1, ¶ IV.1.
196. As set forth in the Orange Book (Part II), in CD-R discs “[t]he format of the ATIP time information is identical to the time encoding in Subcode-Q” used in the CD-standard. CX-163C, p. IV-2, ¶ IV.4.
197. As set forth in the Orange Book (Part II), in CD-R discs the ATIP time-code is in minutes, seconds and frames and is 00:00:00 at the start of the Program Area. CX-163C, p. IV-1, ¶ IV.3; p. IV-2, ¶ IV.4; p. Fig-6, Fig. IV-1.
198. As set forth in the Orange Book (Part II), in CD-R discs the start of the program area is at a location at 50mm disc diameter (25 mm disc radius). CX-163C, p. Fig-6, Fig. IV-1.

199. As set forth in the Orange Book (Part II), in CD-R discs, Special Information 2 “specifies the start position of the Lead-in Area in ATIP timecode.” CX-163C, p. IV-7, ¶ IV.4.2.
200. As set forth in the Orange Book (Part II), in CD-R discs, the Table of Contents is located in the Lead-in area and “contains information about the Tracks on the disc.” CX-163C, p. I-5, ¶ 1.4.1.
201. As set forth in the Orange Book (Part II), in CD-R discs, the lead-in area is closer to the center of the disc than is the start of program area. CX-163C, p. Fig-6, Fig. IV-1.
202. As set forth in the Orange Book (Part II), in CD-R discs, Special Information 3 “specifies the last possible start position of the Lead-out Area in ATIP timecode.” CX-163C, p. IV-7, ¶ IV.4.3.
203. As set forth in the Orange Book (Part II), in CD-R discs “[i]n addition to the normal timecode, in the Lead-in Area extra CD-R information is encoded in the ATIP Minutes, Seconds and Frames bytes. This extra information is identified by specific combinations of the MSB’s of the Minutes, Seconds and Frame bytes (bit 5, 13 and 21) as defined in figure IV.4-1.” CX-163C, p. IV-2, ¶ IV.4.
204. As set forth in the Orange Book (Part III), in CD-RW discs the extra information codes specify parameters such as indicative optimum writing power, reference speed, disc type, the start position of the lead-in area, and start position of the lead-out area. CX-162C, p. IV-4 - IV-13, ¶¶ IV.4.1 - IV.4.6.
205. As set forth in the Orange Book (Part III), in CD-RW discs each extra information code is “followed by nine ATIP frames encoded with timecode information.” CX-162C, p. IV-3, ¶ IV.4.

206. As set forth in the Orange Book (Part III), in CD-RW discs, the ATIP frame frequency is 75 Hz. CX-162C, p. IV-1, ¶ IV.1.
207. As set forth in the Orange Book (Part III), in CD-RW discs “[t]he format of the ATIP time information is identical to the time encoding in Subcode-Q” used in the CD-standard. CX-162C, p. IV-2, ¶ IV.4.
208. As set forth in the Orange Book (Part III), in CD-RW discs the ATIP time-code is in minutes, seconds and frames and is 00:00:00 at the start of the Program Area. CX-162C, p. IV-1, ¶ IV.3; p. IV-2, ¶ IV.4; p. Fig-6, Fig. IV-1.
209. As set forth in the Orange Book (Part III), in CD-RWs the start of the program area is at a location at 50mm disc diameter (25 mm disc radius). CX-162C, p. Fig-6, Fig. IV-1.
210. As set forth in the Orange Book (Part III), in CD-RWs, Special Information 2 “specifies the start position of the Lead-in Area in ATIP timecode.” CX-162C, p. IV-7, ¶ IV.4.2.
211. As set forth in the Orange Book (Part III), in CD-RWs, the Table of Contents is located in the Lead-in area and “contains information about the Tracks on the disc.” CX-162C, p. I-5, ¶ 1.4.1.
212. As set forth in the Orange Book (Part III), in CD-RWs, the lead-in area is closer to the center of the disc than is the start of program area. CX-162C, p. Fig-6, Fig. IV-1.
213. As set forth in the Orange Book (Part III), in CD-RWs, Special Information 3 “specifies the last possible start position of the Lead-out Area in ATIP timecode.” CX-162C, p. IV-7, ¶ IV.4.3.
214. As set forth in the Orange Book (Part III), in CD-RW discs, “[i]n addition to the normal timecode, in the Lead-in Area extra CD-RW information is encoded in the ATIP Minutes,

Seconds and Frames bytes. This extra information is identified by specific combinations of the MSB's of the Minutes, Seconds and Frame bytes (bit 5, 13 and 21) as defined in figure IV.4-1." CX-162C, p. IV-2, ¶ IV.4.

C. Validity

215. U.S. Patent No. 4,907,216 ("Rijnsburger"), cited by Respondents as prior art to the '764 patent, discloses only sync signals; there is no disclosure of auxiliary codes. Hesselink Tr. 2595; RX-66, 4:20-51.
216. The '825 Patent, cited by Respondents as prior art to the '764 patent, discloses only sync signals; there is no disclosure of auxiliary codes or an auxiliary signal. Hesselink Tr. 2595; CX-17, 6:1-25.
217. The Lagadec Patent, cited by Respondents as prior art to the '764 patent, discloses only sync signals; there is no disclosure of auxiliary codes or an auxiliary signal. Hesselink Tr. 2595; RX-177, Figs. 5A, 5B.
218. The Blue Book, cited by Respondents as prior art to the '764 patent, discloses only sync signals; there is no disclosure of auxiliary codes or an auxiliary signal. Hesselink Tr. 2595; CX-155C, p. 11.
219. The asserted claims of the '764 patent would not have been obvious to one of ordinary skill in the art in light of Rijnsburger, Raaijmakers, Lagadec and the Blue Book. Hesselink Tr. 2595-2596.
220. U.S. Patent No. 4,496,993 ("Sugiyama") does not show a table of contents. Hesselink Tr. 2593; RX-79, 5:1-4, 3:5-18.

221. Dr. Hesselink testified that “[a] table of contents contains information by which the player can find certain segments in the program area where certain information is recorded.” Hesselink Tr. 2593.
222. Dr. Hesselink testified that “[d]isclosed in Sugiyama is just the beginning of the sector and the end of the sector. There is no table of contents.” Hesselink Tr. 2594; RX-79, 5:1-4, 3:5-18; Mansuripur 1227-1228.
223. In Sugiyama “there’s no place that you can go to and say what are the different sectors This is not a reference that teaches the table of contents.” Hesselink Tr. 2594; RX-79.
224. Sugiyama “is not a reference that teaches the table of contents, and furthermore, it does not teach the table of contents, that it has to be recorded in the program area at a particular location.” Hesselink Tr. 2594; RX-79.
225. The asserted claims of the ‘764 patent would not have been obvious to one of ordinary skill in the art in light of Sugiyama. Hesselink Tr. 2593-2596.
226. U.S. Patent No. 4,789,974 (“Taniyama”) teaches “that this particular disc can be rotated at a constant linear velocity or constant annular [sic] velocity and just tells the player in certain locations you have to rotate at a faster rate or slower rate or maintain it at a fixed speed. And so this is clearly not the lead-out area.” Hesselink Tr. 2594; RX-76, 4:37-43, 6:55-7:10; CX-619C, ‘764 Slide 13.
227. In contrast, “[t]he lead-out area is very simply that when you write on the disc, you have to specify a location before which you must write lead-out sequence in order not to run out of space when you have written that 90-second sequence.” Hesselink Tr. 2594.

228. Taniyama does not describe where the last recorded section has to be written before you run out of space on the disc. Hesselink Tr. 2595; RX-76.
229. Taniyama describes recording “control conditions” on the disc by “precut[ting] them in the innermost track” which is done “as a set of existence and nonexistence of the pits.” RX-76, 2:57-64, 4:44-49.
230. Taniyama does not disclose encoding control information via transverse modulation of a pre-groove or track. RX-76. The asserted claims of the ‘764 patent would not have been obvious to one of ordinary skill in the art in light of Taniyama. Hesselink Tr. 2594-2596.

VIII. DOMESTIC INDUSTRY

1. Respondents stipulated that Philips “has satisfied its burden of proof on the domestic industry -- both on the ‘technical prong’ and ‘economic prong’ -- based upon the manufacturing in the United States of CD-R discs by Mitsui Advanced Media, Inc. [“Mitsui”] and/or CD-RW discs by Imation Corporation [“Imation”] (including each of their successors and assigns).” Stipulation and Statement of Non-Opposition at 1.

IX. PATENT MISUSE

A. Background Facts

1. Philips and Sony, jointly developed CD-R and CD-RW technology in the early 1980s, as did others. Beune, Tr. 2334; L.Chen Tr. 980:2-9; RX-1379C at p. 79.
2. Philips' and Sony's joint development of CD-R and CD-RW technology was an outgrowth of their earlier joint development work on compact disc technology and the work of others. Mons, Tr. 371; L.Chen Tr. 980:2-9; RX-1379C at p. 79
3. The development of recordable compact disc technology was initially spurred by the interest expressed to Philips in creating a user-recordable optical disc compatible with existing CD hardware. Mons, Tr. 365.
4. A key goal in developing recordable disc technology was to create compatibility rules that would ensure that the discs would be compatible with standard players and drives made by all manufacturers. Mons, Tr. 416.
5. Standards in CD and recordable CD technology ensure that a CD-R disc, whether prerecorded or recordable, purchased anywhere in the world will work with any CD player anywhere else in the world. Van Dijk Dep. Tr. 147-48.
6. Standards in CD and recordable CD technology also ensure that CD-R discs manufactured by different manufacturers are capable of working in CD-recorders manufactured by different manufacturers. Mons, Tr. 416.
7. After Philips and Sony introduced compact disc technology, companies interested in manufacturing compact discs sought to license Philips' and Sony's patents for compact disc technology of both companies. Beune, Tr. 2334-35.

8. Philips and Sony licensed CD-R and CD-RW disc technology in a joint license through a joint licensing program. Beune, Tr. 2334-2335.

1. The “Orange Book”

9. The patents at issue are among those in their patent pools that Complainant alleges are essential for manufacturers to implement the technical standards for manufacture of CD-Rs and CD-RWs as set out in two publications that are jointly issued by Philips and Sony Corporation (“Sony”). Complaint, ¶ 2.4.

10. One of these publications is entitled “Compact Disc Recordable System Description” (for CD-Rs) and the other is entitled “Compact Disc Rewriteable System Description” (for CD-RWs). RX-407C; RX-408C.

11. The “Orange Book” is the common name given to the CD-R (Part II) and CD-RW (Part III) system specifications. CX-162C (p. I-2); CX-163C (p. I-2).

12. The versions of these sections of the Orange Book that were introduced into evidence are “Part II: CD-R Version 3.1,” dated December 1998 (RX-407C), and “Part III: CD-RW Version 2.0,” dated August 1998 (RX-408C).

13. Orange Book Part II (Exhibit RX-407C) is the system specification for CD-R technology. McLaughlin Tr. at 1502:10-16; Mons Tr. at 444:6-12.

14. Orange Book Part III (Exhibit RX-408C) is the system specification for CD-RW technology. McLaughlin Tr. at 1502:10-16; Mons Tr. at 444:6-12.

15. The “CD-R System” is defined under both the joint and Philips-only CD-R disc license agreements as the Compact Disc Recordable System which is capable of recording signals or reading irreversibly stored signals and subsequently reproducing signals in

- digital form compatible with one of the CD Systems.” *See, e.g.*, CX-451C (Art. 1.05); CX-501C (Art. 1.05).
16. Both the joint and Philips-only CD-RW disc license agreements grant licensees “a non-exclusive, non-transferable license under the Licensed Patents” “to manufacture Licensed Products” “in accordance with the relevant Standard Specifications.” *See, e.g.*, CX-436C (Art. 2.01); CX-469C (Art. 2.01).
 17. Much like the CD-R disc license agreements, both the joint and Philips-only CD-RW disc licenses define a “Licensed Product” as a “CD-RW Disc,” which is “designed and manufactured for recording/rewriting signals thereon and the reproduction of signals from such CD-RW Disc in accordance with the CD-Audio Standard Specification.” *See, e.g.*, CX-436C (Art. 1.07); CX-469C (Art. 1.09).
 18. The Orange Book sets forth technical specifications that describe the optical signal characteristics, physical arrangement, writing methods, and testing conditions for CD-R (Orange Book Part II) and CD-RW (Orange Book Part III) discs. CX-282C (p. 1).
 19. First published in 1990, the Orange Book originally described only CD-R discs and recorders capable of single speed recording. Due to rapid advances in hardware and media technology, the Orange Book specification was supplemented to include description of CD-RW discs and recorders in 1996. CX-282C (p. 1).
 20. There have been several changes to the Orange Book standards since they were first published. Beune, Tr. 2353; *compare, e.g.*, CX-163C with CX-165C.
 21. The Orange Book’s technical specifications for CD-R and CD-RW products promote, *inter alia*, both forward and backward compatibility, *i.e.* ensuring interoperability among

- existing and future discs and drives. McCarthy, Tr. 2017; McLaughlin Tr. 1513:5-25.
22. CD-R and CD-RW discs did not exist in their commercial form until after the Orange Book specification was made available in 1989. Beune, Tr. 2376; 2342; Bratic, Tr. 1813-1814.
 23. Some characteristics that the Orange Book defines for CD-R and CD-RW are not mandatory. Mons Tr. at 453:18-21.
 24. A disc need not comply with the recommended or optional characteristics in the Orange Book to be considered Orange Book compliant. McLaughlin Tr. at 1504:10-18; Mons Tr. at 453:22-454:2.
 25. Examples of disc features and functions that appear in the Orange Book that by the very terms of the Orange Book are not mandatory include: methods of optimum power control (OPC), Running OPC, write strategy, skip/unskip functionality, and disc identification methods. McLaughlin Tr. at 1506:7-1507:9.
 26. The Red Book is a set of specifications that need to be satisfied by CD digital audio discs and players. McLaughlin Tr. at 1503:19-23; RX-2007C.
 27. Dr. McLaughlin studied the Red Book because one of the purposes of the Orange Book is to ensure that CD-R discs are backward compatible to CD digital audio systems, which are covered by Red Book specifications. McLaughlin Tr. at 1504:1-9.
 28. Optical Power Control (OPC) is an algorithm, a procedure carried out by an optical drive to determine the optimal write power for recording to a disc. McLaughlin Tr. at 1516:24-1518:7; Kablau Dep. Tr. at 89:24-90:4.
 29. Optimum power control may be implemented by a recorder in whatever fashion the

- manufacturer chooses, so long as the recorded disc is Red Book compliant. Heemskerk Dep. Tr. at 308:16-309:2.
30. The method of performing OPC is not mandatory in the Orange Book because it is discussed in the “recommendations and clarifications” section of Orange Book part II at Section B3, where one possible method of performing the OPC is identified. McLaughlin Tr. at 1507:10-1508:12; RX-407C at PH015759.
 31. The method of performing OPC is not mandatory because Orange Book part II Section B3.5 recommends designing the OPC procedure in a certain way, which indicates there is more than one option. McLaughlin Tr. at 1508:13-21; RX-407C at PH015759.
 32. The method of performing OPC is not mandatory because the language in Orange Book part II Section B3.4 indicates that there is more than one option for implementing the method of OPC. McLaughlin Tr. at 1508:22-1509:2; RX-407C at PH015759.
 33. The method of performing OPC is not mandatory for Orange Book Part III for the same reasons that it is not mandatory for Orange Book Part II. McLaughlin Tr. at 1509:3-17; RX-408C at PH023331-023332.
 34. Running OPC is a method to keep write power optimum during writing. Kablau Dep. Tr. at 209:1-4.
 35. Running OPC is a recommendation in the Orange Book. Kablau Dep. Tr. at 209:1-15.
 36. Running OPC is not mandatory for CD-R because Orange Book Part II, Section B14.3 states that running OPC is recommended for all CD-R recorders. McLaughlin Tr. at 1509:18-1510:6; RX-407C at PH015779.
 37. Running OPC cannot be mandatory for CD-RW because it is not mentioned at all in

- Orange Book part III. McLaughlin Tr. at 1510:7-11.
38. Remark 3 in section II.1.4 of Orange Book Part II states that “in a recorder, the choice of beam profile and write strategy is free.” McLaughlin Tr. at 1510:12-20; RX-407C at PH015696.
 39. A write strategy is a series of electrical pulses that are fed to the laser diodes, which then emits them as light to the disc. McLaughlin Tr. at 1525:14-1526:6; Kablau Dep. Tr. at 56:16-19.
 40. Choice of write strategy is also free for CD-RW, as indicated in Orange Book Part III. McLaughlin Tr. at 1511:2-9; RX-408C at PH023258.
 41. Orange Book Part II expressly identifies skip and unskip functionality as recommended in all CD recorders able to write in the CD digital audio format. McLaughlin Tr. at 1510:10-23; RX-407C at PH015696.
 42. The skip feature is only a recommendation for the CD-RW part of the Orange Book as well. McLaughlin Tr. at 1511:24-1512:3; RX-408C at PH023266.
 43. Section B16 of Orange Book Part II expressly states that the use of OSJ disc identification method is on a voluntary basis and is not mandated by the Orange Book. McLaughlin Tr. at 1512:8-17.
 44. The OSJ disc identification method cannot be mandatory for CD-RW because it is not mentioned at all in Orange Book part III. McLaughlin Tr. at 1512:18-1513:2.
 45. Complainant makes the Orange Book available only to licensees of patented CD-R and CD-RW technology or to entities under other contractual arrangements with Complainant. Complaint, ¶ 2.4.

46. The technical specifications in the Orange Book include certain features that Complainant alleges are covered by the patents in the pool, including the patents at issue. *See* Complaint, ¶ 2.5.
47. Complainant licenses these patents as a package to manufacturers of CD-Rs and CD-RWs. Complaint, ¶ 2.5.
48. In turn, manufacturers of CD-R discs or CD-RW discs include the features set forth in the Orange Book in order for the discs to be compatible with CD players, CD-ROM drives and MultiRead drives that are installed in personal computers and home entertainment systems that are also manufactured in accordance with corresponding Orange Book standards for those devices. *See* Complaint, ¶ 2.5.

2. The Philips CD-R and CD-RW Patent Pools

49. In the early 1990s, Philips, Sony and Taiyo Yuden formed a pool of the CD-R patents that each own in order to license manufacturers to produce and sell Orange Book compliant CD-R discs. Philips and Sony formed a similar patent pool along with Ricoh for Orange Book compliant CD-RW discs.¹
50. Similar pools were also formed by Philips and Sony to license patents for compatible CD-R and CD-RW recorders.
51. By 1990, the terms of the initial CD-R joint licensing program, including the royalty rate for the license, had been determined. *Beckers*, Dep. Tr. 62.
52. CD-R licenses were first made available in the mid-1990s. *Beune*, Tr. 2342.

¹For convenience, the patent pools of Philips, Sony, Taiyo Yuden and Ricoh in their various forms are collectively referred to hereafter as the “Philips CD-R patent pool” and the “Philips CD-RW patent pool.”

53. CD-RW licenses were first made available shortly after CD-R licenses. Beune, Tr. 2343.
54. Sony authorized Philips to grant licenses under certain patents relating to the CD-R technology owned by Sony, as well as certain patents owned by Taiyo Yuden, which Sony has the right to license. CX-128C; CX-132C; Van Dijk, Dep. Tr. 45-47.
55. The patent holders under the joint CD-RW disc license agreement are Philips, Sony, and Ricoh. *See, e.g.*, CX-436C (p. 2).
56. Sony authorized Philips to grant licenses under certain patents relating to CD-RW technology owned by Sony. CX-131C.
57. Ricoh authorized Philips to grant licenses under certain patents relating to CD-RW technology owned by Ricoh. CX-129C.
58. After forming the CD-R and CD-RW patent pool, Philips invited patent holders who claimed to have patents essential to manufacturing CD-R or CD-RW products to join the licensing pool. Beune, Tr. 2336.
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63. “CD-WO” and CD-MO” were names originally used in Philips’ licensing agreements for the two prevalent specifications for what was known in the market as “CD-R” technology. Eventually, CD-WO came to be accepted in the market more than CD-MO. Thus, it is CD-WO technology that today is synonymous with CD-R. *See* RX-1871C (Taiwan ROC Opinion at GT 000328-29).
64. Under the current joint CD-R disc license agreement, “Licensed Patents” are defined as those patents that are contained in pre-selected packages of patents. The packages are then “selected by Licensee” pursuant to the various options stated in the license. The packages cannot be broken into individual patents by the Licensee. *See, e.g.*, CX-451C (Art. 1.09); RX-992C (Art. 1.10, PH 076997).
65. Under one option in the joint CD-R disc license, licensees can elect to be licensed under just a list of what Complainant refers to as the “essential” CD-R disc patent package. *See, e.g.*, CX-451C (Art. 1.09, Option A1); RX-992C (Art. 1.10, Option A1, PH 076998).
66. Licensees also have the option under the joint CD-R disc license of being further licensed under both the essential patent package and certain packages that Complainant refers to as “non-essential” patents related to CD-R discs. *See, e.g.*, CX-451C (Art. 1.09, Option A2); RX-992C (Art. 1.10, Option A2, PH 076998).
67. For those licensees wishing to manufacture various forms of “CD-R Hybrid Discs,” the joint CD-R disc license also offers similar options to licensees for packages of either just “essential” patents relating to Hybrid CD-R discs, or packages of “essential” and certain “nonessential” patents relating to Hybrid CD-R discs. *See, e.g.*, CX-451C (Art. 1.09,

- Options B1, B2, B3); RX-992C (Art. 1.10, Options B1, B2, B3, PH 076998).
68. Licensees under the joint license wishing to manufacture both CD-R discs and Hybrid CD-R discs also have the option of choosing any combination of these patent package options, as long as the package of so-called “essential” patents is also taken. *See, e.g.*, CX-451C (Art. 1.09); RX-992C (Art. 1.09, PH 076997).
69. Under the current Philips-only CD-R disc license agreement, “Licensed Patents” are defined as those patents that are contained in pre-selected packages of patents. The packages are then “selected by Licensee” pursuant to the various options stated in the license. The packages cannot be broken into individual patents by the Licensee. *See, e.g.*, CX-501C (Art. 1.09).
70. Under the current Philips-only CD-R disc license, Licensees have the option of being licensed under the list of what Complainant refers to as the “essential” patents related to the manufacture of CD-R discs, and/or the package of “essential” patents related to various types of CD-R Hybrid Discs. *See, e.g.*, CX-501C (1.09).
71. Under the current Philips-only CD-RW disc license agreement, “Licensed Patents” are defined as those patents that are contained in pre-selected packages of patents. The packages are then “selected by Licensee” pursuant to the various options stated in the license. The packages cannot be broken into individual patents by the Licensee. *See, e.g.*, CX-469C (Art. 1.10).
72. Under the current Philips-only CD-RW disc license, Licensees have the option of being licensed under the list of what Complainant refers to as the “essential” patents related to the manufacture of CD-RW discs, High-Speed CD-RW discs, or various types of CD-RW

Hybrid Discs. *See, e.g.*, CX-469C (Art. 1.10).

73. Licensees may choose to be licensed among the various patent package options offered in the CD-R and CD-RW disc agreements, as long as the package of so-called “essential” patents is also taken. Some have chosen to take only the package of so-called “essential” patents, while others have opted to be licensed under both the package of “essential” patents and packages of “nonessential” patents. *Compare, e.g.*, CX-451C (Art. 1.09) with CX-483C (Art. 1.09).
74. Not all of the patents listed in the CD-R and CD-RW patent pool agreements are necessary to make a CD-R disc and therefore, non-essential patents are included in the licenses. These licenses included patents for CD audio, CD ROM, CD-I, and CD-MO discs. Bratic Tr. at 1642:6-1649:19; RX-2024C; RX-903C.
75. The earlier CD-R and CD-RW patent pool license agreements contained essential and non-essential patents, but did not identify which were essential and which patents were non-essential. van Dijk Dep. Tr. at 74:6-22; 75:17-76:8.
76. Some of the CD-R agreements include expired patents. Bratic Tr. at 1649:24-1650:11.
77. Philips made no distinction between essential and non-essential patents when it first formed the patent lists for the CD-R patent pool, but instead, offered licensees a whole package of patents that could be used by a manufacturer or disc replicator. Bratic Tr. at 1651:20-1652:17; de Vries Dep. Tr. at 78:5-14.
78. There are still licensees operating under pooled license agreements that include non-essential patents. Bratic Tr. at 1659:2-4.
79. The original CD-R standard license agreements provided licenses for a list of some 45

U.S. patents and many other foreign patents owned by Philips, Sony and Taiyo Yuden for Orange Book compliant CD-R discs. *See, e.g.*, RX-1832 (1999 Gigastorage CD-WO/MO Disc Agreement).

80. The original Philips patent pool license agreements included approximately 33 Philips U.S. patents. Bratic Tr. at 1666:21-1667:20; RX-2378.1C; RX-2024C.
81. Philips changed its list of patents in the year 2001 after the Taiwan Fair Trade Commission declared the pool licenses illegal. Bratic Tr. at 1659:5-10.
82. The number of U.S. patents in the CD-R pool license agreement that Philips calls essential has changed from approximately 44 in 1999 to 11 by 2001 – a reduction of 75 percent. Bratic Tr. at 1660:19-1663:4; 1666:3-7; RX-992C; RX-2354.
83. Whereas the CD-R pool was originally licensed to manufacturers as a single package of patents, it has evolved into a series of packages of so-called “essential” and “non-essential” patents, the former of which must be licensed by the manufacturer but the latter of which may be licensed in addition without paying any additional royalty fee. These packages have been further broken up into sub-packages consisting of the essential and non-essential patents of each licensor partner and the combined essential and non-essential patents of Philips and Sony. The many combinations of CD-R patent packages consist of exhibits to the standard “CD-R Disc Patent License Agreement” of all three partners and are maintained on a Philips internet website. *See* “Philips Intellectual Property and Standards, CD-R/RW Patents,” at <http://www.licensing.philips.com/licensees/patent/ob/>, “CD-R/RW hyperlink” (last visited on September 27, 2003). Philips’ CD-RW packages are broken up into similar arrangements, but they are not

shown on the Philips website.

84. Philips' CD-R and CD-RW disc licenses typically have a version number in the bottom left corner that indicate when that version of the license was introduced. Van Dijk, Dep. Tr. 113.
85. There are 4 basic types of licenses that Philips makes available to manufacturers interested in producing CD-R or CD-RW discs: (1) a joint CD-R disc license under the patents of Philips, Sony, and Taiyo Yuden; (2) a Philips-only CD-R disc license under just Philips' patents; (3) a joint CD-RW disc license under the patents of Philips, Sony, and Ricoh; and (4) a Philips-only CD-RW disc license under just Philips' patents. *See, e.g., CX-451C; CX-501C; CX-469C; CX-436C; see also Beune, Tr. 2339.*
86. In 2001 Philips modified the license to include "Option A1." According to the current 2003 license agreement (RX-992C), Option A1 now includes 11 U.S. patents that Philips claims are essential for making CD-R discs. Bratic Tr. at 1660:23-1661:7; RX-992C.
87. In addition to including 11 essential US patents under Option A1, the current modified license also includes non-essential patents for CD-R discs under Option A2, and other B options containing many other patents relating to different types of CD-Rs, such as hybrid CD-R discs. Bratic Tr. at 1660:23-1661:24, 1662:23-1663:4; RX-992C; RX-2354.
88. Option A1 with 11 patents in the current CD-R pool agreement is the smallest grouping of patents available to licensees. Bratic Tr. at 1666:9-14.
89. The difference between Options A1 and A2 in the current CD-R license, is that Option A1 only includes the essential patents for CD-R discs, whereas Option A2 includes both essential and non-essential patents for CD-R discs. RX-992C; RX-1903C tab 5; Bratic Tr.

at 1681:20-1682:13.

90. The non-essential patents of Option A2 are listed in Exhibit A4 to the CD-R agreements. RX-992C; RX-1903C tab 5; Bratic Tr. at 1681:20-1682:13.
91. Option B2 under the current CD-R agreements includes non-essential patents. RX-992C; RX-1903C tab 5 (“the non-essential patents listed in Exhibit A4 for the use of one or more of these patents exclusively for the manufacture and sale of CD-R hybrid discs”); Bratic Tr. at 1683:8-16.
92. Option B3 under the current CD-R agreements includes non-essential patents. *See* RX-992C; RX-1903C tab 5 (“the licensee chooses, in addition to Option B1 above (i) Option B1.(ii) and Option B1. (iii) respectively for the use of any one or more of these patents, exclusively for the manufacture and sale of CD-R hybrid discs, the non-essential patents”); Bratic Tr. at 1683:19-1684:3.
93. The current joint CD-R disc license makes clear that “interested manufacturers may opt to take out individual licenses under the relevant patents of each of Philips, Sony and Taiyo Yuden instead of a combined license.” *See, e.g.,* RX-992C (PH 0769996); CX-451C (p. 2); Van Dijk, Dep. Tr. 53-54.
94. The joint CD-RW disc license also makes clear to licensees that Sony, Ricoh, and Philips retain the right to separately license their patents rights related to CD-RW. *See, e.g.,* CX-436C (p. 2).
95. Approximately 80% of CD-R/RW licensees worldwide are licensed under the joint licenses, while only 20% have a separate Philips-only license. Van Dijk, Dep. Tr. 61-62.
96. The basic licensing terms for each type of CD-R and CD-RW disc license are standard

and include, *inter alia*, a field-of-use provision, an identification of the licensed patents, a royalty obligation, and a grantback clause. *See, e.g.*, RX-992C; CX-451C; CX-501C; CX-436C; CX-469C.

97. Philips CD-R and CD-RW disc licenses grant the licensee the right to make a product conforming to the Orange Book standards. *See, e.g.*, CX-451C (Art. 1.02,1.08, 2.01); CX-501C (Art.1.02, 1.08, 2.01); CX-436C (Art. 1.02, 1.07, 2.01); CX-469C (Art. 1.02, 1.09, 2.01); Van Dijk, Dep. Tr. 65-66.
98. All of Philips' CD-R and CD-RW licenses contain a field of use provision limiting the license grant to use of the patents to manufacture "Licensed Products." "Licensed Products" are defined as either CD-R or CD-RW discs that comply with either the CD-R or CD-RW "Standard Specifications." Accordingly, the license grants the licensee the right to use the patents to make CD-R or CD-RW discs that comply with the Orange Book Standard. *See, e.g.*, CX-451C (Art. 1.02,1.08, 2.01); CX-501C (Art.1.02, 1.08, 2.01); CX-436C (Art. 1.02, 1.07, 2.01); CX-469C (Art. 1.02, 1.09, 2.01); Van Dijk, Dep. Tr. 65-66.
99. Both the joint and Philips-only CD-R disc license agreements grant licensees "a non-exclusive, non-transferable license under the Licensed Patents selected by Licensee . . . to manufacture Licensed Products . . . in accordance with the relevant Standard Specifications." *See, e.g.*, RX-992C (Art. 2.01); CX-451C (Art. 2.01); CX-501C (Art. 2.01).
100. Both the joint and Philips-only CD-R disc license agreements define a "Licensed Product" as "a CD-R Disc, and if so elected by Licensee . . . a CD-R Hybrid Disc" for

either data applications or CD-Audio applications. *See, e.g.*, CX-451C (Art. 1.08); CX-501C (Art. 1.08).

101. A hybrid disc is defined by the Orange Book as a CD-R or CD-RW disc with a prerecorded (stamped) first session with the ability to hold additional sessions written by the user. CX-282C.
102. Both the joint and Philips-only CD-R disc license agreements define a “CD-R Disc” as “a Disc designed and manufactured for irreversibly recording thereon digital information and which conforms to the CD-R Standard Specifications.” *See, e.g.*, CX-451C (Art. 1.02); CX-501C (Art. 1.02).
103. Both the joint and Philips-only CD-R disc license agreements define “CD-R Standard Specifications” as “the specifications for the CD-R System as made available, modified or extended from time to time.” *See, e.g.*, CX-451C (Art. 1.06); CX-501C (Art. 1.06).
104. In 1997 Philips determined that 14 of its CD-R patents were essential (1 has since expired). RX-914. In 2001, the number of essential patents had been reduced to nine, and in 2003, the number was reduced to seven patents. RX-840; RX-41.
105. There were six Taiyo Yuden CD-R patents listed as essential in 2000, and the number today has been reduced to two patents. RX-695; RX-755.
106. Sony had nine CD-R patents listed as essential in 1999 and has only two today. RX-695; RX-755.
107. In every CD-R disc and CD-RW disc license agreement, both joint and Philips-only, licensees agree to pay a royalty to Philips “on each Licensed Product” that licensee sells “in which any one or more of the Licensed Patents” is used. *See, e.g.*, RX-992C (Art.

5.02 (PH 077003); CX-451C (Art. 5.02); CX-501C (Art.5.02); CX-436C (Art. 5.02); CX-469C (Art.5.02).

108. The royalty rate under the licenses is due so long as one patent is used by the licensee. The royalty rate does not increase or decrease if more patents or fewer patents are used. Sakkers, Dep. Tr. 86-89; Plokker Dep. Tr. 84-85.
109. The original CD-R agreements required royalty payments of three percent of the net sales price for each disc, with a minimum royalty of 10 Japanese yen. *See* RX-1832 (1999 Gigastorage CD-WO/MO Disc Agreement, ¶ 4.02).
110. Currently under the joint CD-R disc license agreement, licensees in full compliance with their obligations under the agreement pay a royalty of 6 cents per disc. If not fully compliant, such licensees pay a 10 Yen per disc royalty. *See, e.g.*, CX-451C (Art. 5.02); Beune, Tr. 2339-40.
111. Currently under the Philips-only CD-R disc license agreement, licensees in full compliance with their obligations under the agreement pay a royalty of 4.5 cents per disc. If not fully compliant, such licensees pay a 6 cents per disc royalty. *See, e.g.*, CX-501C (Art. 5.02); Beune, Tr. 2339-40
112. Currently under the joint CD-RW disc license agreement, licensees pay a 10 cent per disc royalty. Beune, Tr. 2340; CX-436 (Art. 5.02).
113. Currently under the Philips-only CD-RW disc license agreement, licensees in full compliance with their obligations under the agreement pay a royalty of 4.5 cents per disc. If not fully compliant, such licensees pay a 6 cents per disc royalty. *See, e.g.*, CX-469C (Art. 5.02).

114. Under the written terms of the “Most Favourable Conditions” provision in the joint CD-R and CD-RW disc license agreements, licensees are entitled to the same royalty rate as any similarly situated third party whom Philips licenses under the same patent rights but at a more favourable rate, but there are exceptions to this rule. *See, e.g.*, CX-451C (Art. 7); CX-436C (Art. 6).
115. Regarding such exceptions, the rights under the Most Favourable Conditions provision in the licenses do not apply with respect to cross-license agreements, or any other agreement not exclusively based on royalties, or arrangements made pursuant to a court decision or a settlement of a dispute between Philips and a third party. *See, e.g.*, CX-451C (Art. 7); CX-436C (Art. 6).
116. All of Philips’ CD-R and CD-RW disc licenses, both joint and Philips-only, contain a grantback provision. The grantback required by this provision is non-exclusive, non-transferable, and must be “on reasonable, non-discriminatory conditions comparable to those set forth” in the CD-R and CD-RW license agreements themselves. *See, e.g.*, CX-451C (Art. 2.06); CX-501C (Art.2.07); CX-436C (Art. 2.07); CX-469C (Art.2.07).
117. Under the terms of the grantback provision found in the current CD-R and CD-RW disc license agreements, licensees must grant back to the licensors and fellow licensees a non-exclusive license “on reasonable, non-discriminatory conditions comparable to those set forth herein,” on any patents they own or control “which are essential to the manufacture, use, sale or other disposal of Licensed Products.” *See, e.g.*, CX-451C (Art. 2.06); CX-501C (Art.2.07); CX-436C (Art. 2.07); CX-469C (Art.2.07).
118. The grantback provision is intended to prevent licensees with a blocking patent to the

Orange Book standards from “holding up” licensees to the pool by refusing to license their essential patent(s). Beune, Tr. 2376; Plokker, Dep. Tr. 163; Beckers, Dep. Tr. 93-94.

119. The grantback provision applies only to patentees that develop patents that are essential to practice the Orange Book standard. Beune, Tr. 2350; *see also, e.g.*, CX-451C (Art. 2.06); CX-501C (Art.2.07); CX-436C (Art. 2.07); CX-469C (Art.2.07).
120. While it is true that the current Philips CD-R and CD-RW licenses contain a grantback provision limited to “essential” patents, past licenses, including many still in effect, are broader, requiring the licensee to grant back all “pertinent” patents. *See, e.g.*, CX-240C at PH 002316; RPF 792, 804-807, 812.
121. The CD-R/RW disc licenses contain a “Have Made” provision that permits a licensee to have CD-R or CD-RW discs manufactured “for it by third-party manufacturers, duly licensed by Philips under an agreement similar to” the CD-R/RW disc licenses, provided that the licensee identifies the third party manufacturer on its royalty reports to Philips, together with the quantities of discs purchased. *See, e.g.*, RX-992C (PH 077002, Art. 4.01).
122. A licensee is required to pay royalties on CD-R or CD-RW disc it purchases on a “have made” basis, and when the licensee does so, the third party manufacturer need not pay the royalty. The royalty is paid by the company that purchases the discs from the manufacturer, unless the licensee is one that pays no royalties, even on discs purchased on a “have made” basis. *See, e.g.*, RX-992C (PH 077002, Art. 4.01); Beune Tr. 2447:1-2448:4.

123. The Philips CD-R/RW disc license agreements--whether joint or under just the Philips patents--has a standard term of 10 years. *See, e.g.*, RX-992 (PH 077010, Art. 12.01); CX-451C (Art. 12.01); CX-436C (Art. 11.01); CX-501C (Art. 11.01); CX-469C (Art. 11.01).
124. There have been approximately 100 licensees since the CD-R/RW licensing program started. Beune, Tr. 2341.
125. Philips currently has 69 CD-R disc licensees and 15 CD-RW disc licensees. CX-382; CX-383.

3. Regulatory History of Patent Pools

a. The DOJ Antitrust Division Business Review Letters

126. Patent pools for technology in industries related to the CD-R industry have been reviewed by the Antitrust Division of the U.S. Department of Justice (“DOJ”) in three business review letters that were issued in the middle and late 1990s. *See* CX-355 (the June 26, 1997 “MPEG-2 Business Review Letter”); CX-357 (the December 16, 1998 “3C DVD Business Review Letter”); CX-358 (the June 10, 1999 “6C DVD Business Review Letter”).
127. In those letters, the DOJ placed restrictions on the types of patents that could be included in such pools in order to avoid anticompetitive effects, and set forth restrictions on the manner in which patents could be included in the pools. *See* CX-355; CX-357; CX-358.
128. In the first MPEG-2 Business Review Letter, the patents in the pool were defined as those that are “essential to compliance” with the industry manufacturing standards for the MPEG-2 product, and “there is no technical alternative to any of the Portfolio patents within the standard.” *See* CX-355 (MPEG-2 Business Review Letter at 9).

129. According to the MPEG-2 Business Review Letter, the essentiality of the patents in the pool was to be monitored by “an independent expert as an arbiter of essentiality” to review patents for inclusion in, or exclusion from, the pool. *See* CX-355 (MPEG-2 Business Review Letter at 5).
130. “The limitation of the Portfolio to technically essential patents, as opposed to merely advantageous ones,” the DOJ went on in the MPEG-2 letter, “helps ensure that the Portfolio patents are not competitive with each other and that the Portfolio license does not, by bundling in non-essential patents, foreclose the competitive implementation options that the MPEG-2 standard has expressly left open.” CX-355 (MPEG-2 Business Review Letter at 10).
131. Further, the DOJ opined, “[t]he continuing role of an independent expert to assess essentiality is an especially effective guarantor that the Portfolio patents are complements, not substitutes.” CX-355 (MPEG-2 Business Review Letter at 10).
132. In the second 3C DVD Business Review Letter, the patent pools in question were limited to “essential” patents that were defined somewhat more broadly from the MPEG-2 pool as being “necessary (as a practical matter) for compliance with the DVD[-Video or DVD-ROM] Standard Specifications.” *See* CX-357 (3C DVD Business Review Letter at p. 3).
133. In the 3C DVD Business Review Letter, the DOJ stated that it understood this definition “to encompass patents which are technically essential – *i.e.*, inevitably infringed by compliance with the specifications – and those for which existing alternatives are economically unfeasible.” *See* CX-357 (3C DVD Business Review Letter at 3 n.8).
134. In finding that no enforcement action would be triggered by this patent pool as so

described, the DOJ asserted the following *caveat* in the 3CVD Business Review Letter:

Some uncertainty arises from this definition's imprecision: Unlike the MPEG-2 pool, which required actual technical essentiality for eligibility, this pool introduces the concept of necessity "as a practical matter." On its face, this latter standard is inherently more susceptible to subjective interpretation. [footnote omitted] An excessively liberal interpretation of it could lead to the inclusion of patent rights for which there were viable substitutes. In that event, the pool could injure competition by foreclosing such substitutes.

Based on what you have told us, however, the definition of "necessary (as a practical matter)" that the expert will be employing is sufficiently clear and demanding that the portfolio is unlikely to contain patents from which there are economically viable substitutes. [footnote omitted] Thus, so long as the patent expert applies this criterion scrupulously and independently, it is reasonable to expect that the Portfolio will combine complementary patent rights while not limiting competition between them and other patent rights for purposes of the licensed applications.

CX-357 (3C DVD Business Review Letter at p. 10).

135. Philips was aware of the statements by the Department of Justice in its Business Review Letters of Philips's patent pools. Bratic Tr. at 1637:17-19; Beune Tr. at 2434:11-24, 2436:4-10.
136. Mr. Beune of Philips, who was in charge of the CD-R and CD-RW licensing programs for Philips in Asia, was involved in making the request for the DVD Business Review Letter, CX-357. Bratic Tr. at 1638:4-9; Beune Tr. at 2433:12-23, 2434:25-2435:13, 2450:14-16.
137. No DOJ Business Review Letter was sought for the CD-R and CD-RW patent pools. Rubenstein Tr. at 2180:7-14; Sackers Dep. Tr. at 95:16-22.
138. Philips did not do anything to conform its CD-R or CD-RW programs to the Department

of Justice Business Review Letters until several years after receiving them. Bratic Tr. at 1638:18-1639:11; Rubenstein Tr. at 2180:7-14; Beune Tr. at 2433:20-2435:20.

b. The Taiwan Fair Trade Commission Investigation

139. In 2001, the Taiwan Fair Trade Commission (“Taiwan FTC”) conducted an investigation into the Philips CD-R patent pool and ruled that it was illegal under the Taiwanese Fair Trade Law. *See* RX-1871C (translation).
140. The Taiwan FTC agreed with the complainants in its investigation that Philips, Sony, and Taiyo Yuden “control the use of the standard specification for producing CD-R” and that they “monopolize the technology market using such specifications.” RX-1871C (translation at GT 000313, GT 000338).
141. The Taiwan FTC agreed with the complainants in its investigation that “[s]ince there is no other specification on the market, all CD-R manufacturers must follow the technical specifications jointly set by Philips and the other two companies. Accordingly, Philips together with the other two companies possess a monopolistic position in the field of CD-R production technology.” RX-1871C (translation at GT 000313, GT 000338).
142. The Taiwan FTC determined that Philips’s “activities have affected the market function of the demand/supply of CD-R patented technology license.” RX-1871C (translation at GT 000336, GT 000345).
143. The Taiwan FTC determined that “CD-R can still be segregated from other optical storage products in terms of supply-demand on current market, price, and technical functions, and it is not replaceable.” RX-1871C (translation at GT 000337).
144. The Taiwan FTC determined that “Under the current market status, if supply, demand,

manufacture/sale and cost are considered, there is no product possibly to substitute CD-R product.” RX-1871C (translation at GT 000338).

145. The Taiwan FTC determined that “It is an undisputed fact that no other specifications exist on the market. As the said major patented technologies are owned by Philips et al. and have an absolute superior position, the chances for other enterprises to enter the subject CD-R technology license market are minimal.” RX-1871C (translation at GT 000338).
146. The Taiwan FTC found that Philips, Sony and Taiyo Yuden were horizontal competitors in the CD-R manufacturing technology market through their ownership of technologies and patents related to that activity. *See* RX-1871C (translation at GT000332).
147. The Taiwan FTC further found that through their joint decision on the royalty rate and joint licensing of that technology, Philips, Sony and Taiyo Yuden had acquired a dominant position in the CD-R technology patent license market in Taiwan, had improperly maintained the royalty rate, had refused to provide licensees with important information regarding the license agreements, and had prohibited licensees from objecting to the validity of the patents in the pool. *See* RX-1871C (translation at GT000311).
148. According to the conclusions of the Taiwan FTC, the CD-R technology owned by Philips and its licensor-partners had “an overwhelmingly superior position in the CD-R patented technology license market and may exclude other enterprises from participating in competition,” thereby constituting a “monopolistic enterprise” under Taiwan law. RX-1871C (translation at GT000336).

149. The Taiwan FTC also found that the royalty rate of three percent of net sales or a minimum of 10 yen did not have a detrimental impact on manufacturers when average selling prices of CD-R discs in the world market in 1996 was \$7.00 U.S. per disc, but by 2000, that price had dropped drastically to less than 50 cents U.S. *See* RX-1871C (translation at GT000339).
150. Juxtaposed with the rapid growth in global CD-R demand and production from 1996 to 2000, which was much faster than expected, Philips' licensing profits under its existing royalty structure in 2000 would amount to 20 to 60 times that in 1997, far more than originally expected, the Taiwan FTC further found. *See* RX-1871C (translation at GT000339-40).
151. The Taiwan FTC further found that the 10 yen minimum rate under this scenario would amount to 17.8 percent of the net selling price of a disc which is far more than the licensees can bear. *See* RX-1871C (translation at GT000340).
152. Philips and its licensor partners had failed to make adjustments to its royalty structure to meet the market needs of manufacturers and had thus violated the Taiwan Fair Trade Law, according to the Taiwan FTC. RX-1871C at GT000340-41.
153. The Taiwan FTC agreed with the complainants in its investigation that Philips, Sony, and Taiyo Yuden "intended to collect royalty fees for 109 patents but failed to explain the necessity of and relation between such patents and various CD-Rs produced by the licensees. They also failed to provide detailed answers to the queries raised by domestic manufacturers." RX-1871C (translation at GT 000318, GT 000342-45).
154. The Taiwan FTC agreed with the complainants in its investigation that Philips, Sony, and

- Taiyo Yuden “only provided explanations on six out of the 109 patent[s]” on the list of patents included in the CD-R patent pool. RX-1871C (translation at GT 000318, GT 000342-45).
155. The Taiwan FTC determined that “Philips required [manufacturers] to withdraw patent invalidation applications against Philips as a condition for the settlement before signing of subject CD-R license agreement and withdrawing its criminal charges against such manufacturers.” RX-1871C (translation at GT 000344-45).
156. The Taiwan FTC determined that Philips’s CD-R patent pool was illegal. J. Chen Tr. at 873:2-6; L. Chen Tr. at 999:11-1000:4, 1002:2-10; RX-1871C (translation at GT 000311, GT 000348).
157. The Taiwan FTC determined that Philips, Sony, and Taiyo Yuden cannot collectively license their CD-R patents. L. Chen Tr. at 1002:2-10, 19-24; RX-1871C (translation at GT 000348.)
158. The Taiwan FTC determined that Philips should be fined in the amount of 8 million Taiwan dollars. L. Chen Tr. at 999:21-24; RX-1871C (translation at GT 000311).
159. Philips appealed the Taiwan FTC’s decision on February 27, 2001. Following a remand, the decision was ultimately affirmed. L. Chen Tr. at 1001:16-21; RX-1332C; RX-1964C.
160. On appeal, the Executive Yuan remanded the Taiwan FTC’s determination for additional findings in November 2001. RX-1332C at PH 066217.
161. On April 11, 2002, the Taiwan FTC issued its second decision, again finding Philips’s CD-R patent pool illegal. L. Chen Tr. at 1001:16-21; RX-1964C (April 12, 2001 press release); RX-1332C (decision as published on April 20, 2002).

162. On remand, the Taiwan FTC determined that Philips, Sony, and Taiyo Yuden “misused their market power.” RX-1332C at PH 066214; RX-1964C at PT 002347-48.
163. On remand, the Taiwan FTC determined that CD-R technology and discs can themselves be defined markets. RX-1332C at PH 066213; RX-1964C at PT 002344.
164. On remand, the Taiwan FTC determined that “CD-R, CD-RW and DVD are totally different products with different function where the compatibility among them is low. Thus each product can be regarded as ‘special market’.” RX-1332C at PH 066218-19; RX-1964C at PT 002344.
165. On remand, the Taiwan FTC determined that “Philips, Sony, and TY’s Orange Book has already possessed the monopoly power in the market and avoid the entry of other competitors into the market.” RX-1332C at PH 066221.
166. The first Philips-only license was executed in April of 2000. Beune, Tr. 2345; CX-430C.
167. The first Philips-only license was executed after the Taiwan FTC investigation had begun but before the investigation was concluded. Its license terms are not the same as those that appear in the standardized Philips-only licenses that have been offered since the Taiwan FTC decision was rendered. *Compare CX-430C with, e.g., RX-1904C, tab 2.*

c. The EC Anti-dumping Investigation

168. The European Commission began an “Anti-dumping proceeding concerning imports of compact disks-recordable (CD-Rs) originating in Taiwan.” RX-1704C.
169. In late 2001, the European Commission determined that CD-R disc manufacturers in Taiwan had been dumping their products in Europe. RX-1379C (p. 77).
170. In response to dumping of CD-R discs by Taiwanese manufacturers, the European

Commission established duties on such CD-Rs, based on its investigation of pricing and volume sales to Europe and how these related to costs and other factors. RX-1379C (p. 77).

171. The duties imposed by the European Commission ranged from 18.8% to 39.3%, the lower amount charged to companies that cooperated with the EC investigation and were found to practice reasonable pricing standards. The higher charges were made to non-cooperating companies. RX-1379C (p. 77).
172. The anti-dumping duty imposed on Gigastorage was 20.1%. RX-1379C (p. 78).
173. The anti-dumping duty imposed on Princo was 29.9%. RX-1379C (p. 78).

B. Overview of the Patent Misuse Defense

No Findings of Fact.

C. Patent Pooling

174. Philips, Sony, and Taiyo Yuden did not use an independent expert to determine which patents were essential when they formed the CD-R patent pool. Bratic Tr. at 1693:5-9.
175. The royalty rate for licensing Philips patents remains the same regardless of which option(s) in the agreement one selects. Sackers Dep. Tr. at 88:8-24.
176. Licensees are encouraged to take as many patents as they can, both essential and non-essential, because the royalty rate is the same regardless of the selection. Bratic Tr. at 1693:14-1694:5.
177. By including non-essential patents in the pool for the same royalty rate, licensees are encouraged to use the included non-essential patents instead of substitute technologies outside the pool. Bratic Tr. at 1804:11-19.

178. Very few, if any, licensees selected only Option A1. Bratic Tr. at 1676:20-1677:23.
179. When licensees must pay the same royalty regardless of whether or not they use the non-essential patents included under the license, they have little if any incentive to license competing non-essential technologies outside the license, thus reducing or eliminating opportunities for alternative technologies to emerge. Bratic Tr. at 1693:14-1694:5.
180. A licensee who has the option to select just essential patents, or both essential and non-essential patents for the same royalty rate, will probably chose both the essential and non-essential patents. McCarthy Tr. at 2146:13-2147:7.
181. Dr. Kenneth R. Rubenstein, who refers to himself as a “neutral evaluator,” has been retained by the pool to issue determinations about which of the patents in the Philips patent pools meet a particular definition of “essentiality.”
182. Dr. Rubenstein began his evaluation of the CD-R and CD-RW patent pools in 2001. Rubenstein, Tr. 2190.
183. Dr. Rubenstein has a bachelor’s degree in physics from MIT, awarded in 1975 and a PhD in physics from MIT, awarded in 1979. Dr. Rubenstein also has a JD from New York Law School, awarded in 1983. Rubenstein, Tr. 2169-70.
184. Dr. Rubenstein is a member of the New York bar, the New Jersey bar, and the Patent Office bar, and has practiced law for 20 years, overwhelmingly in the field of patent law. Rubenstein, Tr. 2170.
185. Since 1998, Dr. Rubenstein has been a partner at the law firm, Proskauer Rose, where he co-heads the patent group. Rubenstein, Tr. 2170-71.
186. In issuing his determinations on a patent’s “essentiality” for compliance with the Orange

Book, Dr. Rubenstein includes both “technical” and “commercial” essentiality.

“Commercial” essentiality, or “essentiality as a practical matter,” means to Dr.

Rubenstein that “the patent covers something that’s not explicitly in the [Orange Book], but as a practical matter you need the patent to do something that is in the [Orange Book].” Rubenstein Tr. 2182:6-23.

187. The ultimate decision of whether to find a patent essential to a technology is Dr. Rubenstein’s. Rubenstein, Tr. 2172-73.

D. Per Se Analysis

1. Market Power

a. Relevant Product Market

188. In this case, the “relevant product market” has been defined by the parties on two different levels. One is the market for the products themselves; namely, CD-R/RWs. The other is the market for patent licenses in CD-R/RW technology.

(i) CD-R/RW Product Market

189. As Respondents’ economic expert, Mr. Walter Bratic, testified at the hearing, floppy discs, MiniDiscs, audiocassettes and flash memory cards are not interchangeable with CD-R/RWs because they require individual players that a PC user having only a CD player would have to buy and install into the PC separately. *See* Bratic Tr. 1701:11-1702:18.
190. Hard drives are not interchangeable with CD-R/RWs because they are not portable. *See* Bratic Tr. 1702:19-1703:8.
191. E-mail is not interchangeable because it can distribute data but cannot store it. *See* Bratic Tr. 1703:9-15; McCarthy Tr. 2034:8-2035:18.

192. CD-R/RWs are rapidly surpassing the once-ubiquitous high-density floppy discs as the predominant means to store and distribute programs and data. *See* CX-618 (Slides 20 and 21).
193. This is so because the capacity of a typical CD-R/RW, at around 700 MB, easily accommodates the large programs and data files used by present-day computers that floppy discs, with capacities of no more than 1.44 MB, cannot handle. *See* CX-50 at PA033204; McCarthy Tr. 2033:20-22.
194. CD-R/RWs have 400 to 500 times the storage capacity as 1.44 MB high density floppy disks. CX-50 at Bates No. PA033204.
195. It defies logic to think that a PC user would forego purchasing a single CD-R/RW to transfer programs and data from one computer to another in favor of purchasing 400 or more floppy discs to accomplish the same task. *See* McCarthy, Tr. 2128:20-2129:7 (difference in storage capacity between CD-R/RWs and floppy discs would be a factor in considering whether products are in the same market).
196. If one assumes that a 700 MB CD-R has 72 minutes of audio storage capacity and a song is three minutes long, this translates into approximately 29 MB ($700/72 * 3$) needed for each song. CX-50 at Bates No. PA033204 (CD-R with 700 MB). This is far more than the 1.44 MB offered on a high density floppy disc.
197. Difference in storage capacity between CD-R/RWs and floppy discs is a factor in considering whether products are in the same market. McCarthy Tr. 2128-29.
198. Rather than switch to manufacturing floppy discs, audio cassettes, hard drives and other products when CD-R/RW sales prices declined, the Princo Respondents continued to

manufacture CD-R/RWs. When asked at the hearing whether the companies had considered switching to manufacturing audio cassettes or floppy discs, Mr. Jerry Chen of Gigastorage and Mr. Louis Chen of Princo said they had not. J. Chen Tr. 965:19-966:6; L. Chen Tr. 1051:21-1052:5.

(ii) CD-R/RW Patent License Market

199. During the period from 1998 to 2000, Philips and its licensor-partners licensed no more than approximately 50 percent of discs sold worldwide; today, that number has increased to approximately 65 percent. *See* Beune Tr. 2384:19-2385:7.
200. More than 100 companies have been licensed under the Philips CD-R/RW patent pools to make discs, and about 60-70 companies remain licensed today. Beune Tr. 2341:9-22.
201. In the product market for CD-R/RWs, Philips and its licensor-partners in 2002 had a worldwide market share of only 13 percent of sales for CD-R discs and only 10 percent of sales for CD-RW discs. CX-618 (Slides 27 and 28).
202. Current and historic royalty rates for the patent pool and the sales price of the discs bear little or no correlation to one another. *See* RX-2344, RX-2345.
203. Several major technology companies, including IBM, Ericsson, Qualcomm, InterDigital and Rambus, are garnering an ever larger amount of their revenues from the licensing of their intellectual property rights compared to their revenues for end-products. *See* Bratic Tr. 1913:16-1916:14.
204. Philips' has received patent licensing revenues of approximately 500 million euros (\$570 million) in 2002. Beune Tr. 2509:21-2510:12.

b. Relevant Geographic Market

205. Purchasers of CD-R/RW discs; *i.e.*, retailers and distributors, can look worldwide for alternative sources of supply. Manufacturers of CD-R/RW discs exist in many countries around the world. *See* Beune Tr. 2501:12-20 (Moser Baer manufactures in India); J. Chen Tr. 828:17-24; L. Chen Tr. 973:2-8 (the Princo Respondents manufacture in Taiwan, Switzerland and Germany); Wieghaus Tr. 341:25-342:9 (Mitsui manufactures in the United States).
206. Unlicensed sales represent 35 percent of the CD-R/RW market. *See* Beune Tr. 2384:19-2385:7.
207. The price and portability of information storage devices are factors in determining which products are in the same market. McCarthy Tr. at 2036:16-20.
208. The relevant geographic market for the licensing of patent rights for CD-R discs is the United States. Bratic Tr. at 1705:9-1706:23.
209. The relevant geographic market for the licensing of patent rights for CD-RW discs is the United States. Bratic Tr. at 1705:9-1706:23.

2. The Extent of Philips' Market Power in the Relevant Markets

a. The Product Market for CD-R/RW Discs

210. In the worldwide product market for CD-R/RW discs, the undisputed evidence presented by Complainant's economics expert, Dr. McCarthy, shows that worldwide demand, supply and manufacturing capacity for CD-R discs grew rapidly during the years 2000-2002 to the point where, in 2002, there was a worldwide demand for nearly six billion CD-R discs and an available supply of nearly 8 billion discs out of a total manufacturing capacity of over 10 billion discs. McCarthy Tr. 1962:21-1963:22; CX-618 (Slide 8).

211. During 1999-2001, wholesale and retail prices for CD-Rs and CD-RWs fell steadily. *See* McCarthy Tr. 1956:17-1958:7; CX-618 (Slides 5 and 6).
212. Falling product prices over time is a typical pattern in the electronics industry. *See* Smith Tr. 1486:19-25.
213. Following a rapid increase during the late 1990s, the number of manufacturers of CD-R discs peaked in 2000 and has fallen in the years thereafter. McCarthy Tr. 1965:5-11; CX-618 (Slide 9); CX-330.
214. As for the worldwide market share for the manufacture and sale of CD-R/RW discs, Philips and Sony have held only a minor share of the world's manufacturing output of CD-Rs that, combined with Taiyo Yuden's output, reached to approximately 8.8 percent in 2002. *See* McCarthy Tr. 1986:5-13; CX-618 (Slide 24).
215. With respect to the manufacturing output for CD-RWs, the collective share of Philips, Sony and Ricoh amount to approximately 2 percent in 2002. *See* McCarthy Tr. 1986:24-1987:6; CX-618 (Slide 25).
216. In terms of worldwide sales to retail outlets, the sales of CD-R discs by Philips, Sony and Taiyo Yuden amount to approximately 13 percent in 2002, and the sales of CD-RW discs by Philips, Sony and Ricoh amount to approximately 10 percent. *See* McCarthy Tr. 1989:22-1990:8; CX-618 (Slides 27 and 28).
217. During the years 1998-2000, the percentage of CD-R and CD-RW discs that were sold in which no royalties were paid to the patent pool, despite their ostensible infringement of those patents, amounted to approximately 50 percent. Beune Tr. 2384:19-25.
218. Since 2000, that percentage has dropped to about 30-35 percent. Beune Tr. 2385:1-7.

219. Prices have continued their inevitable pattern of falling despite the success of Philips and its licensor-partners in signing up over 70 percent of the world's supply of CD-R discs under the pool (*See* RX-1903C (listing current CD-R licenses) and CX-330C (showing percent market shares for CD-R manufacturers)).

b. The Licensing Market for Essential U.S. CD-R/RW Patents

220. Philips derives approximately 500 million euros (approximately \$568 million) per year from patent licensing. *Beune Tr.* at 2510:10-12.

221. Philips's current royalty paying licensees produce over 70% of the world's supply of CD-R discs. RX-1903C (listing current CD-R licenses); CX-330C (showing percent market shares for CD-R manufacturers).

222. No one can manufacture or sell CD-R or CD-RW discs legally in the United States without taking a license to the Philips patents. *See McCarthy Tr.* at 2038:3-3039:11; 2039:25-2040:15; *Bratic Tr.* 1705:25-1706:11; Complaint ¶¶ 2.4 and 2.5.

223. All CD-Rs and CD-RWs sold in the marketplace must comply with Orange Book standards. *See Lang Tr.* 234:19-25.

224. [

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225. The minimum royalty rates under the CD-R patent pools range from 4.5 cents to eight cents (10 yen) depending which royalty rate program is implemented.

226. Philips announced the implementation of a CD-R disc "compliance reward program" in a press release dated November 15, 2000. CX-380.

227. The compliance reward program's terms have been incorporated directly into the standard

- joint license terms of recent versions of the CD-R license agreements. Van Dijk, Dep. Tr. 111-113, 163; *see also, e.g.*, CX-451C (Art. 5.02); CX-501C (Art. 5.02); Beune, Tr. 2340; CX-469C (Art. 5.02); Beune Tr. 2512:24-25.
228. Under the compliance program, the Philips CD-R pool gives a licensee a CD-R royalty rate of 6 cents per disc for a license to the patents of all licensor-partners and 4.5 cents for a Philips-only license. Smith Tr. 1416:7-1417:6, 1424:9-15; Beune Tr. 2342:22-2343:3; RX-992 (CD-R Disc Patent License Agreement, ¶ 5.02).
229. In return for that rate, Philips requires the licensee to submit on a yearly basis a list of the equipment it uses to manufacture CD-R discs, and to demonstrate to Philips' satisfaction that the equipment originated from a Philips licensee; otherwise, the higher (10 yen) royalty rate applies. *See* Smith Tr. 1416:17-1417:6; RX-992 (CD-R Disc Patent License Agreement, ¶ 6.01).
230. Approximately 90% of Philips' CD-R licensees take advantage of the compliance rewards programs. Beune, Tr. 2512.
231. The various Philips pool royalty rates have been maintained despite the fall in CD-R/RW prices to the point where those royalty rates now represent between 50 and 70 percent of today's average net selling price in the industry. Bratic Tr. 1725:14-1727:11; RX-2348C; RX-2349C.
232. Subsequent to the 2001 Taiwan FTC decision finding the Philips patent pools to be illegal under Taiwan law, Respondent Gigastorage was able to enter into individual license agreements with Sony and Taiyo Yuden for the CD-R/RW patents in the pool that they owned. In comparison to royalty rates that Gigastorage was able to work out individually

with Sony and Taiyo Yuden, the 10-yen rate demanded by the Philips CD-R patent pool is approximately [] times those individual rates. *See* J. Chen Tr. 875:21-886:20; RX-1466; RX-1872; RX-1873; RX-1875; RX-1951.

233. When Taiyo Yuden entered into its license agreement with Gigastorage, the actual royalty rate charged was put into a supplemental agreement (or side letter) rather than the main agreement. Respondents' expert, Smith, opined that "[s]ide letters are often used when one does not want the world to see the end result." Smith Tr. at 1482:5-13.
234. According to Roger S. Smith, Esq., Respondents' expert in intellectual property licensing practices in the field of information handling technology, such percentages are "outrageous" compared to industry norms, and would not allow a CD-R licensee to stay in business. Smith Tr. 1417:7-15, 1419:12-24.
235. Nonetheless, Philips and its licensor-partners have signed up more than 100 manufacturers to the patent pools and approximately 60-70 remain signatories today. Beune Tr. 2341:9-22.
236. Philips has market power in the market for CD-R patent rights. Bratic Tr. at 1706:24-1707:17.
237. Philips has market power in the market for CD-RW patent rights. Bratic Tr. at 1706:24-1707:17.
238. Patents can be a barrier to entry to being able to manufacture and sell CD-Rs in the United States. McCarthy Tr. at 2038:10-22.
239. Philips's U.S. patents act as a barrier to entry into the U.S. market for CD-R and CD-RW discs. Bratic Tr. at 1705:9-1706:23.

240. Philips has the power to exclude a company from entering the CD-R or CD-RW market. McCarthy Tr. at 2039:25-2040:15.

3. Per Se Misuse

a. The Royalty Rate as a Price-Fixing Restraint

241. For CD-Rs, the fixed royalty rate of the Philips patent pool is officially equal to three percent of the net selling price per disc or 10 yen (approximately 8 cents U.S.), whichever is greater. J. Chen Tr. 916:15-18.
242. Although the three-percent rate determined the relevant royalty in the early 1990s when CD-R prices were high enough to result in royalties in the order of 20 to 25 cents per disc, prices in recent years for CD-R discs have fallen to the point where only the 10-yen minimum is the relevant per-disc royalty. Beune Tr. 2339:20-22, 2342:2-21.
243. For CD-RWs, the pool partners initially offered a joint royalty rate for all patents in the pool of three percent of the net selling price or 15 cents per disc, whichever was higher; now, that minimum rate is 10 cents per disc. Beune Tr. 2343:10-2344:1.
244. The two primary reasons CD-R prices have decreased are because consumption has increased greatly and because manufacturing costs have been reduced. J. Chen Tr. at 893:3-894:7.
245. Gigastorage began manufacturing CD-R discs in December 1997. J. Chen Tr. at 910:24-911:2
246. Gigastorage began producing CD-RW discs in October 1998. Yang Dep. Tr. 143.
247. Gigastorage had a copy of the Orange Book when it began manufacturing discs in 1997, prior to its becoming licensed by Philips. J. Chen, Tr. 908.

248. Philips contacted Gigastorage regarding the need for Gigastorage to take a CD-R/RW license as early as October 27, 1997. J. Chen, Tr. 958; CX-594.
249. By the fall of 1998, Mr. Beune had been talking with Gigastorage about executing a CD-R license agreement for more than a year. Beune, Tr. 2411.
250. Gigastorage entered into two licenses with Philips in October of 1999 – one for CD-R and one for CD-RW. J. Chen, Tr. 915-916; RX-1832; CX-420C.
251. Under the Philips CD-RW patent pool license, Gigastorage was required to pay a non-refundable upfront payment of \$25,000. RX-903C at PH 002733 (§ 4.03).
252. [
-]
253. Gigastorage's Net Selling Price for CD-R discs in 1997 was [] RX-1945C.
254. Gigastorage's Net Selling Price for CD-R discs in 1998 was [] RX-1945C.
255. Gigastorage's Net Selling Price for CD-R discs in 1999 was [] RX-1945C.
256. Gigastorage's Net Selling Price for CD-R discs in 2000 was [] RX-1945C.
257. Gigastorage's Net Selling Price for CD-R discs in 2001 was [] RX-1945C.
258. Gigastorage's Net Selling Price for CD-R discs in 2002 was [] RX-1945C.
259. Gigastorage's Net Selling Price for CD-R discs in 2003 was [] RX-1945C.
260. Gigastorage's Net Selling Price for CD-R discs has declined from [] in 1997 to [] in 2003. RX-1945C.
261. Gigastorage's Net Selling Price for CD-R discs has declined 82 percent since 1997. RX-1945C.
262. Gigastorage's Manufacturing Cost for CD-R discs in 1997 was \$0.975. RX-1945C.

263. Gigastorage's Manufacturing Cost for CD-R discs in 1998 was [] RX-1945C.
264. Gigastorage's Manufacturing Cost for CD-R discs in 1999 was [] RX-1945C.
265. Gigastorage's Manufacturing Cost for CD-R discs in 2000 was [] RX-1945C.
266. Gigastorage's Manufacturing Cost for CD-R discs in 2001 was [] RX-1945C.
267. Gigastorage's Manufacturing Cost for CD-R discs in 2002 was [] RX-1945C.
268. Gigastorage's Manufacturing Cost for CD-R discs in 2003 was [] RX-1945C.
269. Gigastorage's Manufacturing Cost for CD-R discs has decreased from [] in 1997 to [] in 2003. RX-1945C.
270. Gigastorage's Manufacturing Cost for CD-R discs has decreased [] percent since 1997. RX-1945C.
271. Gigastorage's Net Selling Price for CD-RW discs in 1998 was [] RX-1945C.
272. Gigastorage's Net Selling Price for CD-RW discs in 1999 was [] RX-1945C.
273. Gigastorage's Net Selling Price for CD-RW discs in 2000 was [] RX-1945C.
274. Gigastorage's Net Selling Price for CD-RW discs in 2001 was [] RX-1945C.
275. Gigastorage's Net Selling Price for CD-RW discs in 2002 was [] RX-1945C.
276. Gigastorage's Net Selling Price for CD-RW discs in 2003 was [] RX-1945C.
277. Gigastorage's Net Selling Price for CD-RW discs has declined from [] in 1998 to [] in 2003. RX-1945C.
278. Gigastorage's Net Selling Price for CD-RW discs has declined [] percent since 1998. RX-1945C.
279. Gigastorage's Manufacturing Cost for CD-RW discs in 1998 was [] RX-1945C.
280. Gigastorage's Manufacturing Cost for CD-RW discs in 1999 was [] RX-1945C.

281. Gigastorage's Manufacturing Cost for CD-RW discs in 2000 was [] RX-1945C.
282. Gigastorage's Manufacturing Cost for CD-RW discs in 2001 was [] RX-1945C.
283. Gigastorage's Manufacturing Cost for CD-RW discs in 2002 was [] RX-1945C.
284. Gigastorage's Manufacturing Cost for CD-RW discs has decreased from [] in 1998 to [] in 2002. RX-1945C.
285. Gigastorage's Manufacturing Cost for CD-RW discs has decreased [] percent since 1998. RX-1945C.
286. Gigastorage stopped paying its royalty in August of 2000. J. Chen, Tr. 851-852.
287. At the time Gigastorage stopped paying royalties the net selling price was around [] cents per disc. J. Chen, Tr. 852.
288. Manufacturing costs for Gigastorage include "the materials and including the direct label and including the manufacture expense, like the depreciation, electricity and indirect labor for manufacturing, something like that." J. Chen, Tr. 865.
289. Gigastorage's net selling price for the first quarter of 2003 was [] cents and the manufacturing cost was [] cents. J. Chen, Tr. 865.
290. []
291. Princo began producing CD-Rs in 1995. L. Chen Tr. at 976:1-4.
292. Princo began producing CD-RWs in 1998. L. Chen Tr. at 976:1-6.
293. Philips contacted Princo about a license for its production of CD-R discs as early as February 7, 1996. CX-235C
294. Princo did not respond to Philips for almost an entire year, until March 26, 1997. L.

Chen, Tr. 1037; CX-237C.

295. In 1997, Mr. Beune had a meeting with Princo regarding Princo's becoming licensed.
Beune, Tr. 2400.
296. Princo entered into the Philips CD-R patent pool license agreement on June 23, 1997. L.
Chen Tr. at 980:12-17; CX-240C.
297. Princo's Net Selling Price for CD-R discs in 1998 was [] New Taiwan Dollars, which
equals [] L. Chen Tr. at 1009:11-21; CX-183C.
298. Princo's Net Selling Price for CD-R discs in 1999 was [] New Taiwan Dollars, which
equals [] L. Chen Tr. at 1009:11-21; CX-183C.
299. Princo's Net Selling Price for CD-R discs in 2000 was [] New Taiwan Dollars, which
equals [] L. Chen Tr. at 1009:11-21; CX-183C.
300. Princo's Net Selling Price for CD-R discs in 2001 was [] New Taiwan Dollars, which
equals [] L. Chen Tr. at 1009:11-21; CX-183C.
301. Princo's Net Selling Price for CD-R discs in 2002 was [] New Taiwan Dollars, which
equals [] L. Chen Tr. at 1009:11-21; CX-183C.
302. Princo's Net Selling Price for CD-R discs has declined from [] in 1998 to [] in
2002. CX-183C.
303. Princo's Net Selling Price for CD-R discs has declined [] percent since 1998. CX-183C.
304. Princo's Manufacturing Cost for CD-R discs in 1998 was [] New Taiwan Dollars,
which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
305. Princo's Manufacturing Cost for CD-R discs in 1999 was [] New Taiwan Dollars,
which equals [] L. Chen Tr. at 1009:11-21; CX-183C.

306. Princo's Manufacturing Cost for CD-R discs in 2000 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
307. Princo's Manufacturing Cost for CD-R discs in 2001 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
308. Princo's Manufacturing Cost for CD-R discs in 2002 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
309. Princo's Manufacturing Cost for CD-R discs has decreased from [] in 1998 to [] in 2002. CX-183C.
310. Princo's Manufacturing Cost for CD-R discs has decreased [] percent since 1998. CX-183C.
311. Princo's Net Selling Price for CD-RW discs in 1998 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
312. Princo's Net Selling Price for CD-RW discs in 1999 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
313. Princo's Net Selling Price for CD-RW discs in 2000 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
314. Princo's Net Selling Price for CD-RW discs in 2001 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
315. Princo's Net Selling Price for CD-RW discs in 2002 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
316. Princo's Net Selling Price for CD-RW discs has declined from [] in 1998 to [] in 2002. CX-183C.

317. Princo's Net Selling Price for CD-RW discs has declined [] percent since 1998. CX-183C.
318. Princo's Manufacturing Cost for CD-RW discs in 1998 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
319. Princo's Manufacturing Cost for CD-RW discs in 1999 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
320. Princo's Manufacturing Cost for CD-RW discs in 2000 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
321. Princo's Manufacturing Cost for CD-RW discs in 2001 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
322. Princo's Manufacturing Cost for CD-RW discs in 2002 was [] New Taiwan Dollars, which equals [] L. Chen Tr. at 1009:11-21; CX-183C.
323. Princo's Manufacturing Cost for CD-RW discs has decreased from [] in 1998 to [] in 2002. CX-183C.
324. Princo's Manufacturing Cost for CD-RW discs has decreased [] percent since 1998. CX-183C.
325. In a December 4, 1997 letter to Philips, Louis Chen of Princo complained "that there're still many CD-R manufacturers don't pay the royalty, especially inside and outside the Taiwan which make us a very bad price condition." CX-242C.
326. In early 1998, Princo made the decision to stop paying royalties to Philips under its CD-R license agreement. L. Chen, Tr. 988.
327. By the Fall of 1998, Mr. Beune had been talking with Princo about executing a license for

- more than a year. Beune, Tr. 2411.
328. In March, 2000, Philips terminated its license agreement with Princo. L. Chen, Tr. 993.
329. At the time Princo decided to stop paying the royalty Louis Chen does not know if they were making a profit or not. L. Chen, Tr. 989.
330. At the time that Princo stopped paying the royalty, the royalty represented [] of the disc's price. L. Chen, Tr. 989.
331. Princo stopped paying the royalties because some of its competitors were not paying the royalty. L. Chen, Tr. 989.
332. In the opinion of Respondents' expert on intellectual property licensing, Roger S. Smith, as a general rule in the data storage industry, a royalty is considered reasonable if it "produces income for the licensor and still allows the licensee to operate at a profit so that he can continue to manufacture, use, lease, or sell products that are covered." Smith Tr. 1409:12-17.
333. In Smith's experience in negotiating royalty rates for IBM patents in the information handling systems area, license rates of one percent or less are normal for an individual patent. *See* Smith Tr. 1409:18-25.
334. In licensing multiple IBM patents, Smith found that each patent could add one percent to the total royalty rate, but only up to a maximum of five percent. Smith Tr. 1410:1-20.
335. By contrast, the current 6-cents per disc "compliant" royalty for a license to the entire CD-R patent pool amounts to an effective royalty rate of 40 percent of the disc selling price. Smith Tr. 1417:7-15.
336. The royalty rates under the CD-RW patent pool license agreement were three percent of

the net selling price of the product, or 15 cents, whichever was the greater, and later went down to 10 cents. Smith Tr. at 1418:8-1418:14.

337. As a percentage of net selling prices, the CD-RW pool royalties are roughly 20 percent, which is unreasonable compared to ordinary industry licensing practices. Smith Tr. at 1418:15-1418:23.
338. Mr. Smith admitted on cross-examination that his knowledge about the amount of profits that CD-R/RW manufacturing licensees of the Philips patent pool have been making is limited to the experience of Respondents Princo and Gigastorage. *See* Smith Tr. 1440:20-1441:15.
339. In 2001, after the Taiwan Federal Trade Commission declared the Philips CD-R patent pool to be illegal under Taiwanese law, Respondents Princo and Gigastorage were able to secure individual licenses from Sony and Taiyo Yuden for their own U.S. patents for CD-Rs in the pool at far lower royalty rates than the combined pool rates. *See* Smith Tr. 1418:24-1419:4, 1422:1-23, 1423:23-1424:8; RX-1873, RX-1875, RX-1951 (Gigastorage agreements); RX-1757, RX-1865, RX-1866 (Princo agreements).
340. Philips at that time also started offering separate licenses to its own CD-R patents in the pool. Smith Tr. 1418:24-1419:4.
341. In so doing, Philips structured the royalty for its own CD-R patents under the separate license so that [
-] under the pool licenses. Smith Tr. 1425:21-1427:18; RX-2367.
342. Under the original CD-R patent pool, Philips receives [] percent of the pool royalty proceeds while Sony and Taiyo Yuden share the [] percent remainder [

] This puts Philips' share of the 6-cent "compliant" pool royalty rate at approximately [] cents per disc. By contrast, under the separate license of its own patents, Philips receives a royalty of approximately []cents per disc without having to share this amount with Sony and Taiyo Yuden, even though the total amount of individual royalties paid are lower. Smith Tr. 1425:21-1427:18; RX-2367.

343. This arrangement [] exceeds industry norms. Smith Tr. 1413:14-24; Bratic Tr. 1741-49; RX-2366-70.
344. The combined royalties paid by DVD disc manufacturers under the three DVD patent pools that were approved by the DOJ in its Business Review Letters represent a total of 33% of the current net selling price of DVD discs. See Beune Tr. 2399; also see CX-355 at p. 6 n.20; CX-357 (3C DVD Business Review Letter at p. 5); CX-358 (6C DVD Business Review Letter at p. 6).
345. In two of the three Business Review Letters, the DOJ concluded that the contemplated royalty rates were "*sufficiently small relative to the total costs of manufacture*" to render collusion unlikely. See CX-357 (3C DVD Business Review Letter at p. 11); CX-358 (6C DVD Business Review Letter at PHX009134) (emphasis added).
346. In the third MPEG-2 Business Review Letter, the DOJ concluded even more definitively that "since the contemplated royalty rates are likely to constitute *a tiny fraction of MPEG-2 products' prices, at least in the near term,*" collusion was unlikely. CX-355 (MPEG-2 Business Review Letter at 11 (emphasis added)).
347. The patent pool royalty rates charged by Philips and its licensor-partners for CD-R/RWs are significant product price components that currently equal half of Respondents' costs

- of manufacture. *See* L. Chen Tr. 1009:11-1010:8; CX-183C; RX-1945C (Princo and Gigastorage's 2002 CD-R manufacturing costs were between [] cents compared to the "compliant" pool royalty rate of 6 cents).
348. In response to the Taiwan FTC's decision that Philips's CD-R patent pools are illegal, Sony and Taiyo Yuden negotiated and entered into separate license agreements with Gigastorage. J. Chen Tr. at 873:12-20.
349. Gigastorage is currently licensed by Sony and Taiyo Yuden to manufacture CD-Rs, and by Sony to manufacture CD-RWs. J. Chen Tr. at 833:2-5; RX-1466C; RX-1872C; RX-1873C; RX-1951C.
350. Gigastorage entered into a license agreement with Sony on September 1, 2001. J. Chen Tr. at 880:1-7; RX-1466C.
351. Under Gigastorage's September 1, 2001 license agreement with Sony, the royalty Gigastorage pays is adjusted by means of an "export ratio" such that Gigastorage pays royalties only for discs sold in countries where Sony has patents. J. Chen Tr. at 880:8-882:13; RX-1466C at PHX 009626 (§ 7), PHX 009628 (§ 4(i)), PHX 009642 (calculation of actual royalty adjusted for export ratio).
352. The export ratio under the September 1, 2001 license agreement between Sony and Gigastorage is [] percent, meaning that Gigastorage pays royalties on [] percent of its licensed products sold. J. Chen Tr. at 880:8-882:13; RX-1466C at PHX 009626 (§ 7), PHX 009628 (§ 4(i)), PHX 009642 (calculation of actual royalty adjusted for export ratio).
353. Sony does not have CD-R or CD-RW patents in Taiwan. J. Chen Tr. at 881:10-25; RX-

1466C at PHX 009637-39.

354. The Philips CD-R and CD-RW patent pool licenses do not include an export ratio, or any other mechanism by which royalties are adjusted to reflect countries in which Sony does not have patents. J. Chen Tr. at 885:17-886:21; RX-1832C; RX-903C.
355. The Philips CD-R and CD-RW patent pool licenses required manufacturers in Taiwan, including Gigastorage and Princo, to pay the same royalty despite the fact that Sony did not have any CD-R or CD-RW patents in Taiwan. J. Chen Tr. at 885:17-886:21; RX-1832C; RX-903C.
356. Under Gigastorage's September 1, 2001 license agreement with Sony, the royalty Gigastorage pays is adjusted by means of a "cross-license discount" such that Gigastorage receives a [] percent discount for patents it has given Sony the option to cross-license. J. Chen Tr. at 882:23-884:8; RX-1466C at PHX 009628 (§ 4(ii)), PHX 009629, PHX 009640 (listing Gigastorage patents subject to cross-license), PHX 009642 (calculation of actual royalty adjusted for cross-license discount).
357. The few Gigastorage patents that Sony has the option to cross-license are not very important to Sony. J. Chen Tr. at 883:23-884:4.
358. Under its license agreement with Sony, Gigastorage pays royalties of [

] these amounts then being reduced by the applicable export ratio and cross-license discount. J. Chen Tr. at 882:15-883:22; RX-1466C at PHX 009629, PHX 009642 (calculation of actual royalty adjusted for export ratio and cross-

- license discount).
359. Gigastorage entered into a new license agreement with Sony on October 1, 2002. J. Chen Tr. at 884:12-16; RX-1872C.
360. The export ratio under the October 1, 2002 license agreement between Sony and Gigastorage is [] percent, meaning that Gigastorage pays royalties on [] percent of its licensed products sold. J. Chen Tr. at 884:12-885:6; RX-1872C at GT 004588 (§§ 4(i) and 4(ii)).
361. Under its current Sony separate license agreement, Gigastorage pays Sony a royalty of [] per disc, factoring in the current export ratio of [] percent and cross-license discount of [] percent. J. Chen Tr. at 885:2-12; 857:2-12, 875:11-16; RX-1872C.
362. Gigastorage entered into a license agreement with Taiyo Yuden on December 31, 2001. J. Chen Tr. at 875:25-876:5; RX-1875C.
363. Gigastorage's December 31, 2001 license agreement with Taiyo Yuden has a stated royalty rate of 1.5 Yen or 5% of the Net Selling Price (whichever is lower) per disc; however, in a Supplemental Agreement executed the same day, Gigastorage was required to pay a lower royalty rate of [] of the Net Selling Price. J. Chen Tr. at 876:6-878:19; RX-1875C at GT 004645 (¶ 3.2), GT 004654, GT 004655-56 (Art. 4(2)).
364. Gigastorage's actual royalty rate under the December 31, 2001 license agreement with Taiyo Yuden was [] of the Net Selling Price. J. Chen Tr. at 876:12-878:19; RX-1875C at GT 004655-56 (Art. 4(2)).
365. In addition to royalties, Gigastorage paid [] to Taiyo Yuden for past use. RX-

1875C at GT 004655.

366. Gigastorage entered into a new license agreement with Taiyo Yuden on December 31, 2002. J. Chen Tr. at 878:20-879:12; RX-1873C.
367. Gigastorage's December 31, 2002 license agreement with Taiyo Yuden has a stated royalty rate of 1.5 Yen or 5% of the Net Selling Price (whichever is lower) per disc; however, in a Supplemental Agreement, Gigastorage was required to pay a lower royalty rate of [] of the Net Selling Price. J. Chen Tr. at 878:20-879:25; RX-1873C at GT 004661-62 (¶ 3.1); RX-1951C at GT 004658 (Art. 3(2)).
368. Under its current Taiyo Yuden separate license agreement, Gigastorage pays Taiyo Yuden a royalty of [] percent of Net Selling Price per disc. J. Chen Tr. at 857:2-12, 878:20-879:25; RX-1951C at GT 004658 (Art. 3(2)).
369. On March 10, 1998, Philips sent a letter to Gigastorage stating that a separate license to Philips's patents is available, but explaining that separate licenses from Philips, Sony, and Taiyo Yuden would be more expensive than the pool license. J. Chen Tr. at 846:10-847:3; RX-1098C.
370. On March 10, 1998, Philips sent a letter to Gigastorage stating that a separate license to Philips's patents is available, with the caveat that once a company enters into a separate license, it is not possible to convert it into a combined (*i.e.*, pool) license at a later point in time. J. Chen Tr. at 846:10-847:3; RX-1098C.
371. Philips also told Gigastorage verbally that separate licenses would be more expensive than a patent pool license. J. Chen Tr. at 847:4-848:3.
372. On October 2, 1999, Philips sent Gigastorage a letter stating that separate licenses would

- be more expensive than a pool license. RX-1576C; Beune Tr. at 2460:22-2463:18.
373. Before signing the CD-R and CD-RW patent pool license agreements, Gigastorage considered entering into separate licenses with Philips, Sony, and Taiyo Yuden expecting that that would be less expensive than the pool license agreements. J. Chen Tr. at 855:17-856:8.
374. Before signing the CD-R and CD-RW patent pool license agreement, Gigastorage was dissuaded from entering into separate license agreements with Philips, Sony, and Taiyo Yuden because Philips told Gigastorage that separate licenses would be more expensive and because Philips told Gigastorage that separate licenses could never be converted into a joint license. J. Chen Tr. at 855:17-856:8.
375. When Gigastorage discussed with Philips entering into the CD-R patent pool license agreement, the patent list included over 100 patent and included some relating to other types of compact discs. J. Chen Tr. at 840:15-841:13.
376. When Gigastorage discussed with Philips entering into the CD-R patent pool license agreement, Gigastorage did not believe it needed a license to every patent in the pool and inquired into obtaining a license to less than all of the patents on Philips's patent list. Gigastorage hoped that by eliminating some patents the royalty rate would be lower. Philips responded that the royalty is the same regardless of the number of patents used. J. Chen Tr. at 840:15-841:13, 848:4-11, 918:12-919:7.
377. Princo entered into a license agreement with Taiyo Yuden on January 1, 2001. L. Chen r. at 1002:25-1003:5; RX-1757C at PT 002404.
378. Princo's January 1, 2001 license agreement with Taiyo Yuden has a stated royalty rate of

- 1.5 Yen or 5% of the Net Selling Price (whichever is lower) per disc; however, in a Supplemental Agreement executed the same day, Princo was required to pay a royalty rate of [] of the Net Selling Price. L. Chen Tr. at 1005:3-1006:1; RX-1757C at PT 002406 (¶ 3.2), PT 002412, PT 002414 (Art. 4(3)).
379. In addition to royalties, Princo paid [] to Taiyo Yuden for past use. L. Chen Tr. at 1005:3-1006:1; RX-1757C at PT 002412.
380. Princo entered into a new license agreement with Taiyo Yuden on January 1, 2003. L. Chen Tr. at 1006:5-8; RX-1866C.
381. Princo's January 1, 2003 license agreement with Taiyo Yuden has a stated royalty rate of 1.5 Yen or 5% of the Net Selling Price (whichever is lower) per disc; however, in a Supplemental Agreement executed the same day, Princo was required to pay a royalty rate of [] of the Net Selling Price. L. Chen Tr. at 1006:5-22; RX-1866C at PT 002523 (¶ 3.1), PT 002534 (Art. 3(2)).
382. Princo entered into a Memorandum of Understanding with Taiyo Yuden on March 27, 2002 wherein the parties agreed that Princo's royalty rate would be further reduced to [] of Net Selling Price if Princo fulfills the terms and conditions of the license agreement. L. Chen Tr. at 1006:23-1007:13; RX-1865C.
383. Taiyo Yuden entered into the March 27, 2002 Memorandum of Understanding with Princo lowering Princo's royalty rate to [] of Net Selling Price because Princo reported higher than expected royalties under its license agreement with Taiyo Yuden. L. Chen Tr. at 1006:23-1007:4; RX-1865C.
384. [

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385. [

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b. Price Discrimination

386. According to Respondents' expert, Roger S. Smith, IBM's licenses of its information storage technology patents are typically priced at royalty rates of one percent per patent, and when licenses to multiple patents are granted, the one percent rate is cumulated for each patent in the package until a maximum of five percent is reached. *See* Smith Tr. 1409:18-1410:14.
387. Any number of patents can be chosen for licensing from IBM. *See* Smith Tr. 1472:9-20, 1490:3-8.
388. Thus, IBM's licensees have a choice of acquiring rights only to patents that they need at royalty rates that reflect the number of patents they actually acquire.

389. Certain manufacturers who sell CD-R/RW discs to Philips or its licensor-partners pay no royalty on those discs to the pool members. J. Chen Tr. 858:3-859:22; Beune Tr. 2439:1-7, 2439:20-2440:12.
390. When Philips purchases CD-Rs and CD-RWs from a disc manufacturer, the price quoted to Philips by its suppliers excludes the royalty. Beune, Tr. 2366-67.
391. Manufacturers who sell CD-R/RW discs to a company that has entered into a cross-license with Philips are not required to pay royalties to Philips on those discs. J. Chen Tr. 858:3-859:22; Beune Tr. 2439:8-20, 2444:17-22, 2447:1-8, 2450:2-4.
392. Philips has cross licenses in optical storage technology with at least [] companies worldwide: []
393. Of these Philips cross-licensees, at least [] – are active in either the manufacture or sale of CD-R or CD-RW discs. RX-1379C (PH 110652-53).
394. CMC Magnetics Corporation, a CD-R and CD-RW manufacturer and patent pool licensee, sells discs to Philips and Imation [] and is not required to pay royalties on those sales. J. Chen Tr. at 858:3-859:22.
395. Philips purchases its CD-Rs and CD-RWs from CMC Corporation, a manufacturer in Taiwan. Lang Tr. at 227:17-23.
396. CMC does not pay a royalty on every CD-R disc that it sells. For example, on one royalty

report, CMC only paid royalties on [] of the CD-R discs it sold.

Bratic Tr. 1751:22-1753:17; RX-1536C.

397. Ritek Corporation, a CD-R and CD-RW manufacturer and patent pool licensee, sells discs to Philips and Maxell [] and is not required to pay royalties on those sales. J. Chen Tr. at 858:3-859:22.

398. Lead Data, a CD-R and CD-RW manufacturer and patent pool licensee, sells discs to Sony and Maxell [] and is not required to pay royalties on those sales. J. Chen Tr. at 858:3-859:22.

399. []

]]

400. 42.8 percent of the market for CD-Rs in the Americas does not require a royalty payment to Philips. RX-3003; McCarthy Tr. at 2113:18-23.

401. 41.91 percent of the global market for CD-Rs does not require a royalty payment to Philips. RX-3003; McCarthy Tr. at 2113:18-23.²

402. Gigastorage does not sell CD-Rs or CD-RWs to any companies that are CD-R or CD-RW patent pool licensors, or that are cross-licensees of Philips's; therefore all of its sales are subject to royalties. J. Chen Tr. at 862:18-21.

²Respondents made a clerical error when transposing the value for Sony's market share, resulting in a figure of 40.56%. The correct percentage is 41.91%, as shown by including the correct market shares number for Sony in the addition.

403. Having to pay royalties on 100 percent of its CD-R and CD-RW sales places Gigastorage at a significant competitive disadvantage to manufacturers that are not required to pay royalties. The competitive disadvantage is significant because the royalty rates are so high, comprising a large percentage of the Net Selling Price, and adding significantly to Gigastorage's costs. J. Chen Tr. at 862:22-863:6.
404. Gigastorage cannot stay in business unless it can make some royalty-free sales. McCarthy Tr. at 2086:14-21.
405. Based on Gigastorage's current Net Selling Price and manufacturing costs, paying Philips's patent pool royalty rate of 10 Yen per disc would increase Gigastorage's price per CD-R disc by [] percent. J. Chen Tr. at 866:6-17; RX-1945C.
406. Based on Gigastorage's current Net Selling Price and manufacturing costs, paying Philips's individual license royalty rate of 6 cents per disc would increase Gigastorage's price per CD-R disc by [] percent. J. Chen Tr. at 866:6-17; RX-1945C.
407. Since the royalty under the Philips-only license is 6 cents per disc and paying that royalty would increase Gigastorage's current manufacturing costs by [] percent, CD-R manufacturers who do not pay royalties on sales to Philips and Philips's cross-licensees gain a competitive cost advantage of [] percent. J. Chen Tr. at 866:18-24; RX-1945C.

4. Conclusion on *Per Se* Misuse

E. "Rule of Reason" Analysis

1. Scope of the Patent Grant

2. Application of "Essentiality" Standards to Patents in the Pools

408. The decision whether a patent owned by Philips and its licensor-partners that involves

CD-R/RW technology is to be included in the pools has been assigned by the pools to Dr. Kenneth Rubenstein, a patent attorney with a PhD. in physics, who decides whether the patent is “essential” and therefore included, or “non-essential” and therefore excluded. *See* Rubenstein Tr. 2172:22-2173:7.

409. Dr. Rubenstein considers himself to be an “independent evaluator” of the essentiality of patents submitted to him for inclusion in the pools, not merely an attorney in an attorney-client relationship with Philips or any of its licensor partners. *See* Rubenstein Tr. 2171:24-2172:6, 2191:9-18.
410. Dr. Rubenstein has performed in this capacity with the MPEG-2 and DVD patent pools that were the subject of the Department of Justice’s three business review letters. *See* Rubenstein Tr. 2173:8-14.
411. The CD-R/RW pools were the only pools Dr. Rubenstein’s group has ever examined where licensing activity had begun *prior* to the analysis. Rubenstein Tr. 2314.
412. In deciding whether a patent is “essential,” Dr. Rubenstein breaks his analysis into two subparts – whether the patent is “technically essential” and whether the patent is “essential as a practical matter” (also referred to by Dr. Rubenstein as “commercially essential”). *See* Rubenstein Tr. 2182:14-23.
413. In one of his status reports to Sony rendering decisions on the essentiality of patents that Sony submitted to him for inclusion in the CD-R patent pool, Dr. Rubenstein gave his definition of a patent that is “technically essential” to the pool as being one wherein “at least one claim of the patent covers (i.e., is essential to implement) a portion of the Specifications for Recordable Compact Disc Systems, Part II: CD-R, Verson 3.1,

December 1998 ('the CD-R Standard')"; that is, the CD-R section of the Orange Book. *See, e.g.,* CX-563C (July 3, 2001 Rubenstein Status Report at PH065751).

414. Because a manufacturer practicing the Orange Book standard infringes the patent, Dr. Rubenstein does not consider whether any alternative patents or technology exists that would allow the licensee to accomplish the purpose of the standard. In Dr. Rubenstein's view, a licensee practicing the standard infringes the patent and needs a license to the patent to manufacture the product. Rubenstein, Tr. 2208, 2213.
415. Dr. Rubenstein further testified that if he decides that a patent is not "technically essential," he then decides whether the patent is nevertheless "essential as a practical matter" and should nevertheless be included in the pools on that basis. *See* Rubenstein Tr. 2184:15-25.
416. To Dr. Rubenstein, "essential as a practical matter" means that the patent "must be shown to have at least one claim having no commercially reasonable alternative for implementing a portion of the CD-R Standard." CX-563C (July 3, 2001 Rubenstein Status Report at PH065751).
417. In making the determination as to whether a patent is "essential as a practical matter," Dr. Rubenstein looks at "what's going on in the marketplace" to see if substantially all of the relevant products practice the patent; if many do not, then he considers a commercially feasible alternative to exist and he finds the patent to be commercially non-essential as well as technically non-essential. *See* Rubenstein Tr. 2185:8-25.
418. According to Dr. Rubenstein, commercial essentiality is a time-dependent issue, such that something that may have been commercially essential two or three years ago may not be

now. Rubenstein Tr. at 2286:19-2287:7.

419. According to Rubenstein, the pool “should follow the technology,” meaning that when the technology changes, patents in the pool that were previously commercially essential should be re-evaluated to determine if the industry is still using them. Rubenstein Tr. at 2287:8-17.

420. According to Dr. Rubenstein’s status report to Sony, when a patent is submitted by Philips or its licensor-partners for inclusion in the pools on the basis of essentiality as a practical matter, Dr. Rubenstein asks the submitting company for evidence that demonstrates such essentiality, which can come in several forms as follows:

Preferably, evidence submitted should describe: the technical/commercial reason(s) why the invention claimed in the patent is the only practical way to implement part of the CD-R Standard; any known alternatives to the invention claimed; and why these alternatives are not used. The evidence may also cover a study of the products available in the market to demonstrate that substantially all (*e.g.*, 90% or more) of the market infringes one or more claims of the patent. Other forms of evidence that similarly demonstrate pervasive use in the marketplace of the patent or patents may be provided.

CX-563C (July 3, 2001 Rubenstein Status Report at PH065751).

421. In practical terms, this practice means that if Dr. Rubenstein and his staff are unable to find a patent technically essential in some cases, they will rely upon test data submitted by the patentee to make the determination about a patent’s commercial essentiality.

Rubenstein, Tr. 2184; 2273:25-2274:12, 2275:23-2276:5; CX-315C (PHX 009036 - PHX 009037).

422. If a new technology develops on CD-R/RW discs that most of the industry accepts and a

pool member submits a patent covering that new technology, that can effectively preclude non-pool members from competing in this area. Rubenstein Tr. at 2286:4-20; 2287:18-2288:5.

423. According to Dr. Rubenstein, approximately 50 patents have been submitted to him for review by Philips and its licensor-partners, and that of these, approximately 30 have been included in the pools as “technically essential” whereas two have been included as “essential as a practical matter.” *See* Rubenstein Tr. 2195:20-2196:13; *also see, e.g.*, CX-563C; CX-564C; CX-565C; CX-569C; CX-572C.

424. Philips’ CD-R/RW patent pool licensing agreements have a provision that requires a licensee that has an “essential patent ” (*i.e.*, both “technically” essential and essential “as a practical matter”) to grant such patent back to the licensors and other licensees on reasonable terms and conditions, including the payment of a royalty. Smith Tr. 1448:2-22; RX-992C (Philips CD-R Disc Patent License Agreement § 2.06, at PH077998 and PH077001).

425. During the 1990s, this “grantback” provision required a grant back of all “pertinent” patents, not all “essential” patents. Bratic Tr. 1779:21-1780:23.

426. Several CD-R and CD-RW licensees continue to operate under licenses with grantback clauses that require them to grant back all “pertinent” patents. *See, e.g.*, RX-1903C, tab 2 (¶ 2.07) , tab 4 (¶ 2.07) , tab 7 (¶ 2.07) , tab 9 (¶ 2.07); Bratic Tr. 1781:3-6.

427. There have never been any grantbacks under the CD-R or CD-RW disc license agreements. Bratic Tr. 1781:20-1782:4; Beune Tr. 2354:4-7.

428. The current grantback provision in Philips’ license agreements tracks a similar provision

requiring a grantback of “essential” patents that was reviewed by the DOJ in its 3C DVD business review letter and was not found to be anticompetitive. *See* CX-357 (3C DVD Business Review Letter at pp. 12-13).

429. According to Dr. Rubenstein, there are several differences between his definitions of “essentiality” and Dr. McLaughlin’s that cause him to include more patents in the pools as “essential” than Dr. McLaughlin does. Rubenstein Tr. 2206:11-14, 2210:2-18.
430. The principal difference, according to Dr. Rubenstein, is that he deems patents to be essential if they cover any section of the Orange Book, whereas Dr. McLaughlin does not count patents that cover technology identified in the Orange Book as only “recommended” or “optional.” *See* Rubenstein Tr. 2209:15-25, 2211:14-2214:11.
431. Another difference Dr. Rubenstein perceived was that Dr. McLaughlin included theoretical alternative technologies as substitutes, not just alternatives that actually exist in the marketplace. *See* Rubenstein Tr. 2214:12-2216:25.
432. Although it is not mandatory for a CD-R or CD-RW disc to comply with some portions of the Orange Book, according to Dr. Rubenstein those provisions are nevertheless so integrated with other mandatory sections that it is best to view the Orange Book as a whole. *See* Rubenstein Tr. 2295:8-2296:7; RX-407C (Orange Book CD-R Standard § 1.3 at PH015684) (“All parts in this document are mandatory unless they are specially defined as recommended or optional or informative.”).
433. In its business review letters, the Department of Justice noted that it understood “essentiality” to “encompass patents which are technically essential – *i.e.*, inevitably infringed by compliance with the specifications – and those for which existing

alternatives are economically unfeasible.” CX-357 (3C DVD Business Review Letter at 3 n.8).

434. However, the DOJ expressed misgivings that the definition of essentiality “as a practical matter” could be interpreted too liberally:

If our understanding of the criterion “necessary (as a practical matter)” is correct, [footnote omitted] then it appears that the Licensors intend to license through the pool only complementary patents for which there are no substitutes for the purposes of compliance with the Standard Specifications. Some uncertainty arises from this definition's imprecision: Unlike the MPEG-2 pool, which required actual technical essentiality for eligibility, this pool introduces the concept of necessity “as a practical matter.” On its face, this latter standard is inherently more susceptible to subjective interpretation. [footnote omitted] An excessively liberal interpretation of it could lead to the inclusion of patent rights for which there were viable substitutes. *In that event, the pool could injure competition by foreclosing such substitutes.*

CX-357 (3C DVD Letter at 10) (emphasis added).

435. From Dr. Rubenstein’s point of view, the procompetitive impact of his “commercial essentiality” criterion is that it provides licensees with all the patents they need to make an Orange Book compliant CD-R or CD-RW disc by including all patents found by Dr. Rubenstein to be used by virtually all of the CD-R/RW market in addition to those that are “technically essential” to Orange Book compliance. *See Rubenstein Tr. 2279:7-16.*
436. Submitting a patent to Dr. Rubenstein for evaluation as to whether it can be included in the pool is voluntary on the part of the pool member. *Rubenstein Tr. 2320:18-2321:14.*
437. Dr. McLaughlin’s definition of “essential as a practical matter” includes “only complementary patents for which there are no substitutes,” which is the same definition that the DOJ found acceptable. *See CX-357 (3C DVD Business Review Letter at 10).*
438. Dr. Rubenstein claimed that he continually reviews his essentiality determinations and

can remove a patent from the pools if competing alternative technologies have arisen that render the patent no longer "essential as a practical matter." *See* Rubenstein Tr. 2286:4-2287:7.

439. Manufacturers know enough about the patents in the pools to realize that they are being forced to license technology that they do not want. *See* J. Chen Tr. 918:4-920:7. The testimony of Jerry Chen to this effect is as follows:

Q You had a copy of the license and the patent list before you entered into the license; is that right, sir?

A In the --

Q No, I'm just asking you, you had a copy of the license and the patent list before you entered into the license with Philips?

A They give us, yes.

Q And you didn't look at that patent list, did you?

A Of course, yes. I just explained that. I will explain again. Before we signed the patent license, we have a patent list, because Philips offer us so-called standard joint license agreement to us, so of course, including the patent list. But in the patent list, there are over 100, over 100 patents. So -- and also, there are a lot of irrelevant patents in the list, for example the CD audio, CD-ROM and CD-I, and also the CD-MO patent in the list. Of course, we have a list, and also, we expressed such opinion to Philips Taipei. So I have a phone with Danny Lin. He's a manager of Philips Taipei who is in charge of patent licensing in Taiwan. I, on the phone, spoke with him regarding this issue, those patents we don't need, why they need to put in the list. But we got the answer I just explained. We got the answer, even if you use one patent of the list or two or more, you still need to pay the same royalty rate, the same amount. So I have, before, we signed a joint license agreement.

Q Mr. Chen, I want to direct you to tab 2 of your binder, which is a copy of your deposition testimony, and direct your attention to

page 158, line 13. Page 158, line 13.

A Line 13.

Q You testified at your deposition "I have looked at the patent list, this is an attachment to the agreement, and there are so many numbers that I didn't look at them in detail, and I remember there were over 100." Do you remember that testimony?

A Yeah, that's my answer, right.

JUDGE HARRIS: Yes, he remembers that.

BY MS. AQUINO:

So you didn't look at the patents in detail; correct?

A Yes. I also explained that we have a patent list, but we don't have the patent in very detail, but from the patent list, I remember in the deposition, I also explain to you, it's very easy to take a look in the list, there are different category for the patent. So at that time I explained to you they are CD audio, CD-ROM and CD-I and also the CD-MO in the patent list. So it's very obvious we don't need that, but in the detail, we don't have time, we don't have the manpower to go into the detail, and also, that's over 100 patents.

J. Chen Tr. 918:4-920:7.

3. The Presence of Non-essential Patents in the Pools

440. Among the patents in the Philips CD-R and CD-RW pools that have been identified by the Staff as non-essential are Sony's U.S. Patent No. 4,942,565 (the "Lagadec '565 patent") and Philips' U.S. Patent No. 5,001,692 (the "Farla '692 patent"). *See* SPHB at 23. Neither of these patents have been asserted by Complainant as having been infringed by Respondents.
441. Respondents, in addition to identifying the Farla '692 patent as non-essential, contend that Philips' U.S. Patent Nos. 4,962,493 and 4,807,209 (the "Kramer '493 and '209

patents”) in the pools are non-essential. The Kramer patents have been asserted by Complainant as being infringed by Respondents.

442. Respondents also identify as non-essential the following patents in the pools, which Complainant has not asserted as being infringed by Respondents: (i) Sony’s U.S. Patent No. Re. 34,719 (the “Yamamoto ‘719 patent”); (ii) Ricoh’s U.S. Patent No. 5,740,149 (the “Iwasaki ‘149 patent”); (iii) Sony’s U.S. Patent No. 5,126,994 (the “Ogawa ‘994 patent”); (iv) Philips’ U.S. Patent No. 5,978,351 (the “Spruit ‘351 patent”); (v) Philips’ U.S. Patent No. 5,060,219 (the “Lockhoff ‘219 patent”); (vi) Philips’ U.S. Patent No. 5,835,462 (the “Mimnagh ‘462 patent”); and (vii) Taiyo Yuden’s U.S. Patent Nos. 4,990,388 and 5,090,009 (the “Hamada ‘388 and ‘009 patents”). *See* RPHB at 12 and 15-16.
443. Dr. Rubenstein has not yet made an essentiality determination for U.S. Patent No. 5,001,692, the Farla patent. Rubenstein Tr. at 2232:19-25; 2235:8-12; RX-1472.
444. Dr. Rubenstein has not yet made an essentiality determination for U.S. Patent No. 5,740,149, the Iwasaki patent. Rubenstein Tr. at 2236:1-4; RX-52.
445. Dr. Rubenstein has not yet made an essentiality determination with respect to United States Reissue Patent No. 34,719, the Yamamoto patent. Rubenstein Tr. at 2263:1-10; RX-50.
446. Dr. Rubenstein has not yet made an essentiality determination with respect to United States Patent No. 5,001,692 (RX-3007C). Rubenstein Tr. at 2263:17-2264:12.
447. Dr. Rubenstein has concluded that only two patents are essential as a practical matter: United States Patents Nos. 4,990,388 and 5,090,009 issued to Hamada and assigned to

Taiyo Yuden. Rubenstein Tr. at 2250:4-22.

448. Philips recognized that its nonessential patents could be in competition with those of its licensees: “The non essential patents or nice to have patents. There is no need to license and it would, *we thought it would be good to have these non essential patents as a defence against patents of licensees*, which would not be the license back to Philips anyway, at least not for free.” RX-1488 (Beckers Depo. at 85) (emphasis added).
449. Calimetrics’ OPC and write strategy methods are commercially viable. McLaughlin Tr. at 1563:1-12.
450. Calimetrics’ OPC procedure and write strategy has been applied to CD-R and CD-RW discs and has been shown to be effective, *i.e.* able to produce Orange Book-compliant discs. McLaughlin Tr. at 1564:17-23.
451. Calimetrics has licensed its OPC and write strategy method to [] and to [] McLaughlin Tr. at 1566:4-8.
452. The two-beam mastering method is a commercially viable alternative to the Yamamoto ‘719 patent. McLaughlin Tr. at 1568:3-14.
453. The Calimetrics OPC procedure and the two-beam mastering system would satisfy the commercial essentiality criteria that Dr. Rubenstein applies as a part of his essentiality analysis because both are cost effective and implementable. McLaughlin Tr. at 1568:15-20; 1570:1-9.
454. The Calimetrics OPC method is an alternative to each of the Ogawa ‘994 patent, the Iwasaki ‘149 patent, the Spruit ‘351 patent, and the Farla ‘692 patent. McLaughlin Tr. at 1571:3-9.

455. Calimetrics has been affected by the Philips CD-R and CD-RW patent licenses because it experiences difficulty licensing its competing write strategy and OPC methods.

McLaughlin Tr. at 1572:4-15; 1574:6-20.

456. The effect of having the patents on the OPC and write strategy technology in the CD-R/RW patent pools is that when Calimetrics tries to license its technology, the target companies will not consider the Calimetrics technology, even if superior, because they already have a license under the Philips patent pool. McLaughlin Tr. at 1575:15-1576:2.

a. The Sony Lagadec '565 Patent

457. In April of 2001, Sony submitted the Lagadec '565 patent – the same patent asserted by the Princo Respondents in support of their invalidity arguments as to the '856 and '825 patents – to Dr. Rubenstein for the purpose of including it in the Philips CD-R patent pool as essential for the practice of the CD-R standard. RX-1800.

458. Dr. Rubenstein agreed with Sony that Lagadec was “technically” essential, meaning that in his view, at least one of its claims covered at least a portion of the Orange Book standards. *See* CX-563C (July 3, 2001 Rubenstein Status Report on the Study of Sony’s Patent Submissions for CD-R at PH065751).

459. Dr. Rubenstein found that in Lagadec, “[a]t least claim 6 is essential for a disc with a substrate, a recording layer, and a protective layer, where the substrate has a substantially spiral wobbled pregroove formed thereon by a control signal consisting of a carrier frequency (22.05 kHz) modulated by an ATIP signal,” which he found consistent with certain sections of the Orange Book. *See id.* at PH065753.

460. “ATIP” stands for “Absolute Time In Pre-groove,” standing for the methodology for

inputting time-code information in the CD-R groove. *See* RX-407C (Orange Book CD-R Standard § 1.4.1 at PH015685 (definition of “ATIP”)).

461. Since the patent was technically essential in his view, Rubenstein expressly chose not to reach the issue of whether Lagadec was also essential “as a practical matter.” CX-563C (July 3, 2001 Rubenstein Status Report on the Study of Sony’s Patent Submissions for CD-R at PH065752).
462. As a consequence, the Lagadec ‘565 patent was then added to the CD-R “essential” patent list and remains on the most current list. *See, e.g.*, RX-695 at PH 086957; RX-41 at PH 108046.
463. Prior to Sony’s submission of the Lagadec ‘565 patent to Dr. Rubenstein, that patent had never been on the list of essential CD-R patents. *See, e.g.*, RX-755 (Exhibit B4).
464. According to the testimony of Hans Mons, a Philips engineer who worked with Philips and Sony technicians on the cooperative efforts of both companies to develop CD-R technology, the Lagadec digital method for storing time code information proposed by Sony during that phase of the project was rejected by both Philips and Sony in favor of Philips’s frequency-modulated ATIP method. *See* Mons Tr. 394:19-409:2. “I think that was in the next meeting that Sony decided to accept the ATIP proposal,” Mons testified, “because in the next meeting, they had evaluated our ATIP proposal and the discs. They had written information on it, and what they told us, that it was simple and it worked well, and they silently withdr[e]w their own proposals.” Mons Tr. 408:33-409:2.
465. Dr. Hesselink testified that Lagadec would not work with a CD-R system: “As a result, Philips and Sony dismissed the Lagadec approach because this is a very difficult problem

to solve and Lagadec just did not provide a scheme that would work and was reliable and could be used for a variety of different purposes as is required under these patents.”

Hesselink Tr. 2585:1-5.

466. According to Mons, Philips and Sony jointly addressed during the CD-R development phase the issue of having the “absolute time” encoded into the pregroove of a disc. Mons Tr. 385:10-386:24.
467. The two companies came up with two different ways to solve this problem. Philips came up with the ATIP method of analog modulation of the frequency of the “wobble” signal of the pregroove, whereas Sony came up with two alternative methods, one of which was a digital modulation of the wobble signal. Mons Tr. 399:21-401:2, 401:6-403:13.
468. The digital modulation alternative ultimately formed the basis of Sony’s Lagadec ‘565 patent. *See* Hesselink Tr. 2585:1-13.
469. In arguing that the Lagadec ‘565 patent did not anticipate the ‘825 patent at issue, Dr. Hesselink testified at trial that the digital modulation methodology of Lagadec differs substantially from the analog modulation technology of the ‘825 patent:

So if you look at this signal, this is a digital approach. And in fact, it turns out that Lagadec discloses in its patent that he doesn't want to use an analog approach because there are some problems with the analog approach in his opinion. And so he opts for a digital approach

* * *

Furthermore, there is a real difficulty with actually analyzing this information in a player or reading it out and trying to decode it, because there's only one area in this code where you have to make sure that you understand that this transition is now twice as long. And so the measurement of this is prone to errors, and it is very difficult to carry out a decoding of this particular approach.

* * *

Lagadec has a broad spectrum. Rijnsburger has a broad spectrum. They do not look like frequency-modulated signals. They don't act like frequency-modulated signals and they don't produce the results of a frequency-modulated signal. As a result, Philips and Sony dismissed the Lagadec approach because this is a very difficult problem to solve and Lagadec just did not provide a scheme that would work and was reliable and could be used for a variety of different purposes as is required under these patents.

Hesselink Tr. 2580:16-21, 2581:7-14, 2584:25-2585:5.

470. The Orange Book relies upon Philips' ATIP technology, not Lagadec's digital technology. *See* CX-563C (July 3, 2001 Rubenstein Status Report on the Study of Sony's Patent Submissions for CD-R at PH065753); RX-407C (Orange Book CD-R Standard § IV).

b. The Philips Farla '692 Patent

471. The claims of the Farla '692 patent are directed to a particular method of carrying out a strategy for writing data, otherwise known as a "write strategy," onto a blank recordable disc. In particular, the patent relates to whether additional write pulses or additional information relating to the write pulses is necessary for the write strategy. McLaughlin Tr. 1525:18-1526:6; RX-1472.
472. The methodology and claims of the patent are directed to optimizing the writing accuracy of an optical recorder when faced with the properties of a particular disc. *See* RX-1472 ('692 patent, col. 1:67-2:3).
473. On May 21, 2001, Dr. Rubenstein sent Philips a status report in which he stated that the Orange Book CD-R standard did not appear to require the Farla '692 patent and therefore was not "technically essential." RX-1792 (May 21, 2001 Rubenstein Status Report re

Study of Philips' Patent Submissions re CD-R at RK005216).

474. Dr. Rubenstein analyzed the following passage from independent claim 1 of the patent, which is similar to the language of independent claims 10 and 13:

. . . a record carrier having optically readable adjustment information signifying whether a sequence of write pulses for recording a bit sequence . . .

said adjustment information signifying the number and relative positions of said additional pulses in a write pulse sequence

RX-1792 (May 21, 2001 Rubenstein Status Report re Study of Philips' Patent Submissions re CD-R at RK005216); *also see* RX-1472 ('692 patent, col. 16:27-33).

475. According to Dr. Rubenstein's status report, the "adjustment information" limitation of the claim could be viewed as the "special information" encoded in the ATIP frames of the Lead-in Area" of an Orange Book compliant CD-R disc, but "this 'special information' does not appear to provide information about having additional write pulses (*i.e.*, increasing the number of write pulses)." RX-1792 (May 21, 2001 Rubenstein Status Report re Study of Philips' Patent Submissions re CD-R at RK005216), *citing* RX-407C (Orange Book CD-R Standard § IV.4).
476. Dr. Rubenstein also pointed out that the "Optimum Power Control" ("OPC") procedure described in the Orange Book "did not appear to require writing additional pulses" or "varying the number or relative positions of additional write pulses in accordance with 'adjustment information'" as claimed in the '692 patent. RX-1792 (May 21, 2001 Rubenstein Status Report re Study of Philips' Patent Submissions re CD-R at RK005216), *citing* RX-407C (Orange Book CD-R Standard Attachment B3).
477. Dr. Rubenstein noted, however, that his group did not know if the Farla '692 patent was

nevertheless “essential as a practical matter,” and invited Philips to comment further on that possibility. RX-1792 (May 21, 2001 Rubenstein Status Report re Study of Philips’ Patent Submissions re CD-R at RK005217).

478. In his status report, Dr. Rubenstein defined a patent that is “essential as a practical matter” as one having “at least one claim which is found to have no realistic alternative for implementing the CD-R Standard (or a portion thereof). However, for a patent to be found essential on this basis, evidence must be submitted that demonstrates such essentiality.” RX-1792C (May 21, 2001 Status Report at RK005214). The evidence, according to the status report definition, could include, *inter alia*, “technical/commercial reason(s) why the invention claimed in the patent is the only practical way to implement part of the CD-R Standard” *Id.*
479. On May 16, 2002, Dr. Rubenstein again wrote Philips in reference to the essentiality of the Farla ‘692 patent to the Orange Book CD-RW standard. *See* RX-1781C (May 16, 2002 Rubenstein Status Report on CD-R & CD-RW Patent Evaluation for CD-R & CD-RW Patent Licensing Programs at RK007930-31).
480. Dr. Rubenstein’s findings for CD-RW matched his earlier findings for the CD-R standard that the patent was not “technically essential.” *Id.* Again, he requested information from Philips as to whether the Farla ‘692 patent was nevertheless “essential as a practical matter” for the CD-RW standard. *See* RX-1781C (May 16, 2002 Rubenstein Status Report on CD-R & CD-RW Patent Evaluation for CD-R & CD-RW Patent Licensing Programs at RK007930-31).
481. Respondents’ expert, Dr. McLaughlin, opined that the Farla ‘692 patent is not necessary

- to practice the CD-RW portion of the Orange Book. *See* McLaughlin Tr. 1525:14-1528:8.
482. Dr. McLaughlin also testified that at least one economically viable alternative for performing write strategy exists that does not infringe the Farla patent. McLaughlin Tr. 1563:1-12.
483. Dr. McLaughlin identified an OPC and write strategy method available from Calimetrics, Inc., where he is employed as a Principal Scientist, as an alternative that is not covered by the Farla '692 patent and that would comply with the requirements of the Orange Book if it were used. McLaughlin Tr. 1493:3-8; 1520:16-22, 1521:12-1522:13, 1527:7-1528:8.
484. According to Dr. McLaughlin, the Calimetrics OPC and write strategy method uses a write strategy matrix. McLaughlin Tr. 1519:12-22. It examines information that has been written to a recordable disc and information to be written to the disc, and uses the write strategy matrix to define the strategy for writing data onto the disc by appropriately setting the power of the write laser. *Id.* It has been applied to CD-R and CD-RW discs, and has been shown to operate and to be effective in Orange Book-compliant discs. McLaughlin Tr. 1564:17-23.
485. The Calimetrics OPC and write strategy method is not covered by the Farla '692 patent. McLaughlin Tr. 1527:7-1528:8. In particular, the Calimetrics method does not use or examine information from a disc to make a determination if additional write pulses are necessary to record a particular sequence of information onto the disc. *Id.*
486. The Farla '692 patent was included in the CD-R license agreement for many years before it was removed from the list of essential patents in 2001. *Compare* RX-840; RX-778; RX-755; RX-914.

487. At least as of a license agreement signed in January 2002, the Farla '692 patent was still being listed as an essential patent under the CD-RW license agreement. *See* RX-770 at PH087634.
488. It is unclear whether the Farla '692 patent remains listed on Philips' standard license agreements as an essential patent in the CD-RW pool. Philips' website of form license agreements does not include the lists of essential and non-essential patents for the CD-RW disc pool. *See* "Philips Intellectual Property and Standards, CD-R/RW Patents," at [http:// www.licensing.philips.com/ licensees/patent/ob/](http://www.licensing.philips.com/licensees/patent/ob/) (CD-R/RW hyperlink) (last visited on August 26, 2003).

c. The Ricoh Iwasaki '149 Patent

489. The claims of Ricoh's Iwasaki '149 patent are directed to a particular method of performing the OPC procedure, which is setting laser power to an appropriate level to record onto a particular disc. McLaughlin Tr. 1516:24-1518:7; RX-52 (Iwasaki '149 patent).
490. The OPC method defined by the Iwasaki patent consists of calculating a standardized gradation factor by monitoring the amplitudes of signals from test data patterns. McLaughlin Tr. 1520:23-1421:11; RX-52 (Iwasaki '149 Patent).
491. The Orange Book does not mandate a particular method for carrying out the OPC function. McLaughlin Tr. 1507:10-1509:17; RX-407C (Orange Book CD-R Standard at PH015759); RX-408C (Orange Book CD-RW Standard at PH023331-023332).
492. Philips's employee and technical witness, Hans Mons, testified that some of the characteristics the Orange Book defines for CD-Rs and CD-RWs are not mandatory, and

that Orange Book-compliant CD-Rs and CD-RWs do not need to conform to the non-mandatory characteristics defined by the Orange Book. Mons Tr. 453:18-454:2; McLaughlin Tr. 1504:10-18.

493. At least one economically viable alternative for performing OPC exists that does not infringe the Iwasaki '149 patent. McLaughlin Tr. 1563:1-12. The OPC and write strategy method available from Calimetrics, Inc. was identified by Dr. McLaughlin as an alternative that is not covered by the Iwasaki patent and would comply with the requirements of the Orange Book if it were used. McLaughlin Tr. 1521:12-1522:13; 1523:5-13.
494. The Calimetrics method is not covered by the Iwasaki '149 patent. McLaughlin Tr. 1521:12-18. The Iwasaki patent requires the calculation of a certain mathematical quantity, and the calculation of that mathematical quantity does not occur during the Calimetrics OPC procedure. McLaughlin Tr. 1521:19-1522:13.
495. Dr. Rubenstein has not rendered any opinion as to the essentiality of the Iwasaki '149 patent. Rubenstein Tr. 2263:11-2264:12.

d. The Sony Yamamoto '719 Patent

496. The Sony Yamamoto '719 patent relates to the ability to create, with a single laser beam, a master disc containing both the wobbled pre-groove and certain pre-recorded data. McLaughlin Tr. at 1534:14-25; RX-50.
497. The Yamamoto patent is not essential to practice the Orange Book because the Orange Book does not discuss or relate to how one should generate a master. McLaughlin Tr. at 1535:1-6.

498. There are alternative methods for implementing the functionality of the Yamamoto '719 patent, including using separate laser beams to pre-store the data and generate the wobble. McLaughlin Tr. at 1535:7-15.
499. A two-beam system can be used to generate both the wobble and the prestored information in compliance with the Orange Book without practicing the claims of the Yamamoto patent. McLaughlin Tr. at 1535:16-1536:13.
500. According to Dr. McLaughlin, the Calimetrics two-beam mastering method is a commercially viable alternative to the patent. McLaughlin Tr. 1568:3-15, 1570:1-9.
501. The two-beam mastering system of the Calimetrics method allows a groove and pits to be simultaneously formed in a master disc. McLaughlin Tr. 1535:7-1536:13.
502. The two-beam alternative is not covered by the Yamamoto patent because it does not use one recording beam modulated at two different frequencies to create marks and a track. McLaughlin Tr. 1535:16-1536:13.
503. Dr. Rubenstein has not rendered any opinion as to the essentiality of the Yamamoto '719 patent. Rubenstein Tr. 2262:14-2263:10.

e. The Philips Kramer '493 and '209 Patents

504. The Kramer '209 and Kramer '493 patents are both directed to recordable discs with diffractive follow-on tracks. McLaughlin Tr. at 1536:14-25; RX-58 and RX-59.
505. The Kramer '209 and Kramer '493 patents are not complementary to one another. McLaughlin Tr. at 1538:15-24.
506. According to Dr. Rubenstein, the Kramer '209 and '493 patents are "technically essential" patents to the CD-R disc standard, but as of February 2002 had not yet reached

an opinion on their essentiality to the CD-RW disc standard. *See* Rubenstein Tr. 2299:20-23; RX-87C (October 17, 2001 Rubenstein Status Report at PH065770); RX-1798C (February 25, 2002 Rubenstein Status Report at RK000239, RK000242).

507. According to Dr. McLaughlin, the Kramer '209 and Kramer '493 patents are not essential to practice the Orange Book because both patents are directed towards a single-beam tracking methods, and the Orange Book indicates that single- or three-beam systems can be used. McLaughlin Tr. at 1537:9-17; RX-407C at PH015776.
508. Under the claim construction of the Kramer '493 and '209 patents that has been reached in this Initial Determination, the claims of those patents cover both single-beam and three-beam methods. *See* FF Section III A.
509. Thus, the claims of the Kramer '493 and '209 patents are broad enough to encompass two of the three tracking methods that have been identified in the Orange Book as alternatives to one another, but there is no evidence in the record as to whether it covers the third alternative that is also identified in the Orange Book, known as the "Differential Phase Detection" or "DPD" method. *See* RX-407C (Orange Book CD-R Standard Attachment B13 at PH 015776).

f. The Taiyo Yuden Hamada '388 and '009 Patents

510. With respect to Taiyo Yuden's Hamada '388 and '009 patents, Dr. Rubenstein found that they were not technically essential to the Orange Book, but also found on the basis of tests conducted by his own independent expert, ETA-Optik, and by Taiyo Yuden that virtually all of the CD-R discs in the U.S. market practiced those patents. He therefore concluded that the Hamada patents were "essential as a practical matter," and included

- them in the CD-R disc pool as well. Rubenstein Tr. 2264:21-2280:6; RX-1777C (June 21, 2001 Rubenstein Status Report to Taiyo Yuden at RK008207); RX-1759C (October 16, 2001 Rubenstein Status Report to Taiyo Yuden at RK008151-53).
511. Of the CD-R brands of 27 different manufacturers that Dr. Rubenstein and his colleagues collected for testing purposes, 26 satisfied the tests for coverage by the patents that ETA-Optik performed and all 27 satisfied the tests for coverage that Taiyo Yuden performed. *See* Rubenstein Tr. 2264:21-2280:6; RX-1759C (October 16, 2001 Rubenstein Status Report to Taiyo Yuden at RK008151-53).
512. To reach this result, however, Dr. Rubenstein had to construe the '009 patent in a particular way so that the test results would result in a finding of "commercial essentiality." *See* RX-1759C at RK008152.
513. Specifically, the relevant claim of the Hamada '009 patent requires an optical parameter to fall within a specific range, and that parameter is dependent upon a variable determined by measuring the thickness of the recording layer of a CD-R disc. *See* RX-1759C at RK008152.
514. This measurement is shown in the patent to be essentially equal throughout the recording layer of a CD-R disc, but this disclosure does not account for CD-R discs that have a pregroove even though the patent acknowledges the use of pregrooves on optical discs. *See* RX-1759C at RK008152.
515. Dr. Rubenstein avoided this problem by deciding that it was appropriate to measure the thickness of the recording layer of such discs only in the pregroove "in view of the recording of information only in the pregroove" on the disc. *See* RX-1759C at

RK008152.

516. Measuring thickness in this way yielded a higher result than if the thickness of the “land” on the disc had also been accounted for, since the thickness of the recording layer in the groove is thicker than it is in the “land.” *See* RX-1759C at RK008152.
517. Using this value, ETA-Optik was able to report to Dr. Rubenstein that 25 of the 26 brands that it tested met the claim limitation of the ‘009 patent. *See* RX-1759C at RK008152.
518. However, one brand, the Verbatim CD-R disc manufactured by Mitsubishi, did not meet the claim limitation of the ‘009 patent. *See* RX-1759C at RK008152.
519. Dr. Rubenstein dismissed this difference on the ground that the Verbatim disc was “an old type of CD-R disc,” that “newer discs do not use such thick dye,” that “Mitsubishi’s market share is only around 1.7-1.8%,” and that “a Yamaha disc also manufactured by Mitsubishi but bearing a different ATIP code did meet the requirement” *See* RX-1759C at RK008152.
520. Dr. Rubenstein also found that an alternative thickness measurement devised by Taiyo Yuden, consisting of a weighted average of the thickness of the recording layer in the groove and the “land,” resulted in optical parameter values that fell within the claimed range for all 26 discs that were tested. RX-1759C at RK008152-53. He therefore concluded that both Hamada patents were “essential as a practical matter.” *Id.*
521. In conducting his essentiality analysis of the Hamada patents, Dr. Rubenstein did not consider discs other than CD-Rs and CD-RWs. Rubenstein Tr. at 2285:10-19.
522. In performing essentiality analyses, it is not Dr. Rubenstein’s practice to search optical data storage literature for alternative technologies. Dr. Rubenstein does not consider

- “theoretical alternatives”. Rubenstein Tr. at 2284:20-2285:9.
523. Dr. McLaughlin disagreed with Dr. Rubenstein’s analysis, finding that the Hamada patents relate to disc layer structure and have commercially viable substitutes that are not covered by the patents. McLau ghlin Tr. 1539:9-22, 1540:18-1545:1.
524. The Hamada ‘388 patent describes the layer structure of a recordable optical disc and how the pits containing the recorded information are to be formed. McLaughlin Tr. at 1539:9-22.
525. The Hamada ‘388 patent is not essential to practice the Orange Book because the Orange Book does not require a specific disc layer structure and describes nothing about the mechanism for forming pits on the disc. McLaughlin Tr. at 1539:23-1540:5, 18-21.
526. Alternative technologies to that disclosed and claimed in the Hamada ‘388 patent exist. McLaughlin Tr. at 1540:18-25.
527. Mitsui Toatsu proposed and developed an optical disc made on a glass substrate that did not meet the claims of the Hamada ‘388 patent. McLaughlin Tr. at 1541:4-15; RX-1418.4C and RX-1418.5C at PH048287.
528. Bayer AG developed a photo-addressable polymer that did not meet the claims of the Hamada ‘388 patent. McLaughlin Tr. at 1541:16-20.
529. Philips developed a tellurium-based material that did not meet the claims of the Hamada ‘388 patent. McLaughlin Tr. at 1541:21-24.
530. None of the Mitsui Toatsu, Bayer, and Philips alternatives are covered by the claims of the Hamada ‘388 patent because these methods do not use deformation of one of the layers as described in the Hamada patent. McLaughlin Tr. at 1542:8-16.

531. The Hamada '009 patent claims certain ranges for two optical parameters, rho and the complex index of refraction, related to how light is reflected from a disc. McLaughlin Tr. at 1542:17-1543:14; RX-47.
532. The Hamada '009 patent is not essential to practice the Orange Book because the Orange Book does not specify the optical parameters that are claimed in the patent. McLaughlin Tr. at 1544:5-1545:1.
- g. Other Non-essential Pool Patents Erroneously Classified as "Essential"**
533. Other patents in the pools that have been identified by Dr. Rubenstein as "essential" but that Respondents contend are really non-essential are the Sony Ogawa '994 patent, and the Philips Spruit '351, Lokhoff '219, and Mimmagh '462 patents.
534. Dr. Rubenstein found that the Ogawa '994 patent was technically essential to the Orange Book and therefore included that patent in the CD-R disc pool. Rubenstein Tr. 2291:19-2292:16; RX-87C (October 17, 2001 Rubenstein Status Report at PH065774).
535. The Spruit '351, Lockhoff '219, and Mimmagh '462 patents were also found by Dr. Rubenstein to be technically essential to both the CD-R and CD-RW disc standards and were included in those pools. Rubenstein Tr. 2292:17-25; RX-126C (May 14, 2002 Rubenstein Status Report at PH065718, PH065719 and PH065726).
536. According to Dr. McLaughlin, the Ogawa, Spruit, Lokhoff, and Mimmagh patents are not essential to comply with the Orange Book CD-R and CD-RW specifications. McLaughlin Tr. 1500:16-1501:16; RX-45 (Ogawa); RX-48 (Lokhoff); RX-49 (Mimmagh); RX-53 (Spruit).

537. OPC is a function that is required to be performed in order to establish the proper write power that a laser must use to write on a disc. McLaughlin Tr. at 1517:7-20.
538. The Orange Book does not mandate a particular method for carrying out OPC and write strategy functions. McLaughlin Tr. 1518:8-15, 1523:5-16,1524:1-7.
539. The Ogawa '994 patent relates to estimating the time interval that the laser must remain at a given spot on the disc before a pit or mark is formed on the disc. McLaughlin Tr. at 1517:21-1518:7; RX-45.
540. According to Dr. McLaughlin, the Spruit patent, like the Ogawa patent, relates to OPC and write strategy methods. McLaughlin Tr. 1517:21-1518:7, 1522:14-1523:4.
541. The Ogawa '994 patent is not essential to practice the Orange Book because the Orange Book does not require a particular method for performing OPC. McLaughlin Tr. at 1518:8-15.
542. The Calimetrics OPC method is an alternate technology to perform the same function as the Ogawa '994 patent that will create an Orange Book compliant disc without infringing that patent. McLaughlin Tr. at 1518:16-1519:1.
543. Dr. McLaughlin became aware of the Calimetrics alternative through his affiliation with Calimetrics. McLaughlin Tr. at 1520:16-22.
544. The Calimetrics OPC method uses a write strategy matrix and considers multiple data bits to determine how the laser power should be adjusted to record information on the disc. McLaughlin Tr. at 1519:12-22.
545. The Calimetrics OPC method, which is not time-dependent, is not covered by the Ogawa patent. McLaughlin Tr. at 1519:23-1520:15.

546. The Spruit '351 patent relates to the use of a gradient similar to that in Iwasaki and then conveying the resulting information through the use of ATIP codes. McLaughlin Tr. at 1522:14-1523:4.
547. The Spruit '351 patent is not essential to comply with the Orange Book because the Orange Book does not specify a method for performing OPC. McLaughlin Tr. at 1523:5-13.
548. Patents are not complementary if there exists any overlap between the scope of the claims of the patents. McLaughlin Tr. at 1523:17-25.
549. The Spruit '351 patent is not essential to comply with the Orange Book because it uses the auxiliary codes described in another patent in the pool, the '764 patent (RX-57), and therefore is not complementary to the '764 patent. McLaughlin Tr. at 1523:13-16; 1524:1-7.
550. The Calimetrics method is not covered by the Spruit '351 patent because the information that is calculated and conveyed in the Spruit patent is not required to perform the Calimetrics OPC procedure. McLaughlin Tr. at 1524:8-1525:13.
551. The Calimetrics OPC and write strategy method does not infringe the Ogawa or Spruit patents. McLaughlin Tr. 1518:16-1519:1, 1519:23-1520:15, 1521:12-1522:13, 1523:5-13, 1524:8-1525:13.
552. Dr. McLaughlin further testified that the Lokhoff patent relates to a copy control method (McLaughlin Tr. 1528:11-19; RX-48) and the Mimmagh patent relates to a recording velocity control system (McLaughlin Tr. 1532:10-17).
553. The Lokhoff '219 patent relates to a method of copy control wherein a copy bit is placed

- in the ATIP to indicate what kinds of information may properly be recorded on the disc. McLaughlin Tr. at 1528:11-19; RX-48.
554. The Lokhoff '219 patent is not essential to comply with the Orange Book because it does not function to meet one of the essential purposes of the Orange Book, which to ensure backward compatibility and interchangeability. McLaughlin Tr. at 1528:23-1529:5.
555. The Lokhoff '219 patent is not essential to comply with the Orange Book because the invention is implemented through the use of auxiliary codes that are described and claimed in the '764 patent (RX-57), which means Lokhoff '219 is not complementary to the '764 patent. McLaughlin Tr. at 1529:6-13.
556. The Lokhoff '219 patent is not essential to comply with the Orange Book because there exist alternative copy protection methods to implementing copy control in either the ATIP or in the subcode Q channel of the servo track, such as embedding the copy control in the content. McLaughlin Tr. at 1529:14-1530:3.
557. Embedding copy control in the content would satisfy the Orange Book but would not be covered by the Lokhoff '219 patent. McLaughlin Tr. at 1530:4-1531:21.
558. The Mimmagh '462 patent is related to conveying velocity-related information, *i.e.* the range of speeds at which a disc may be recorded upon, through the ATIP. McLaughlin Tr. at 1532:10-17.
559. The Mimmagh patent is not essential to practice the Orange Book because such velocity-related information is not required for backward compatibility and is not a function that is necessary for interchangeability. McLaughlin Tr. at 1532:18-25.

4. Unreasonableness of the Royalty Rate

560. In the 10 years since Philips has licensed its patent pools, sales of CD-R and CD-RW discs have become a mature, price-sensitive market of consumer commodities. McCarthy Tr. 1955:25-1956:16.; 1992:2-25; Beune Tr. 2384:2-2385:22.
561. In the late 1990s, prices of CD-R and CD-RW products have declined. J. Chen Tr. 888:7-9, 896:5-18.
562. In response to the Taiwan FTC's decision that Philips's CD-R patent pools are illegal, Sony and Taiyo Yuden negotiated and entered into separate license agreements with Gigastorage. J. Chen Tr. at 873:12-20.
563. Gigastorage is currently licensed by Sony and Taiyo Yuden to manufacture CD-Rs, and by Sony to manufacture CD-RWs. J. Chen Tr. at 833:2-5; RX-1466C; RX-1872C; RX-1873C; RX-1951C.
564. Gigastorage entered into a license agreement with Sony on September 1, 2001. J. Chen Tr. at 880:1-7; RX-1466C.
565. Under Gigastorage's September 1, 2001 license agreement with Sony, the royalty Gigastorage pays is adjusted by means of an "export ratio" such that Gigastorage pays royalties only for discs sold in countries where Sony has patents. J. Chen Tr. at 880:8-882:13; RX-1466C at PHX 009626 (§ 7), PHX 009628 (§ 4(i)), PHX 009642 (calculation of actual royalty adjusted for export ratio).
566. The export ratio under the September 1, 2001 license agreement between Sony and Gigastorage is [] percent, meaning that Gigastorage pays royalties on [] percent of its licensed products sold. J. Chen Tr. at 880:8-882:13; RX-1466C at PHX 009626 (§ 7), PHX 009628 (§ 4(i)), PHX 009642 (calculation of actual royalty adjusted for export

- ratio).
567. Sony does not have CD-R or CD-RW patents in Taiwan. J. Chen Tr. at 881:10-25; RX-1466C at PHX 009637-39.
 568. The Philips CD-R and CD-RW patent pool licenses do not include an export ratio, or any other mechanism by which royalties are adjusted to reflect countries in which Sony does not have patents. J. Chen Tr. at 885:17-886:21; RX-1832C; RX-903C.
 569. The Philips CD-R and CD-RW patent pool licenses required manufacturers in Taiwan, including Gigastorage and Princo, to pay the same royalty despite the fact that Sony did not have any CD-R or CD-RW patents in Taiwan. J. Chen Tr. at 885:17-886:21; RX-1832C; RX-903C.
 570. Under Gigastorage's September 1, 2001 license agreement with Sony, the royalty Gigastorage pays is adjusted by means of a "cross-license discount" such that Gigastorage receives a [] percent discount for patents it has given Sony the option to cross-license. J. Chen Tr. at 882:23-884:8; RX-1466C at PHX 009628 (§ 4(ii)), PHX 009629, PHX 009640 (listing Gigastorage patents subject to cross-license), PHX 009642 (calculation of actual royalty adjusted for cross-license discount).
 571. The few Gigastorage patents that Sony has the option to cross-license are not very important to Sony. J. Chen Tr. at 883:23-884:4.
 572. Under its license agreement with Sony, Gigastorage pays royalties of [

] these amounts then being reduced by the

applicable export ratio and cross-license discount. J. Chen Tr. at 882:15-883:22; RX-1466C at PHX 009629, PHX 009642 (calculation of actual royalty adjusted for export ratio and cross-license discount).

573. Gigastorage entered into a new license agreement with Sony on October 1, 2002. J. Chen Tr. at 884:12-16; RX-1872C.
574. The export ratio under the October 1, 2002 license agreement between Sony and Gigastorage is [] percent, meaning that Gigastorage pays royalties on [] percent of its licensed products sold. J. Chen Tr. at 884:12-885:6; RX-1872C at GT 004588 (§§ 4(i) and 4(ii)).
575. Under its current Sony separate license agreement, Gigastorage pays Sony a royalty of [] per disc, factoring in the current export ratio of [] percent and cross-license discount of [] percent. J. Chen Tr. at 885:2-12; 857:2-12, 875:11-16; RX-1872C.
576. Gigastorage entered into a license agreement with Taiyo Yuden on December 31, 2001. J. Chen Tr. at 875:25-876:5; RX-1875C.
577. Gigastorage's December 31, 2001 license agreement with Taiyo Yuden has a stated royalty rate of 1.5 Yen or 5% of the Net Selling Price (whichever is lower) per disc; however, in a Supplemental Agreement executed the same day, Gigastorage was required to pay a lower royalty rate of [] of the Net Selling Price. J. Chen Tr. at 876:6-878:19; RX-1875C at GT 004645 (¶ 3.2), GT 004654, GT 004655-56 (Art. 4(2)).
578. Gigastorage's actual royalty rate under the December 31, 2001 license agreement with Taiyo Yuden was [] of the Net Selling Price. J. Chen Tr. at 876:12-878:19; RX-

- 1875C at GT 004655-56 (Art. 4(2)).
579. In addition to royalties, Gigastorage paid [] to Taiyo Yuden for past use. RX-1875C at GT 004655.
580. Gigastorage entered into a new license agreement with Taiyo Yuden on December 31, 2002. J. Chen Tr. at 878:20-879:12; RX-1873C.
581. Gigastorage's December 31, 2002 license agreement with Taiyo Yuden has a stated royalty rate of 1.5 Yen or 5% of the Net Selling Price (whichever is lower) per disc; however, in a Supplemental Agreement, Gigastorage was required to pay a lower royalty rate of [] of the Net Selling Price. J. Chen Tr. at 878:20-879:25; RX-1873C at GT 004661-62 (¶ 3.1); RX-1951C at GT 004658 (Art. 3(2)).
582. Under its current Taiyo Yuden separate license agreement, Gigastorage pays Taiyo Yuden a royalty of [] percent of Net Selling Price per disc. J. Chen Tr. at 857:2-12, 878:20-879:25; RX-1951C at GT 004658 (Art. 3(2)).
583. On March 10, 1998, Philips sent a letter to Gigastorage stating that a separate license to Philips's patents is available, but explaining that separate licenses from Philips, Sony, and Taiyo Yuden would be more expensive than the pool license. J. Chen Tr. at 846:10-847:3; RX-1098C.
584. On March 10, 1998, Philips sent a letter to Gigastorage stating that a separate license to Philips's patents is available, with the caveat that once a company enters into a separate license, it is not possible to convert it into a combined (*i.e.*, pool) license at a later point in time. J. Chen Tr. at 846:10-847:3; RX-1098C.
585. Philips also told Gigastorage verbally that separate licenses would be more expensive

- than a patent pool license. J. Chen Tr. at 847:4-848:3.
586. On October 2, 1999, Philips sent Gigastorage a letter stating that separate licenses would be more expensive than a pool license. RX-1576C; Beune Tr. at 2460:22-2463:18.
587. Before signing the CD-R and CD-RW patent pool license agreements, Gigastorage considered entering into separate licenses with Philips, Sony, and Taiyo Yuden expecting that that would be less expensive than the pool license agreements. J. Chen Tr. at 855:17-856:8.
588. Before signing the CD-R and CD-RW patent pool license agreement, Gigastorage was dissuaded from entering into separate license agreements with Philips, Sony, and Taiyo Yuden because Philips told Gigastorage that separate licenses would be more expensive and because Philips told Gigastorage that separate licenses could never be converted into a joint license. J. Chen Tr. at 855:17-856:8.
589. When Gigastorage discussed with Philips entering into the CD-R patent pool license agreement, the patent list included over 100 patents and included some relating to other types of compact discs. J. Chen Tr. at 840:15-841:13.
590. When Gigastorage discussed with Philips entering into the CD-R patent pool license agreement, Gigastorage did not believe it needed a license to every patent in the pool and inquired into obtaining a license to less than all of the patents on Philips's patent list. Gigastorage hoped that by eliminating some patents the royalty rate would be lower. Philips responded that the royalty is the same regardless of the number of patents used. J. Chen Tr. at 840:15-841:13, 848:4-11, 918:12-919:7.
591. In 1999, the Net Selling Price of a CD-R was approximately 55 to 60 cents per disc. J.

Chen Tr. at 848:12-850:12.

592. In 1999, Philips's CD-R patent pool royalty rate of 10 Yen was approximately [] percent of the Net Selling Price. J. Chen Tr. at 848:12-850:12.
593. Gigastorage entered into the Philips CD-R patent pool license in October 1999. J. Chen Tr. at 915:21-916:1; RX-1832C.
594. Gigastorage entered into the Philips CD-RW patent pool license in October 1999. J. Chen Tr. at 915:21-916:1; RX-903C.
595. When Gigastorage signed the CD-R patent pool license agreement in 1999, Gigastorage expected that CD-Rs would decline, as electronic products typically do, and that the royalty rate of 10 Yen would continue to grow as a percentage of Net Selling Price. J. Chen Tr. at 848:12-850:12, 917:1-13.
596. Even though Gigastorage knew the price of CD-Rs would continue to decline and that the royalty rate of 10 Yen would continue to grow as a percentage of Net Selling Price, Gigastorage entered into the CD-R patent pool license agreement in 1999 because of Philips's threats of initiating a criminal patent infringement lawsuit against the Chairman of Gigastorage. J. Chen Tr. at 850:13-851:1, 917:1-22.
597. One reason Gigastorage entered into the CD-R patent pool license agreement was because Philips threatened to file a criminal patent infringement lawsuit against the chairman of Gigastorage. J. Chen Tr. at 842:19-844:2, 917:1-22; RX-1516C.
598. From 1997 to 2002, worldwide demand for CD-R discs increased from a few hundred thousand to more than 5 billion, supply increased from several hundred thousand to almost 8 billion, prices to consumers for CD-R and CD-RW discs decreased by more than

50% from 1999 to 2001, supply capacity increased from approximately 6 billion discs in 2000 to more than 10 billion discs in 2002, the number of CD-R manufacturers increased by nearly 50% from 1997 to 2002, CD-R and CD-RW drive sales that were negligible in 1996 increased to almost 60 million units in 2002, and the price of CD-R/RW drives decreased from \$700 to approximately \$100 over that period of time. *See* CX-619C at p. 3, 6, 8, 9, 17 and 18.

599. As a result of standardization, prices for CD-R/RW discs have fallen dramatically, as is typical with electronic technology. *See* Smith Tr. 1486:19-25.

600. Manufacturers tend to license all of the pool patents that they can license, both essential and non-essential, in order to avoid all possibility of infringement litigation from Philips and its licensor-partners; they do not pick and choose some lists and not others. *See, e.g.*, J. Chen Tr. 918:4-920:7.

601. Philips has always told the manufacturers that the cost of the intellectual property was a fixed cost that manufacturers should “appropriately reflect[] in [their] prices [their] costs of patent royalties.” CX-457, CX-465, CX-467.

5. Conclusion on Misuse Under the “Rule of Reason”

F. Purge of Patent Misuse

602. Philips offered no evidence that the anticompetitive effects of including many nonessential patents in the lists of essential patents in the CD-R/RW pools have dissipated. In fact, Philips’s economic expert, Dr. McCarthy, did not examine the patents that were in the pool to determine their subject matter, let alone determine whether competition in these areas had been restored. McCarthy Tr. 2130.

G. Conclusion on Patent Misuse

See, below, Conclusions of Law.

CONCLUSIONS OF LAW

1. The Commission has personal jurisdiction over the parties, and subject matter jurisdiction over this investigation. *See Op. at 7-8 & n.7; FF Sections I and II.*
2. The importation or sale requirement of section 337 has been established for purposes of this Initial Determination. *See Op. at 7-8; FF Section II.*
3. It has been established by at least a preponderance of the evidence that the accused products infringe the asserted claims of the '209 and '493 patents. *See Op. at 50; FF Section III B.*
4. It has not been established by clear and convincing evidence that the asserted claims of the '209 and '493 patents are invalid for failing to comply with the enablement requirement of 35 U.S.C. § 112. *See Op. at 53; FF Section III C.*
5. It has not been established by clear and convincing evidence that the asserted claims of the '209 and '493 patents are invalid due to failure to provide a written description as required by 35 U.S.C. § 112. *See Op. at 57; FF Section III C.*
6. It has not been established by clear and convincing evidence that the asserted claims of the '209 and '493 patents are invalid as obvious in view of the prior art. *See Op. at 64; FF Section III C.*
7. It has been established by at least a preponderance of the evidence that the accused products infringe the asserted claims of the '401 patent. *See Op. at 85; FF IV B.*
8. It has not been established by clear and convincing evidence that the asserted claims of the '401 patent are invalid due to obviousness. *See Op. at 92-93; FF Section IV C.*
9. It has not been established by clear and convincing evidence that the asserted claims of

the '401 patent are invalid for failure to disclose the best mode in the patent specification. *See* Op. at 98; FF Section IV C.

10. It has been established by at least a preponderance of the evidence that the accused products infringe the asserted claims of the '856 patent. *See* Op. at 102; FF Section V B.

11. It has not been established by clear and convincing evidence that the asserted claims of the '856 patent are invalid due to obviousness. *See* Op. at 107; FF V C.

12. It has not been established by clear and convincing evidence that the asserted claims of the '856 patent are invalid due to a failure of the specification to supply the best mode. *See* Op. at 111; FF Section V C.

13. It has been established by at least a preponderance of the evidence that the accused products infringe the asserted claims of the '825 patent. *See* Op. at 117; FF Section VI B.

14. It has not been established by clear and convincing evidence that the asserted claims of the '825 patent are invalid due to anticipation or obviousness. *See* Op. at 124; FF Section VI C.

15. It has been established by at least a preponderance of the evidence that the accused products infringe the asserted claims of the '764 patent. *See* Op. at 134; FF VII B.

16. It has not been established by clear and convincing evidence that any asserted claim of the '764 patent is invalid due to anticipation. *See* Op. at 136; FF Section VII C.

17. It has not been established by clear and convincing evidence that any asserted claim of the '764 patent is invalid due to obviousness. *See* Op. at 138; FF Section VII C.

18. The domestic industry requirement of section 337 has been satisfied. *See* Op. at 138; FF Section VIII.

19. The asserted patents are unenforceable due to patent misuse. Op. at 182, 221; FF

Section IX.

INITIAL DETERMINATION AND ORDER

Based on the foregoing opinion, findings of fact, conclusions of law, the evidence, and the record as a whole, and having considered all pleadings and arguments, including the proposed findings of fact and conclusions of law, it is the Administrative Law Judge's INITIAL DETERMINATION ("ID") that no violation of section 337 of the Tariff Act of 1930, as amended, has occurred in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain recordable compact discs or rewritable compact discs by reason of infringement of claims 1, 5, or 6 of U.S. Letters Patent 4,807,209, claim 11 of U.S. Letters Patent 4,962,493, claims 1, 2, or 3 of U.S. Letters Patent 4,972,401, claims 1, 3, or 4 of U.S. Letters Patent 5,023,856, claims 1-5 or 6 of U.S. Letters Patent 4,999,825, or claims 20, 23-33, or 34 of U.S. Letters Patent 5,418,764.

The Administrative Law Judge hereby CERTIFIES to the Commission this ID, together with the record of the hearing in this investigation consisting of the following:

1. The transcript of the hearing, with appropriate corrections as may hereafter be ordered by the Administrative Law Judge; and further,
2. The exhibits accepted into evidence in this investigation as listed in the attached exhibit lists, and JX-1C (which contains certain deposition transcripts) admitted after the close of the hearing.

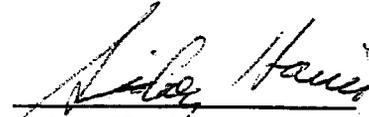
In accordance with 19 C.F.R. § 210.39(c), all material found to be confidential by the Administrative Law Judge under 19 C.F.R. § 210.5 is to be given *in camera* treatment.

The Secretary shall serve a public version of this ID upon all parties of record and the confidential version upon counsel who are signatories to the Protective Order (Order No. 1)

issued by the Administrative Law Judge in this investigation, and upon the Commission investigative attorney.

To expedite service of the public version, counsel are hereby ORDERED to serve on the Administrative Law Judge by no later than November 17, 2003, a copy of this ID with those sections considered by the party to be confidential bracketed in red, accompanied by a list indicating each page on which such a bracket is found.

Pursuant to 19 C.F.R. § 210.42(h), this ID shall become the determination of the Commission unless a party files a petition for review pursuant to § 210.43(a) or the Commission, pursuant to § 210.44, orders on its own motion a review of the ID or certain issues herein.


Sidney Harris
Administrative Law Judge

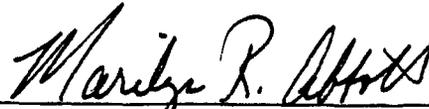
Issued: October 24, 2003

**CERTAIN RECORDABLE COMPACT
DISCS AND REWRITABLE COMPACT
DISCS**

INV. NO. 337-TA-474

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached Order was served upon
Rett V. Snotherly, Esq. and upon the following parties via first class mail, and air mail where
necessary, on December 10, 2003.



Marilyn R. Abbott, Secretary
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**CERTAIN RECORDABLE COMPACT
DISCS AND REWRITABLE COMPACT
DISCS**

INV. NO. 337-TA-474

Page 2

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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

03 DEC 1 2 15 PM '93

In the Matter of

**CERTAIN RECORDABLE COMPACT
DISCS AND REWRITABLE COMPACT
DISCS**

Investigation No. 337-TA-474

**Order No. 32: Granting Respondents' Motion to Preclude Complainant from
Asserting Unclean Hands Against Respondents**

The Complainant, Philips Corporation ("Philips"), alleges in this investigation that the respondents, Princo Corporation ("Princo Taiwan"), Princo America Corporation ("Princo America"), GigaStorage Corporation Taiwan ("Gigastorage Taiwan"), GigaStorage Corporation USA, and Linberg Enterprise Inc. ("Linberg")(collectively, "Respondents"), manufacture, import and/or sell recordable compact discs ("CD-Rs") and rewritable compact discs ("CD-RWs") that infringe six U.S. patents. As an affirmative defense to Philips' infringement allegations, Respondents allege that with respect to each asserted patent, Philips is engaged in patent misuse, and that therefore Philip's asserted patents are unenforceable and no finding of infringement can be made.

Philips argued in its Prehearing Brief that Respondents should be prevented from asserting the equitable defense of patent misuse because they have "unclean hands." See Philips' Prehearing Brief at 162-72. Philips alleged that "Respondents" (or at least Princo Taiwan and Gigastorage Taiwan) unlawfully formed a consortium or "monopsony" with other Taiwanese

manufacturers in order to force Philips to agree to their licensing terms. Philips also alleged that Respondents gave related evasive and misleading deposition testimony.

During the hearing on the question of violation of section 337 of the Tariff Act of 1930 (held June 10 through 20, 2003), Philips expanded its arguments concerning Respondents' alleged unclean hands to include violations of the North American Free Trade Act ("NAFTA") and the supplying of copyright pirates. Philips also offered evidence allegedly relevant to its unclean hands arguments.

On June 16, 2003 (during the hearing), Respondents filed their Motion *in Limine* to Preclude U.S. Philips Corp. From Asserting Its Unclean Hands Counter-Defense. Motion Docket No. 474-64. Respondents argue that Philips should be precluded from asserting unclean hands because: (1) Philips failed to notify Respondents of the counter defense, particularly in response to Respondents' Interrogatory No. 158,¹ a response to which was compelled by Order No. 8; (2) there has been no allegation that respondent Linberg has unclean hands. Thus, even if the Taiwanese respondents and their related United States corporations are barred due to unclean hands, a patent misuse defense should go forward, and any Philips patent found to be subject to misuse would be unenforceable as to Linberg or any other party; and finally, (3) even if Respondents had unclean hands, public policy, as supported by case law, would require that Philips be prevented from enforcing patents while engaged in patent misuse.²

¹ Interrogatory No. 158 requested Philips to "[i]dentify and describe your response(s) to the patent misuse defense Princo, Gigastorage, and Linberg have asserted in their responses to the complaint, and describe the facts and circumstances that support each of your responses."

² On June 16, 2003, Respondents also filed their Motion for a shortened response time in which they requested expedited consideration of their Motion *in Limine*, so that the parties would know prior to the close of the hearing whether or not to include a discussion of unclean hands in

On June 17, 2003, Respondents filed their Motion to Supplement the Motion *in Limine*. Motion Docket No. 474-66. Motion No. 474-66 for leave to supplement is GRANTED. In their short Supplement, Respondents note that they deny Philips' allegations of misconduct and would be fully prepared to contest those allegations on the merits, yet even if all Respondents were barred from asserting patent misuse as a defense, the Administrative Law Judge should *sua sponte* refuse to enforce patents that are misused. *See* Respondents' Supplement at 1-2 (quoting *Texas Instruments, Inc. V. Hyundai Electronics Indus., Co.*, 191 F.R.D. 119, 124 (E.D. Texas 1992)).

On June 18, 2003, Philips filed its Response in Opposition to Respondents' Motion *in Limine*. Philips argues that Respondents misapprehend the unclean hands doctrine, which is not properly characterized as a "counter defense," but rather as a fundamental principle of equity jurisprudence. Philips argues, among other things, that in *Atari Games Corp. V. Nintendo of America, Inc.*, 975 F.2d 832 (Fed. Cir. 1992), the Court of Appeals for the Federal Circuit found that a copyright misuse defense derived from the same principles, purpose and policy as the patent misuse defense, and found that unclean hands precluded a defendant from invoking the equitable defense of copyright misuse. Thus, Philips argues, as a threshold matter, there must be an equitable entitlement for Respondents to raise their misuse defense. Philips argues that there is ample evidence that Respondents have unclean hands. Philips also argues that despite Interrogatory No. 158 and the Order compelling Philips to answer it, Philips was under no

their post-hearing briefs. Motion Docket No. 474-65. Motion No. 474-65 is GRANTED IN PART. Expedited briefing was required from the parties, and the Administrative Law Judge has expedited consideration of this issue in order to assist the parties in preparing their post-hearing briefs and proposed findings.

obligation to reveal its unclean hands arguments to Respondents prior to the filing of its Prehearing Statement.

On June 20, 2003, the Commission Investigative Staff of the Commission's Office of Unfair Import Investigations ("OUII") filed its Response in support of Respondents' Motion to preclude Philips from asserting an unclean hands counter-defense. The Staff argues that the Federal Circuit's *Atari* opinion, raised by Philips, was based on Ninth Circuit law (rather than law that would control the decisions of this Commission),³ and further that the unclean hands analysis contained in *Atari* has been criticized by other courts, including the Fifth Circuit. See OUII Response at 3-4 (citing, *inter alia*, *Alcatel USA, Inc. V. DGI Tech., Inc.*, 166 F.3d 772 (5th Cir. 1999)). The Staff argues that while there are federal court cases on both sides of the issue as to whether unclean hands can be asserted to bar a party's misuse defense, the Staff believes that the cases denying the applicability of unclean hands are better reasoned and should be followed in this case.

On June 23, 2003, Philips filed a Reply to the Commission Investigative Staff's Response in support of Respondents' Motion. Philips argues that the Commission Investigative Staff's analysis of case law, including the Federal Circuit's *Atari* opinion, is incorrect, and further, that as a matter of discretion, a determination of whether the unclean hands doctrine applies to Respondents should be made by the Administrative Law Judge on the merits and not on a motion to strike.

No party has questioned the fact that decisions of the Federal Circuit are generally

³ The Federal Circuit obtained jurisdiction over the appeal in the *Atari* case because the action included patent claims. To resolve issues of copyright law, however, the Federal Circuit applied the law as interpreted by the regional circuits. See *Atari* 975 F.2d at 837.

controlling for the Commission. Indeed, the Federal Circuit is the Commission’s reviewing court for section 337 investigations. *See* 19 U.S.C. § 1337(c); 28 U.S.C. § 1295(a)(6). Furthermore, the Federal Circuit rules upon patent law and certain other intellectual property issues, over which it has exclusive appellate jurisdiction. *See* 28 U.S.C. § 1295(a). However, there is a dispute concerning the nature of the holding of the Federal Circuit in the *Atari* case.

In opposing Respondents’ Motion in *Limine* and the arguments of the Commission Investigative Staff, Philips states that the Federal Circuit “has explored the interaction between the public policies underlying both misuse and unclean hands, and held that an equitable defense of copyright misuse cannot be invoked by one with unclean hands.” Philips’ Reply at 4 (citing *Atari* generally with a particular page citation). Philips discusses the defendant’s misconduct at issue in the *Atari* case, and further states that “[t]he Court also specifically stated that copyright misuse should be treated like patent misuse. Thus *Atari* is the rule governing the decision regarding Respondents’ Motion.” *Id.* at 4-5 (citing *Atari* 975 F.2d at 846). Yet, a reading of the *Atari* opinion shows that it does not contain a detailed exploration of the public policy underlying patent misuse. Rather, the Federal Circuit specifically based its holding on its assessment of the Ninth Circuit law of unclean hands as it applies to copyright.⁴

The *Atari* opinion affirmed a preliminary injunction granted by the United States District Court for the Northern District of California, and addressed five main issues, including patent

⁴ Regardless of how Ninth Circuit law is to be interpreted with respect to copyrights, the relevant fact is that the Federal Circuit looked to Ninth Circuit law to answer the question of whether unclean hands could preclude a defendant from making a copyright misuse defense. The Federal Circuit’s use of that methodology does not indicate much about what the court would do if the law of another circuit were involved, and indicates even less about how the Federal Circuit would rule in a case of alleged patent misuse were it not applying regional circuit law.

misuse. The Federal Circuit devoted six paragraphs of its opinion to the copyright misuse issue, and most of that discussion considered whether or not, in response to allegations of copyright infringement, a copyright misuse defense would be allowed under the law as interpreted by the Ninth Circuit. Having decided that the Ninth Circuit's prior rulings suggest that it would allow a copyright misuse defense in the proper circumstances, the Federal Circuit then set forth additional paragraphs, one paragraph concerning the policy underlying a misuse defense, and one paragraph addressing the unclean hands doctrine in particular. The arguments that the parties make concerning the *Atari* holding are based to a large extent on those two paragraphs, and they are as follows:

Although it has yet to apply the copyright misuse defense, the United States Supreme Court has given at least tacit approval of the defense. *United States v. Loew's, Inc.*, 371 U.S. 38, 83 S.Ct. 97, 9 L.Ed.2d 11 (1962). In *Loew's*, the Court applied principles of patent misuse to a patentee's unlawful tying arrangements and held that recovery for infringement should be denied. The Court then went on to apply, with reference to the copyrights, the same antitrust restrictions on tie-in of sales. Numerous cases suggest that the purpose and policy of patent misuse apply as well to copyright. See, e.g., *Sony Corp. [of Am. v. Universal City Studios]*, 464 U.S. [471] at 439, 104 S.Ct. [774] at 787 [1984]; *Loew's*, 371 U.S. at 44-51, 83 S.Ct. at 101-05; *United States v. Paramount Pictures*, 334 U.S. 131, 157-59, 68 S.Ct. 915, 929-30, 92 L.Ed. 1260 (1948); *Mitchell Bros. [Film Group v. Cinema Adult Theater]*, 604 F.2d [852] at 865 [5th Cir. 1979]; *Bellsouth [Advertising & Publishing v. Donnelly Info. Publishing]*, 933 F.2d [952] at 960-61 [11th Cir. 1991].

In the absence of any statutory entitlement to a copyright misuse defense, however, the defense is solely an equitable doctrine. Any party seeking equitable relief must come to the court with "clean hands." *Keystone Driller Co. v. General Excavator Co.*, 290 U.S. 240, 245, 54 S.Ct. 146, 147, 78 L.Ed. 293 (1933). The Ninth Circuit has noted that the doctrine of unclean hands can also preclude the defense of copyright misuse. *Supermarket of Homes [San Fernando Valley Bd. or Realtors]*, 786 F.2d [1400] at 1408 [9th Cir. 1986].

The district court states, "Atari lied to the Copyright Office in order to obtain the copyrighted 10NES program." *Atari Games v. Nintendo of Am.*, Nos. 88-4805, 89-0027, 89- 0824, slip op. at 14, 1991 WL 57304 (N.D.Cal. Apr. 11, 1991). This record supports the district court's conclusion and suggests that Atari's unclean hands prevent it from invoking equity. Thus, even if the Ninth Circuit permits an equitable copyright misuse defense, Atari appears ineligible to invoke the defense. This court discerns no reversible error in the district court's assessment of Nintendo's likelihood of success on the merits of its copyright infringement claim.

Atari, 975 F.2d at 846-47.

As seen in the above quotation, the Federal Circuit stated in its *Atari* opinion that the purpose and policy of patent misuse applies to copyright in that inasmuch as misuse may be raised as a defense to allegations of patent infringement, misuse should also be permitted as a defense to allegations of copyright infringement.

In the second paragraph quoted above, the Federal Circuit acknowledged that the copyright misuse defense is solely an equitable doctrine, and repeated the maxim that a party seeking equitable relief must come to court with clean hands. Yet, the Federal Circuit's decision to apply the doctrine of unclean hands as a bar to the copyright misuse defense was based specifically on the court's stated analysis that "[t]he Ninth Circuit has noted that the doctrine of unclean hands can also preclude the defense of copyright misuse." 975 F.2d at 846.

While the Federal Circuit has in the past stated that the defense of patent misuse arises in equity,⁵ it is not clear that the Federal Circuit would prevent a party from alleging patent misuse

⁵ For example, in *C.R. Bard, Inc. v. M3 Sys., Inc.*, 157 F.3d 1340 (Fed. Cir. 1998), *cert. denied*, 52 U.S. 1130 (1999), the Federal Circuit stated that "[t]he defense of patent misuse arises from the equitable doctrine of unclean hands, and relates generally to the use of patent rights to obtain or to coerce an unfair commercial advantage." 157 F.3d at 1372. Thus, in that case, the Federal Circuit identified patent misuse as arising in equity, and also described the patent misuse itself as a form of "unclean hands."

if there were proof that the party raising the defense also had unclean hands. In the *Atari* opinion, the Federal Circuit did examine the basic equity principles relating to unclean hands, yet the court took care to rely on the existence of case law in the Ninth Circuit that it deemed adequate to demonstrate that unclean hands bars a copyright misuse defense. With respect to patent misuse, and the affirmative defense raised in this investigation, the circumstances are different. Neither the Commission nor the Federal Circuit is bound to apply the law of any particular circuit in determining whether the unclean hands doctrine should ever bar a patent misuse defense or could preclude Respondents from raising such a patent-based defense in this investigation. However, the issue to be determined here is not unsettled. As pointed out by the Commission Investigative Staff in its Response, there is precedent that is particularly relevant to the issues presented in this investigation.

For example, in *Schreiber v. Dolby Labs., Inc.*, 293 F.3d 1014 (7th Cir. 2002), the patentee and licensor (Schreiber) brought suit against a licensee (Dolby) to enforce a patent licensing agreement. Summary judgment was entered in favor of the licensee, Dolby. The Seventh Circuit affirmed the lower court's ruling, and held that the licensing agreement was unenforceable because it extended beyond the patent terms, and that the doctrine of unclean hands did not apply. The licensor (Schreiber) argued that the licensee (Dolby) had asked Schreiber to stretch out the royalties until the last patent expired, and that by seeking to be relieved of the obligation it requested and accepted, Dolby came to the court with unclean hands. The Seventh Circuit pointed out that such a description of circumstances fits almost any party that comes to court seeking relief from paying royalties subject to an unenforceable and illegal contract, and furthermore, the relief sought is not truly equitable. Dolby simply didn't want to

pay Schreiber under an unlawful agreement, and the Seventh Circuit saw no reason the preclude it from making a defense of patent license illegality.

In addition, the Seventh Circuit observed that case law pertaining to the payment of royalties for expired patents had an “antimonopoly” basis. The court reasoned that inasmuch as the Supreme Court has rejected the defense of *in pari delicto* in antitrust cases, whenever some maxim of equity (such as “unclean hands”) collides with the objectives of antitrust laws, the equity maxim must give way.⁶ *Schreiber*, 293 F.3d at 1022 (citing, *inter alia*, *Perma Life*

⁶ The Seventh Circuit was also reluctant to “get deeper into this thicket of archaic distinctions [between law and equity], since it is apparent that to apply the doctrine of unclean hands in a case such as the present one would fatally undermine the policy of refusing enforcement to contracts for the payment of patent royalties after expiration of the patent.” *Schreiber*, 293 F.3d at 1022.

With respect to the pending Motion, Philips argues that the Taiwanese respondents seek “to invoke this Court’s equitable jurisdiction for their benefit.” *See* Philips Opposition at 3-4. Philips also argues that it was under no obligation to inform Respondents during discovery of its intention to raise the doctrine of “unclean hands” because, among other things, “ignorance of equitable principles is no excuse.” *See Id.* at 14-15. As stated by the Federal Circuit in *Bard*, quoted, *supra*, and other cases, the doctrine of patent misuse arises in principles of equity. Nevertheless, the Administrative Law Judge, having read the Seventh Circuit’s opinion in *Schreiber* is concerned that the Federal Circuit and the Commission might deem it contrary to Commission policy and the Tariff Act to disallow a patent misuse defense in a section 337 investigation based on an attempt to apply traditional equity jurisprudence.

It is also noteworthy that while the defense of patent misuse arises from an equitable doctrine, it is acknowledged in law, and has been defined to some extent by statute, at least in the negative. *See Virginia Panel Corp. v. Mac Panel Co.*, 133 F.3d 860, 872 (Fed. Cir. 1997), *cert. denied*, 525 U.S. 815 (1998)(commenting on the statutory restrictions placed on patent misuse). With respect to patent misuse, the Patent Act provides in pertinent part:

No patent owner otherwise entitled to relief for infringement or contributory infringement of a patent shall be denied relief or deemed guilty of misuse or illegal extension of the patent right by reason of his having done one or more of the following: (1) derived revenue from acts which if performed by another without his consent would constitute contributory infringement of the patent; (2) licensed or authorized another to perform acts which if performed without his consent would constitute contributory infringement of the patent; (3) sought to enforce his patent rights against infringement or contributory infringement; (4) refused to license or use any rights to the patent; or (5) conditioned the license of any rights to the patent or

Mufflers, Inc. v. International Parts Corp., 392 U.S. 134, 137-39 (1968)(rejection of *in pari delicto*), and *General Leaseways, Inc. v. National Truck Leasing Ass'n*, 744 F.2d 588, 597 (7th Cir. 1984)(equity maxims yield to antitrust laws)).

In the *Schreiber* case, the licensor sought to enforce a licensing agreement (presumably to collect money) rather than to obtain an infringement determination. Thus, the licensee did not raise a patent misuse defense. Yet, much of the Seventh Circuit's reasoning deserves consideration in this investigation. In a strict sense, the licensee in *Schreiber* did not come to court in equity, and neither do Respondents come to the Commission seeking relief in equity. The Taiwanese respondents stopped paying royalties in Taiwan and now simply do not want the Commission to grant the request of Philips for an exclusion order and/or cease and desist orders. Moreover, the particular patent misuse allegations made by Respondents are of the antitrust-type, involving questions of patent license pooling and potentially analyses of markets and market power.⁷ Applying the rationale expressed by the Seventh Circuit in *Schreiber*, the doctrine of

the sale of the patented product on the acquisition of a license to rights in another patent or purchase of a separate product, unless, in view of the circumstances, the patent owner has market power in the relevant market for the patent or patented product on which the license or sale is conditioned.

35 U.S.C. § 271(d). *See also* 37 C.F.R. § 404.5(b)(11) (concerning the licensing of government-owned inventions, and recognizing patent misuse)(“Nothing relating to the grant of a license, nor the grant itself, shall be construed to confer upon any person any immunity from or defenses under the antitrust laws or from a charge of patent misuse, and the acquisition and use of rights pursuant to this part shall not be immunized from the operation of state or Federal law by reason of the source of the grant.”).

⁷ A patentee's act may serve as both a violation of antitrust law and patent misuse. A patentee's act may, however, constitute patent misuse without rising to the level of an antitrust violation. *See Senza-Gel Corp. v. Seiffhart*, 803 F.2d 661, 668 (Fed. Cir. 1986)(citing *Zenith Radio Corp. v. Hazeltine Research, Inc.*, 395 U.S. 100, 140 (1969)). Violation of the antitrust laws requires more exacting proof than suffices to demonstrate patent misuse. *Virginia Panel*,

unclean hands, even assuming *arguendo* that it were applicable on the merits, should not bar Respondents from arguing patent misuse in this investigation.

The same conclusion is reached upon consideration of the California District Court's opinion in *In re Napster, Inc.*, 191 F. Supp.2d 1087 (N.D. Cal. 2002), a case raised by the Commission Investigative Staff. *Napster* is a copyright case. It is, however, one of the cases in which a court has reached a decision about the doctrine of unclean hands as applied in the Ninth Circuit that differs from the decision arrived at by the Federal Circuit, and it addresses the same principles raised in *Atari* concerning the unclean hands of those who come to court seeking equitable relief. *See Napster*, 191 F. Supp.2d at 1110. The court in *Napster* concluded that because the plaintiffs (a group of recording companies) sought equitable relief, *Napster's* allegedly improper behavior could not bar its use of equitable defenses, such as copyright misuse. *Id.* In this investigation, if one were to apply traditional equity doctrines, one might surmise that it is Philips which comes to the Commission in search of a form of relief of an equitable nature, and if it is engaged in patent misuse, the Commission should deny an exclusion order or a cease

133 F.3d at 872. The Federal Circuit has held:

Patent misuse is an affirmative defense to an accusation of patent infringement, the successful assertion of which "requires that the alleged infringer show that the patentee has impermissibly broadened the 'physical or temporal scope' of the patent grant with anticompetitive effect." *Windsurfing Int'l, Inc. v. AMF, Inc.*, 782 F.2d 995, 1001, 228 USPQ 562, 566 (Fed.Cir.1986) (quoting *Blonder-Tongue Lab., Inc. v. University of Ill. Found.*, 402 U.S. 313, 343, 91 S.Ct. 1434, 1450, 28 L.Ed.2d 788, 169 USPQ 513, 525 (1971)).

Virginia Panel, 133 F.3d at 869.

and desist order as to any patent thus tainted and rendered unenforceable.⁸

Moreover, the District Court in its *Napster* opinion, noting the Fifth Circuit's concerns in the *Alcatel* case, added further reasoning relating to "an unclean hands bar *specifically* applied to misuse (as opposed to laches or some other equitable defense)." 191 F. Supp. at 1111. The District Court noted that "[c]opyright misuse is distinguishable from other equitable defenses in that it focuses on harm to the public as well as harm to the court's integrity." *Id.* (citing *Precision Instruments*, 324 U.S. at 815 ("[W]here a suit in equity concerns the public interest as well as the private interests of the litigants [unclean hands] assumes even wider and more significant proportions.")). The District Court, in *Napster*, held that "[i]f the ultimate concern of the misuse doctrine is to ensure public access to the fruits of creative energies, then unclean hands should not bar a misuse defense." 191 F. Supp.2d at 1111 (emphasis in original). Indeed, the District Court reasoned that because of the focus on harm to the public as a relevant factor in whether an unclean hands bar to misuse exists, the distinction between whether the plaintiff seeks equitable or legal relief may be of little significance, and possibly the public interest would justify allowing a misuse defense even when the defendants have unclean hands and the plaintiff seeks only legal relief. *See Id.* at 1111 n.18.

In this case, the public interest concerns in not enforcing patents that are misused, in not impeding international commerce based on misused patents, and in not placing the resources of

⁸ As observed, *supra*, attempting to apply traditional notions of entitlement or standing in equity to a section 337 investigation is fraught with complication. Philips points out that the relief it seeks is provided for by statute, i.e., section 337, and thus argues that the Commission Investigative Staff is incorrect in arguing that Philips seeks equitable relief. *See Philips' Reply* at 3. Ultimately, such distinctions may be irrelevant when proper consideration is paid to the public interest concerns at issue and also to the strength of Philips' unclean hands arguments.

the Commission and other government agencies at the disposal of a party engaged in patent misuse require that Respondents be permitted to present evidence and arguments relating to alleged patent misuse, notwithstanding any unclean hands arguments or evidence upon which Philips would rely.

It has been held that ultimately the decision whether to apply unclean hands rests in the discretion of a court, which in this case would imply the Administrative Law Judge or the Commission. *See Napster*, 191 F. Supp.2d at 1112-13 (citing *Precision Instruments*, 324 U.S. at 815; *Washington Capitols Basketball Club, Inc. v. Barry*, 419 F.2d 472, 478 (9th Cir. 1969)); *see also* Philips' Reply at 5 (agreeing that equitable defenses are committed to the discretion of the trial court, albeit urging that in this case the Administrative Law Judge should not strike its unclean hands argument or "counter defense"). Thus, as an alternate basis for deciding whether or not to preclude Philips from raising's Respondents supposedly "unclean hands," it is useful to evaluate some of the major portions of Philips' unclean hands argument on the merits.

As discussed above, Philips' argument concerning unclean hands was not revealed to Respondents, the Commission Investigative Staff or to the Administrative Law Judge until relatively shortly before the hearing, i.e., at the time that Philips filed its Prehearing Brief. Philips also takes the position that the normal rules pertaining to discovery and pleadings do not apply to their unclean hands arguments. Furthermore, Philips' arguments expanded and shifted in emphasis during the course of the hearing. Even at this late date, it is not clear exactly what Philips would argue in its Posthearing brief, or how Respondents or the Staff could effectively counter what Philips might argue, if (especially in the case of the Staff) they chose to do so.

Philips argues that the Taiwanese respondents banded together (under the auspices of a

licensing organization or negotiating agent) in Taiwan to negotiate a pool license with Philips. It is now argued that this was some sort of “group boycott” to form a “monopsony” in order to force Philips’ Dutch parent company and other members of the patent pools (such as the Sony company in Japan) to allow the Taiwanese companies to pay a royalty rate of the licensees’ choosing. It is also clear that Philips did not agree to lower the royalty rate and that ultimately some of the members forming this alleged “monopsony” did take individual licenses from Philips. The effects of this joint negotiation on Philips were limited and temporary, and certainly any effects on United States commerce were extremely remote.

The evidence also showed during the hearing that according to a 2001 decision of a Taiwanese tribunal, the Taiwan Fair Trade Commission, at least one of the patent pools was unlawful because the defendants in that action (Philips, Sony and Taiyo Yuden) “through joint decision on the royalty rate and joint licensing, acquired a dominant position in the CD-R technology patent license market in Taiwan, improperly maintained the royalty rate, refused to provide licensees with important information regarding the license agreement, and prohibited licensees from objecting to the validity of patents, which constituted abuse of their market power,” and thus violated Articles of the Taiwanese Fair Trade Law. Furthermore, the Taiwanese tribunal noted that Philips and other members of the patent pool did not obtain prior approval in Taiwan for their “concerted action.” *See* RX-1871C (Taiwanese Fair Trade Commission decision in translation). It is unclear, therefore, whether the Taiwanese companies did anything improper or illegal in reaction to Philips’ licensing practices in Taiwan. No evidence was offered to establish that anything the Respondents have allegedly done with respect to the alleged Taiwanese monopsony would be illegal in Taiwan. Moreover, there is no evidence

that anything that the Taiwanese companies may have done vis-a-vis Dutch and Japanese companies operating in Taiwan had any effect on the enforcement of United States patents or any effect on United States markets or commerce.⁹ Given the fact that Philips relies on equity to raise its unclean hands arguments, the concerns of the Taiwan Fair Trade Commission tend to justify the acts of joint license negotiation.¹⁰

The Foreign Trade Antitrust Improvements Act concerns the jurisdictional reach of the federal antitrust laws. The FTAIA amended the Sherman Act, and provides that the Sherman Act "shall not apply to conduct" involving trade or commerce with foreign nations unless "such conduct has a direct, substantial, and reasonably foreseeable effect" on trade or commerce in the United States, and "such effect gives rise to a claim" under the provisions of the Sherman Act.

⁹ Such a showing would be necessary to involve the Foreign Trade Antitrust Improvements Act (or "FTAIA"), 15 U.S.C. § 6a.

¹⁰ These facts stand in sharp contrast to those in *Texas Instruments, Inc. v. Hyundai Electronics Indus.*, 49 F. Supp.2d 893 (E.D. Tex. 1999), relied upon in part by Philips, in which the District Court allowed the doctrine of unclean hands to bar a patent misuse defense. The unclean hands issues were numerous and clear-cut to the District Court in that case, including the attempt to base the misuse defense on grounds that were already rejected. *Id.* at 918. The District Court, however, also found that the defendant "significantly failed to make out the essential elements of its equitable patent-misuse defense." In light of that failure, and for other reasons, including unclean hands, the District Court struck the affirmative defense of patent misuse. *Id.* at 919.

The *TI* case provides little guidance in this investigation. Although the District Court in the *TI* case relied upon the *Keystone Driller* maxim of equity jurisprudence that one who comes to court in equity must have clean hands, the District Court did not find it necessary to consider the public or other interest in precluding the defendant from pursuing its patent misuse defense. *See Id.* at 917. That could be in large part because of the nature of the supposed misuse defense (which did not involve patent pools). The District Court found that the defendants had relied on incorrect, if not outdated, law pertaining to tying, and failed to establish other necessary facts relevant to the proper legal standard. The District Court employed harsh language to describe the defendant's actions with respect to the underlying cause of action, the defendant's attempt to delay the proceeding and to raise patent misuse. The District Court viewed the defendant's patent misuse arguments to be frivolous or nearly so. *See Id.* at 918-19.

Section 6a(1) of FTAIA thus makes it clear that United States federal antitrust laws regulate foreign conduct only where that conduct has the proscribed "effects" on domestic or foreign United States commerce. Similarly, section § 6a(2) of FTAIA provides that the antitrust laws are inapplicable unless the effect of extraterritorial conduct on United States commerce "gives rise to a claim" under the Sherman Act. *See Empagran S.A. v. Hoffman-LaRoche, Ltd.*, 315 F.3d 338, 340 (D.C. Cir. 2003).¹¹ Philips has presented no evidence that Respondents' alleged misconduct in Taiwan had a direct, substantial, and reasonably foreseeable effect – or indeed any effect – on trade or commerce in the United States, and that Respondents' acts would give rise to a claim under the provisions of the Sherman Act.

The Administrative Law Judge finds that there would be no equitable or legal basis for finding that the actions of any or all respondents would support a claim of unclean hands with respect to their taking, refusing to take or negotiating a license in Taiwan.¹²

¹¹ In *Turicentro, S.A. v. American Airlines, Inc.*, 303 F.3d 293 (3rd Cir. 2002), the Court of Appeals for the Third Circuit held that the FTAIA "does not designate the geographical effect of defendants' allegedly illegal activity." Yet, even if certain activities might have taken place in the United States with respect to commissions paid outside the country, they are "irrelevant if the economic consequences are not felt in the United States economy." 303 F.3d at 305.

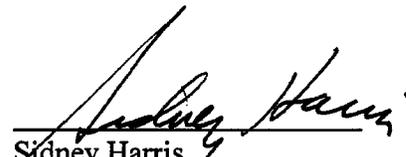
¹² It is also important to point out that the evidence relating to alleged NAFTA violations and the supplying of pirates is problematic. As indicated, *supra*, Philips argues that it was under no obligation to inform Respondents of its unclean hands arguments until late in the proceedings. However, by delaying any indication that unclean hands would be raised, Respondents and the Commission Investigative Staff were taken by surprise with little time to respond to Philips' accusations. Furthermore, evidence relating to NAFTA and alleged piracy, including information about an allegedly fraudulent Princo America invoice seized in Mexico, developed during the hearing and in certain hearing testimony. Because Philips did not avail itself of the discovery and notice provisions developed under the Federal Rules of Civil Procedure and analogous Commission Rules, the lack of preparation by all sides resulted in a record that is meager, incomplete and unfair to other parties. Consequently, based on this evidence, the Administrative Law Judge would not render an opinion finding Respondents to have unclean hands.

Accordingly, Respondents Philips' Motion No. 474-64 is GRANTED.

The parties need not address the issues raised by Philips in its Prehearing Brief and the hearing with respect to Respondents' allegedly unclean hands. The issue of Philips' alleged patent misuse should be addressed by the parties in their post-hearing briefs and proposed findings.

By July 8, 2003, each party shall submit to the Office of the Administrative Law Judge a statement as to whether or not it seeks to have any portion of this document deleted from the public version thereof. The parties' submissions may be made by facsimile and/or hard copy. By the aforementioned date, any party seeking to have any portion of this document deleted from the public version must submit to this Office a copy of this document with red brackets indicating any portion asserted to contain confidential business information. The parties' submissions concerning the public version of this document need not be filed with the Commission Secretary.

So ORDERED.


Sidney Harris
Administrative Law Judge

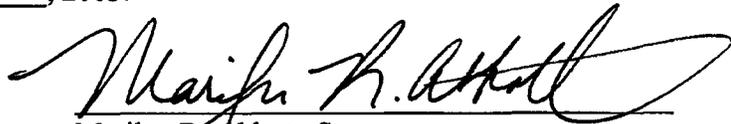
Issued: June 30, 2003

**CERTAIN RECORDABLE COMPACT
DISCS AND REWRITABLE COMPACT
DISCS**

INV. NO. 337-TA-474

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached Order was served upon Rett V. Snotherly, Esq. and upon the following parties via first class mail, and air mail where necessary, on December 2, 2003.



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